# ASTM E119 COMPLIANCE FOR FIRE RATED ASSEMBLIES: ENGINEERING JUDGEMENTS ON USING MAGNUM BOARD®

**Prepared for**

**Green Building Solutions, LLC & Magnum Board Products, LLC**

**Telgian E&C, Project No. 34667.200.100**

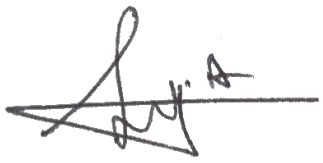
**Date: 02.23.2026**

**Revision 1.1**

**Prepared by**

**Saleel Anthrathodiyil, PE, CFPS, CFPE**

## 1. Report Review and Approval

| | |
|---|---|
| **Date** | 02/23/2026 |
| **Revision** | 02/12/2026 – Rev 1.0, Initial Submission |
| | 02/23/2026 – Rev 1.1, Client comments & updates |
| **Prepared & submitted by:** | Saleel Anthrathodiyil, PE, CFPS, CFPE<br>santhrathodiyil@telgian.com |
| Title | Team Lead, Fire Protection Engineer |
| Signature |  |
| **Peer reviewed by:** | Alexander Gonzales, PE, CFPS |
| Title | Team Lead, Engineering & Consulting |

## Table of Contents

1. Report Review and Approval ..... 2
2. Executive Summary ..... 5
3. Introduction ..... 9
4. Reviewed Documents ..... 10
5. Magnum Board ..... 12
6. Literature Review of MgO-based Building Products and Thermal Characteristics ..... 13
7. Characteristics of Magnum Board ® ..... 17
8. Review of Past Test Data ..... 19
8.1. 2- Hour ASTM E119 Tests: Magnum Sheathing ASTM E119 Test Record Review (Telgian E&C, Rev 2.0) ..... 20
8.2. Hour ASTM E119 Test: Fire Performance Evaluation of a Magnum® Board Wall Assembly 24
8.3. Caloric Content of "Magnum Board" / ASTM E1354 Testing of "Magnum Board ..... 27
8.4. MgO Board (ULC S135-04 Cone Calorimeter / Oxygen Consumption Calorimeter) (Intertek Verification Center) ..... 28
8.5. Surface Burning Characteristics of a Nominal 12 mm Magnum Board (ASTM E84-10) ... 28
8.6. Fire Performance Evaluation of Magnum Board Tested in Accordance with ASTM E 136 29
8.7. Investigation of the Surface Burning Characteristics of a 6 mm Magnum Board ..... 30
8.8. ULC Online Directory Listing – Mineral and Fibre Boards (BQXRC.R26120) ..... 30
8.9. Fire Test Investigation of a Non-Load bearing 12 mm Magnum Wall: UL Fire Test ..... 30
9. ASTM E2032: Standard Practice for Extension of Data from Fire Resistance Tests Conducted in Accordance with ASTM E 119 ..... 32
10. Fire-Rated Assemblies ..... 33
10.1. UL Design L528 – Reference Assembly ..... 34
10.2. UL Design L525 – Reference Assembly ..... 35
10.3. UL Design L502 – Reference Assembly ..... 37
10.4. UL Design M500 – Reference Assembly ..... 39
10.5. UL Design P522 – Reference Assembly (Note the fire rating) ..... 41
10.6. UL Design H509 – Reference Assembly ..... 42
10.7. UL Design G556 – Reference Assembly ..... 44
10.8. UL Design H515 – Reference Assembly ..... 46
10.9. UL Design U419 – Reference Assembly ..... 48

10.10. UL Design P561 – Reference Assembly ..... 50
11. Conclusions ..... 52
12. Appendix ..... 56

## 2. Executive Summary

Telgian Engineering & Consulting (Telgian E&C) prepared this engineering judgment report to evaluate the suitability of Magnum Board® (MgO-based board product) as a substituted component within selected similar UL fire-resistance designs where the project requires an alternate board material while maintaining the assembly intent. The report is prepared consistent with the International Building Code (IBC) provisions that allow alternative materials/methods and analytical substantiation of fire-resistance, including IBC Section 104.11 (Alternative materials, design and methods of construction and equipment) and the fire-resistance determination and alternative methods provisions in IBC Chapter 7, including IBC 703.2 and its subsections addressing fire-resistance rating determination by testing, prescriptive methods, and approved alternative methods (e.g., 703.2.2, 703.2.3, as applicable).

The UL reference assemblies evaluated in this report include L528, L525, L502, M500, P522, H509, G556, H515, U419, and P561, and the judgments address only the specific substitutions identified for each design.

Across the evaluated UL designs, the proposed substitutions generally fall into two categories: (1) substitution of Magnum Board for floor/roof deck or floor membrane elements (including tongue-and-groove panel applications where shown), and (2) substitution of Magnum Board for the fire-exposed protective membrane (ceiling or wall membrane) that functions as the assembly's initial thermal and integrity barrier. Where used as a protective membrane, the proposed substitution matrix provides single-layer 12 mm Magnum Board for 1-hour objectives and either 2 × 12 mm Magnum Board or 16 mm Magnum Board for objectives up to 2 hours, as applicable to the specific UL reference design and required rating. For floor/roof deck substitutions, the judgment is based on preserving the listed construction features that control assembly behavior (continuity, joint staggering, and a fastening schedule not less robust than the listed concept), without introducing additional unlisted changes that could increase deflection and impose greater demand on the fire-exposed membrane during furnace exposure.

The technical basis for the judgments includes both product-level and selected assembly-level fire-performance evidence, supplemented by published literature on MgO (MOC) boards. The product-level evidence reviewed indicates Magnum Board exhibits noncombustibility (ASTM E136), very low surface burning characteristics (ASTM E84 and CAN/ULC-S102), and low heat and smoke release under cone calorimetry (ASTM E1354/CAN/ULC-S135) relative to benchmark criteria referenced in the underlying reports. Assembly-level evidence includes full-scale ASTM E119/UL 263 wall testing demonstrating 1-hour fire endurance with successful hose-stream performance, and an archived-record review indicating performance consistent with 2-hour thermal criteria for a mechanically fastened, joint-finished Magnum Board wall configuration (as documented in the reviewed records).

The literature review supports the general engineering premise that MgO-based boards can function as credible fire-exposed protective linings when integrity and detailing are maintained (noncombustible refractory behavior and insulating characteristics), while also emphasizing that "MgO board" performance can be manufacturer- and formulation-dependent; therefore, conclusions must remain tied to product-specific evidence and consistent manufacturing/quality control.

This report's judgments are limited to fire-resistance considerations within the scope of the reviewed evidence set. Standardized fire tests evaluate specimens in the condition tested and do not, by themselves, establish long-term durability or in-service performance under post-installation conditions (e.g., moisture exposure, corrosion potential, aging, or workmanship variability) unless such conditions are explicitly incorporated into the specimen and/or pre-test conditioning; the reviewed evidence does not include such data and these post-installation effects were not evaluated. All non-substituted design requirements remain in effect and must be followed without modification, including framing member type and spacing, insulation provisions, support/channel systems, fastener type and spacing, and joint treatment requirements. All Magnum Board ® components and related fasteners/joint treatments shall be installed in accordance with the manufacturer's published guidelines and instructions, and in a manner consistent with the applicable UL design construction details, deviations may affect performance and are outside the scope of this opinion.

This document represents an expert technical opinion regarding the expected fire-resistance performance of the identified material and assemblies, based on the referenced test evidence and the limitations stated herein. Final acceptance and confirmation of suitability for the intended project conditions remain with the Authority Having Jurisdiction (AHJ) and the end user

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Expected Fire Rating |
|---|---|---|---|---|
| P561 (LGS Assembly) | N/A | '2' – Roof deck | 18mm 4x8 Square Edge Magnum Board | 1 - Hour |
| | N/A | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board<br>Or<br>16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| U419 (LGS Assembly) | System - 1 | '5' – Wall sides | Side 1 - 12 mm 4 X 8 Magnum Board<br>**And**<br>Side 2 - 12 mm 4 X 8 Magnum Board | 1 - Hour |

| | | | | |
|---|---|---|---|---|
| | | | Side 1 – 2 X 12 mm 4 X 8 Magnum Board **And** Side 2 – 2 X 12 mm 4 X 8 Magnum Board | |
| | | | Side 1 – 16 mm 4 X 8 Magnum Board **And** Side 2 – 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| H515 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm 4 X 8 T & G Magnum Board | 1 - Hour |
| | | '5' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| G556 (LGS Assembly) | System - A | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour |
| | | '6' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| H509 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour |
| | | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| P522 (Wood Assembly) | N/A | '1' - Roof Membrane | 18 mm 4 X 8 Square Edge Magnum Board for roof decking | 1 - Hour |
| | N/A | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or | Up to 2 – Hours *(Note: Current UL Listing is only for 1 hr)* |

| | | | | |
|---|---|---|---|---|
| | | | 16 mm 4 X 8 Magnum Board | |
| M500 (Wood Assembly) | System No -10 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 2 - Hour |
| | System No -09 | | 12 mm 4 x 8 Square Edge Magnum Board over wood | |
| | N/A | '3' – Ceiling Membrane | 16 mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L502 (Wood Assembly) | System No -17 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | N/A | '7' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L525 (Wood Assembly) | System No -16 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | System No -17 | | 12mm 4 x 8 Square Edge Magnum Board over wood | |
| | N/A | '14' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L528 (Wood Assembly) | System No -24, 34 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | N/A | '4' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |

*Table 1 Summary of evaluated modifications*

## 3. Introduction

Telgian Engineering & Consulting (Telgian) was engaged to provide a technical opinion (engineering judgement) on the use of Magnum Board ® for fire-rated assemblies complying with ASTM E119, similar to 10 different Underwriters Laboratories (UL) assemblies (L528, L525, L502, M500, P500, H509, G556, H515, U419 & P561), including 12 different designs by Magnum Board Product (MBP) herein, referred to as client. Because full-scale fire testing of every possible combination of materials, layer configurations, and design permutations is not reasonably achievable, an engineering judgment approach is used to evaluate limited, clearly defined substitutions using representative test evidence and established code-accepted evaluation principles

International Building Code (IBC), Section 703.2.2, Analytical Methods (4) and 703.2.3, Approved Alternate Method, permit the use of assemblies that have not been tested as per ASTM E119, exactly as constructed, provided that testing has been conducted on representative assemblies and an engineering analysis demonstrates that the proposed alternative can be expected to perform at least as well as the tested assembly for the required rating. This approach is also in alignment with the alternative materials and methods provisions of IBC 104.11 (2021 IBC) and IBC 104.11 (2024 IBC).

The engineering judgement is based on multiple fire tests conducted on Magnum boards, including ASTM E84, E136 & ASTM E119. Magnum Board® is a glass-fiber–reinforced magnesium oxide (MgO) cement board used as a noncombustible sheathing and fire-protective membrane in rated building assemblies. The product has been evaluated through both material-level fire testing, including ASTM E136 (noncombustibility), ASTM E84 (surface burning characteristics: flame spread and smoke development), and ULC S135 (heat release and smoke measurements by cone calorimetry), as well as full-scale fire-resistance testing of representative steel-stud wall assemblies in accordance with ASTM E119 / ANSI/UL 263, with Magnum Board installed as the face layers. A detailed review of the test reports and other applicable standards and literature is provided in the later section of this report.

## 4. Reviewed Documents

The following applicable codes, referenced documents, and references have been utilized in the preparation of this report to ensure compliance with industry standards, regulatory requirements, and best practices.

| Category | Document Name | Assembly | Date | Remarks |
|---|---|---|---|---|
| Engineering Analysis | Magnum Sheathing ASTM E119 Test Record Review– E 119 2- Hour Assembly | 16-mm Magnum Board | 11.10.2025 | 2-hour fire rating for 16mm Magnum Board on each side |
| ASTM E1354 - Report No. 13-002-529(A) | Caloric Content of "Magnum Board" | 3-mm Magnum Board Assembly | 11/04/2013 | Determination of Effective Heat of Combustion according to ULC-S135-04 |
| ULC S135-04, Intertek Report No. 101433709MID-001Rev1 | Report of Testing MgO Board for compliance with the applicable requirements of the following criteria: ULC S135-04 | 100mm x 100mm x 15mm | 11/04/2013 | Test report |
| Test Video Recording | 2 Hr. Fire Wall Test Hose Stream – ASTM E119 2 hr Test | 16-mm Magnum Board | - | Hose stream test - Duration 00:05:13 |
| Test Video Recording | 2 Hr. full video – ASTM E119 2 hr Test | 16-mm Magnum Board | - | Test cam facing the unexposed surface – 02:00:20 |
| ASTM Standard | ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials | - | - | N/A |
| ASTM Standard | ASTM E2032- Standard Practice for Extension of Data from Fire Resistance Tests Conducted in Accordance with ASTM E 119 | - | - | N/A |
| Certified Submittal Sheet | PRODUCT SUBMITTAL SHEET – Issue 091125.1544 | - | - | N/A |
| ASTM Test Report | ASTM E84- 10: Investigation of Surface Burning Characteristics of Nominal 12mm Magnum Board | 12 mm | 07/04/2010 | N/A |

| | | | | |
|---|---|---|---|---|
| ASTM Test Report | ASTM E119 – 12 mm Magnum Board | 12 mm | 01/05/2010 | 1 hr. Assembly |
| UL Report | UL 263 – 12mm Magnum Board | 12 mm | 01/05/2010 | 1 hr. Assembly |
| UL Report | Surface Burning Characteristics - Magnum Board | 20 mm & 4 mm | 04/27/2011 | |
| ASTM Test Report | ASTM E136 – Magnum Board | 40 X 40 X 50 mm | 10/17/2006 | |
| ASTM Test Report | ASTM E84 Magnum Board | 6 mm | 05/05/2006 | |

*Table 2 Documents reviewed for this report*

## 5. Magnum Board

'MgO board' is not a single standardized product. It typically refers to an inorganic composite board whose binder is a magnesium-based cement system. Two broad chemistries are common in practice: magnesium oxychloride (MOC, chloride-based) and magnesium oxysulfate (MOS, sulfate-based). Boards typically include glass-fiber mesh facers and mineral fillers.

Product variability is a major characteristic in the Magnesium oxide board market, and therefore, these results and discussion in this report should not be extrapolated to any similar MgO-based products, but only the **sole proprietary information of Green Building Solutions, LLC, and the testing on the Magnum Board ®, produced by Magnum Board Products, LLC.**

Magnum Board is a paperless, mineral-based magnesium oxide (MgO) cement board intended for use in building assemblies. It is manufactured as a fiberglass-mesh–reinforced sheet, and its typical formulation includes magnesium oxide with a magnesium-chloride–based binder system, mineral fillers such as perlite, and fiber components such as cellulose, along with proprietary additives. This composition produces a rigid, inorganic panel that is distinct from paper-faced gypsum board and traditional wood-based sheathing.

Magnum Board is supplied as flat sheets in common construction panel sizes and thicknesses, including widely used 12 mm, 16 mm, and 18 mm panels reinforced with fiberglass mesh on both faces. As a cementitious MgO board, it is intended to provide a stable substrate and protective panel where noncombustible construction materials and robust performance are desired, with installation and detailing performed in accordance with the applicable manufacturer’s product evaluation/installation requirements for the specific application.

## 6. Literature Review of MgO-based Building Products and Thermal Characteristics

MgO boards are fundamentally non-combustible; the core material (magnesium cement plus mineral fillers) will not ignite or contribute fuel to a fire. Unlike gypsum, standard MgO boards do not contain large amounts of chemically bound water specifically for fire protection (although magnesium oxychloride and oxysulfate cements do include water of hydration in their crystal structure).

Švajlenka et al. conducted a detailed study of MgO-based materials. The fire resistance of MgO boards depends on the stability of the magnesium cement matrix and the board's physical integrity under heat. Magnesium oxychloride (MOC) boards, made with $MgCl_2$ brine, form hydrated magnesium chlorides (such as 5 $Mg(OH)_2 \cdot MgCl_2 \cdot 8H_2O$, known as "5-phase"). These hydrates will break down at elevated temperatures, releasing water and eventually leaving magnesium oxide and magnesium hydroxide residues. Notably, such boards can undergo significant mass loss upon heating. Experimental thermal analysis showed that MgO boards lost ~40–50% of their weight at high temperatures, whereas gypsum boards lost only ~15–25% under the same conditions. The study also notes that findings on the thermal-technical properties of MgO boards were similar to those in their research but not identical. This is because manufacturers employ different formulations to produce MgO boards, resulting in varying properties. If the board remains intact, it acts as a robust refractory barrier (magnesium oxide itself has a very high melting point and was historically used as a refractory material. Overall, the fire resistance mechanism of MgO boards can be summarized as: structural heat barrier (the board does not burn and can shield against flame and heat), potentially some endothermic reaction (dehydration of cement hydrates) at higher temperatures, which slows heat transfer, and thermal stability of the remaining magnesium oxide matrix. The critical factor is maintaining the board's integrity. The study concluded that MgO boards for lining structures built using the dry construction method bring certain benefits compared to traditional materials, especially in terms of energy accumulation and fire resistance.

For their thermal modelling inputs, the paper uses representative properties showing MgO-based board thermal conductivity around, $\lambda \approx 0.22$ W/(m·K) (at density ~800 kg/m³), compared with gypsum board at $\lambda \approx 0.58$ W/(m·K) (density ~1200 kg/m³). This supports the argument that MgO boards can function as a protective membrane by slowing heat transfer through lining layers, which is directly relevant to delaying unexposed-face temperature rise in fire-exposed assemblies. In the authors' comparative wall modelling for dry construction variants, the MgO-lined external-wall variant is reported as performing better than the gypsum-lined variant in the selected R/U outputs (even if differences are modest for single-layer linings). The work cites past studies (Martins et al.) comparing magnesium boards against commonly used cement/fiber boards in LSF applications and report that

magnesium-based boards had better dimensional stability and lower thermal conductivity, and that thermal-performance measurements indicated magnesium boards can improve the thermal performance of the construction environment.[1]

*Chen et al. (2015)* and colleagues investigated load-bearing cold-formed steel walls with double-layer cladding configurations, comparing gypsum board Vs. a magnesium board product (referred to as a "Bolivian magnesium board" in the study) along with other panels. In their fire experiments, wall assemblies sheathed with the MgO boards achieved higher fire-resistance times than similar assemblies with gypsum drywall. The superior performance was attributed to the MgO boards not burning or falling off as quickly, especially when used as the base layer in a multi-layer system. The outcome led the authors to recommend *"gypsum boards should be replaced with MgO boards to serve as the base layer"* in multi-layer wall systems for improved fire resistance[2]

Ahmad et al. (2025) investigated hybrid fibre-reinforced magnesium oxychloride cement (MOC) composites intended for non-structural cladding and report that the material exhibited non-combustibility, good insulating behavior, and excellent resistance to spalling, all of which are desirable properties for a protective membrane that helps limit heat transfer and maintain surface integrity during fire exposure. The study also shows that formulation matters, modifying the MOC system (e.g., incorporating supplementary cementitious materials such as Benefits of using ground granulated blast furnace slag (GGBFS) and metakaolin) influenced the fire/thermal performance, with the authors noting improved fire resistance and thermal performance for a mix containing ~30% GGBFS, highlighting that MgO products should not be treated as interchangeable without confirming composition and performance through actual fire testing.[3]

Maier et al. (2022) summarize work on magnesium oxychloride cement (MOC) (an MgO-based binder commonly used in "MgO boards") and identify fire-related performance as a recurring advantage in the literature. The authors note that, due to properties such as thermal insulation and fire resistance, MOC has been used in applications including fire protection and wall panels, and they specifically state that MOC boards can offer greater

[1] Švajlenka, J.; Kozlovská, M.; Mokrenko, D. MgO-Based Board Materials for Dry Construction Are a Tool for More Sustainable Constructions—Literature Study and Thermal Analysis of Different Wall Compositions. Sustainability 2021, 13, 12193. https://doi.org/10.3390/su132112193

[2] Jihong Ye, Xingxing Wang, Hongyuan Jia, Mengyuan Zhao, Cyclic performance of cold-formed steel shear walls sheathed with double-layer wallboards on both sides, Thin-Walled Structures, Volume 92, 2015, Pages 146-159, ISSN 0263-8231, https://doi.org/10.1016/j.tws.2015.03.005.

[3] Farhan Ahmad, S. Rawat, Richard (Chunhui) Yang, Lihai Zhang, Y.X. Zhang, Fire resistance and thermal performance of hybrid fibre-reinforced magnesium oxychloride cement-based composites, Construction and Building Materials, Volume 472, 2025, 140867, ISSN 0950-0618, https://doi.org/10.1016/j.conbuildmat.2025.140867.

fire resistance and lower thermal conductivity compared with gypsum- or fiber-based boards, supporting the engineering rationale for using MgO/MOC products as protective linings that limit heat transfer in fire-exposed constructions. At the same time, the review also notes a limitation like water resistance, with reported cases of severe strength loss after prolonged water exposure, and related issues such as moisture absorption/efflorescence and potential corrosion concerns.[4]

Aiken et al. (2020) provide a useful reference in their study on why MgO boards are often considered attractive for fire-rated construction, while also clearly highlighting the importance of product selection and service conditions. In their review of MgO/MOC boards as a building sheeting product, the authors note that magnesium oxychloride cements are widely reported to have advantages such as good fire resistance and low thermal conductivity, and they state that a key claimed advantage of magnesium oxychloride boards is fire resistance that is considerably better than gypsum plasterboard in some cases. The paper also focuses on durability & documents real cases of moisture-related problems (the "crying/sweating" phenomenon) and notes the challenges of significant variability among boards from different manufacturers, with some boards deteriorating under high humidity while others remain resistant over long exposure periods. The paper, therefore, supports a balanced engineering approach. MgO/MOC boards can be justified as a fire-resistant lining material in principle, but fire-performance claims must be supported by confirmed product identity and quality, and by appropriate moisture detailing controls, because durability and chloride-related corrosion risk can undermine real-world suitability even if the material is fire-resistant.[5]

Dias, Keerthan, and Mahendran (2019) provide useful literature context for MgO boards in fire-rated light steel framing, even though their experimental program mainly focuses on steel and gypsum plasterboard sheathed non-loadbearing LSF walls. They summarize prior research showing that LSF wall fire performance depends strongly on the lining/sheathing material and is typically assessed using standard fire criteria for integrity and insulation (e.g., insulation failure when the average unexposed temperature rise exceeds ~140 °C or the maximum exceeds ~180 °C). The paper notes that some researchers (e.g., Chen et al.) reported Bolivian magnesium board sheathed loadbearing walls performing better than gypsum and calcium silicate, while other studies reported

[4] Maier A, Manea DL. Perspective of Using Magnesium Oxychloride Cement (MOC) and Wood as a Composite Building Material: A Bibliometric Literature Review. Materials (Basel). 2022 Feb 26;15(5):1772. doi: 10.3390/ma15051772. PMID: 35269002; PMCID: PMC8911279.

[5] Aiken, T.A., Russell, M., McPolin, D. et al. Magnesium oxychloride boards: understanding a novel building material. Mater Struct 53, 118 (2020). https://doi.org/10.1617/s11527-020-01547-z

premature failure under the integrity criterion for MgO-lined walls, and still others found alternative linings (e.g., calcium silicate) performing similarly to gypsum.

This supports that MgO boards can contribute positively to fire resistance, but performance is product (manufacturer)- and system-dependent.[6]

Overall, the literature supports MgO-based boards as credible protective lining materials for fire-exposed building elements when they are specified and detailed correctly. Across published studies, the main advantages are that MgO-based products can be non-combustible, provide insulating behavior (supporting slower heat transfer and delayed heating of protected substrates), and exhibit good resistance to spalling in certain formulations—properties that align with the role of a protective membrane in fire-rated assemblies. In addition, assembly-level testing of cold-formed steel wall systems demonstrates that MgO-sheathed configurations can provide meaningful fire endurance, although the achieved time is highly dependent on-board type and detailing.

Although MgO boards have clear fire-related advantages, the literature shows that "MgO board" is not a single uniform material, so performance must be tied to product-specific evidence and assembly testing. Properties that matter to fire endurance—binder type (e.g., MOC vs MOS), density, reinforcement, additives, mass-loss behavior, and cracking tendency—can vary significantly between manufacturers and even batches without proper quality checks, so results from one MgO product cannot be assumed to apply to another without qualification. Therefore, it is not appropriate to state that all MgO boards are suitable for achieving a fire rating without product-specific, assembly-level test evidence demonstrating compliance for a similar configuration and installation details.

[6] Yomal Dias, Poologanathan Keerthan, Mahen Mahendran, Fire performance of steel and plasterboard sheathed non-load bearing LSF walls, Fire Safety Journal, Volume 103, 2019, Pages 1-18, ISSN 0379-7112, https://doi.org/10.1016/j.firesaf.2018.11.00

## 7. Characteristics of Magnum Board ®

According to MBP, the Magnum Board meets and exceeds industry standards and specifications and undergoes a thorough quality check. This section examines the physical properties of the board (excluding proprietary data) and compares them to industry standards. No testing, suitability, or evaluation against other standards was conducted within this scope, as the evaluation relies solely on data provided by MBP and uses the criteria mentioned on their data sheet.

| **Property (Unit)** | **Criteria (from spec)** | **12 mm** | **Advantage vs Criteria** | **16 mm** | **Advantage vs Criteria** | **18 mm** | **Advantage vs Criteria** |
|---|---|---|---|---|---|---|---|
| Density | 1.10–1.20 | 1.10–1.20 | Meets range | 1.10–1.20 | Meets range | 1.18 | Within range |
| Thickness | 12mm (1/2") *(or stated nominal)* | 12mm | Meets | 12mm (1/2") *(as printed)* | Meets printed value | 17.93mm (criteria: 18mm ±0.2) | Within tolerance |
| Water content (%) | ≤ 8% | 5.9% | ~26% below max | 5.9% | ~26% below max | 5.9% | ~26% below max |
| Dry shrinkage (%) | ≤ 0.3% | 0.23% | ~23% below max | 0.23% | ~23% below max | 0.23% | ~23% below max |
| Swelling ratio (%) | ≤ 0.6% | 0.39% | ~35% below max | 0.39% | ~35% below max | 0.39% | ~35% below max |
| Screw holding (N/mm) | ≥ 50 | 68 | ~36% above min | 68 | ~36% above min | 68 | ~36% above min |
| Chlorine ion content (%) | ≤ 3% *(sheet also notes industry standard 10% max)* | 2.43% | ~19% below 3% limit *(~76% below 10%)* | 2.43% | ~19% below 3% limit *(~76% below 10%)* | 2.43% | ~19% below 3% limit *(~76% below 10%)* |
| Flexural strength (MPa) | ≥ 8.0 (12/16 mm sheets) / ≥ 12 (18 mm) | 9.4 | ~18% above min | 9.5 | ~19% above min | 16.0–17.0 | ~33–42% above min |
| Impact strength (kJ/m²) | 2.0 | 3.1 | ~55% above min | 3.7 | ~85% above min | 3.1 | ~55% above min |
| Combustibility rating | Class A1 | Class A1 | Meets | Class A1 | Meets | Class A1 | Meets |

*Table 3 Physical Properties of Magnum Baord*

Across all three boards, the moisture and dimensional stability results provide a consistent performance margin against the stated maximum limits. The reported water content of 5.9% is well below the ≤8% criterion (about 26% lower than the maximum allowed). Similarly, dry shrinkage (0.23%) is below the ≤0.3% limit (about 23% lower), and the swelling ratio (0.39%) is below the ≤0.6% limit (about 35% lower). In practical terms, these margins indicate the boards meet the published requirements with extra allowance, which supports stable dimensions under the conditions represented by the testing.

Fastener retention performance is also above the stated minimum. The screw holding capability is reported as 68 N/mm against a minimum criterion of ≥50 N/mm, which is about 36% above the minimum. For mechanical resistance, all boards exceed the stated minimums for bending and impact performance, with the 18 mm substrate showing the highest flexural values. The 12 mm and 16 mm sheets list flexural strength of 9.4–9.5 MPa against a minimum of ≥8.0 MPa (about 18–19% above the minimum). The 18 mm roofing/flooring substrate lists flexural strength of 16.0 to 17.0 MPa against a minimum of ≥12 MPa (about 33–42% above the minimum). Impact strength is also above the minimum in all cases: 3.1 kJ/m² (12 mm and 18 mm) and 3.7 kJ/m² (16MM) against a 2.0 kJ/m² criterion—approximately 55% and 85% above the minimum, respectively. The 18 mm sheet also includes a narrative statement that its interim testing and comparison indicates performance above “typical requirements” cited in the document for industrial applications.

Regarding fire and material classification, all three sheets report a combustibility rating of Class A1, meeting the stated criterion. The reported chlorine ion content (2.43%) is below the ≤3% criterion, and the sheets also note an industry standard of 10% maximum, meaning the reported value provides a substantial margin versus both the stated criterion and the referenced industry maximum and allowance for observed corrosion issues in LGS (Light Gauge Steel).

## 8. Review of Past Test Data

This section reviews the historical testing available for the Magnum Board and uses that information to support the engineering judgments for its use in the UL designs referenced earlier. The assessment is based solely on the data provided from pre-installation or product-level testing.

Testing data on post-installation conditions and in-service performance of the assemblies were unavailable and are therefore not evaluated. In addition, performance characteristics other than fire resistance, including, but not limited to, acoustics, corrosion potential, impact resistance, moisture/water resistance, and durability, are outside the scope of this report and have not been assessed. The determination of final suitability for the intended application and service environment remains with the end user and the project design team.

It is assumed that all Magnum Board products supplied for use will be manufactured consistently to the same specifications and quality as the tested materials referenced herein. Product variability, substitutions, or deviations from the tested formulations and manufacturing controls are not considered in this assessment; maintaining compliance with the specified properties remains the manufacturer's responsibility.

All applicable limitations and conditions imposed by ICC/other applicable building codes, UL design requirements, and other governing local codes and standards remain in effect and must be complied with.

| Test / Source | Standard | Key outcome (as reported) |
|---|---|---|
| SwRI Project No. 01.11850.01.431 (Sep 28, 2006) | ASTM E136 | Magnum Board “Meets All Criteria” (noncombustibility) in multiple runs. |
| SwRI Project No. 01.15209.01.141 (May 17, 2010) | ASTM E84 | Flame Spread Index (FSI)=0; Smoke Developed Index (SDI)=0. |
| ULC Online Directory listing R26120 (last updated Mar 6, 2015) | CAN/ULC-S102 | Flame Spread=0; Smoke Developed=0 for Type Magnum Boards (4–20 mm). |
| Intertek Report 101433709MID-001Rev1 (Dec 2, 2013) | CAN/ULC-S135 (NBCC 3.1.5.1(2) criteria) | MgO Board meets NBCC criteria: avg total heat release ≤3 MJ/m² and avg total smoke extinction area ≤1.0 m² at 50 kW/m². |
| Exova Warringtonfire Report 13-002-529(A) (Nov 4, 2013) | ASTM E1354 / CAN/ULC-S135 (cone calorimeter) | Avg total heat release=0.9 MJ/m²; avg total smoke extinction area=0.2 m² at 50 kW/m² (3 mm sample). |

| Test / Source | Standard | Key outcome (as reported) |
|---|---|---|
| SwRI No. 01.15210.01.101c (test date Nov 19, 2009) | ASTM E119-08a | Wall assembly with 12 mm Magnum Board each side + mineral wool met acceptance criteria for a 1-hour fire endurance rating. |
| Telgian record review (Rev 2.0, Nov 10, 2025) of SwRI test (Apr 10, 2009) | ASTM E119 / UL 263 | Wall assembly with 16 mm Magnum Board each side + mineral wool: temperature log indicates 2-hour performance except for one thermocouple near end (treated as outlier per statistical review). |

*Table 4 Test Analysis Summary Table*

### 8.1. 2- Hour ASTM E119 Tests: Magnum Sheathing ASTM E119 Test Record Review (Telgian E&C, Rev 2.0)[7]

Telgian reviewed archived records (log and videos) for a 2-hour ASTM E119 wall test conducted at SwRI on April 10, 2009 for the above assembly (16-mm Magnum Board each side over 20-ga steel studs with mineral wool insulation and taped/compounded joints).

The tested wall configuration was described as a 9 ft × 12 ft assembly framed with 20-gauge, 3-5/8 in steel studs at 16 in o.c., insulated with 2.5 pcf mineral wool in the cavity, and sheathed with **one layer of 16 mm Magnum Board on each side.** Boards were fastened using #8 × 1-5/8 in self-tapping screws (closer spacing at perimeter/joints and wider spacing in the field). Joints were finished with fiberglass tape and joint compound, and fastener heads were covered; the final construction did not include stud-to-track fasteners.

For the temperature criteria, the record shows 12 unexposed-face thermocouples; the average temperature rise remained below 250°F for the full 2 hours. TC-10 exceeded the 325°F single-point rise limit near the end of exposure, but Telgian applied ASTM E178 (Grubbs outlier test) and qualified TC-10 as a statistically significant high outlier; using the remaining 11 representative thermocouples (minimum 9 required), the single-point and average limits were met for the full duration. Video review reported no observed passage of flame/hot gases on the unexposed face during the 2 hours and no hose-stream water projecting beyond the unexposed face.

[7] SwRI Project # 01.14431.01.105

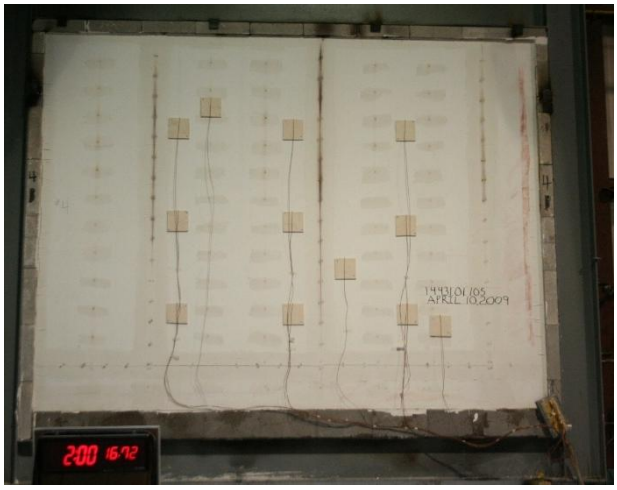



*Figure 1 Thermocouple placement photo at the end of 2 hours testing.*

Based on the review of the available video, any passage of flame or hot gases on the unexposed face during the 2 hours is observed, nor any loss of stability or structural collapse.

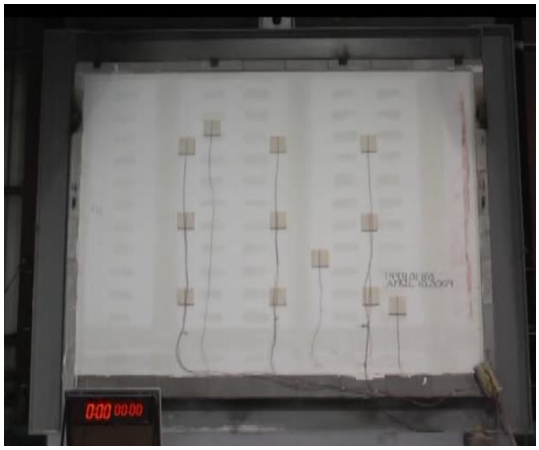



*Figure 2 At 00:00:00*

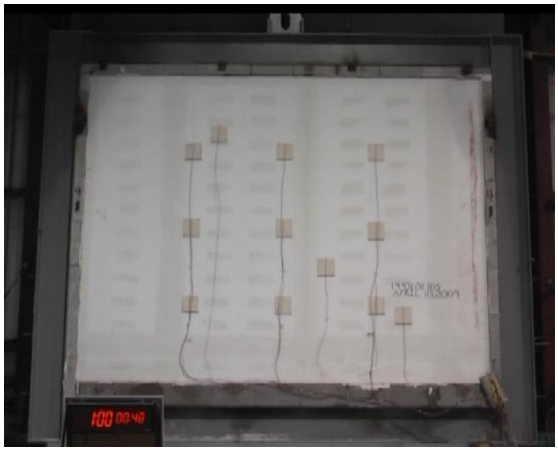


*Figure 3 At 01:00:00*

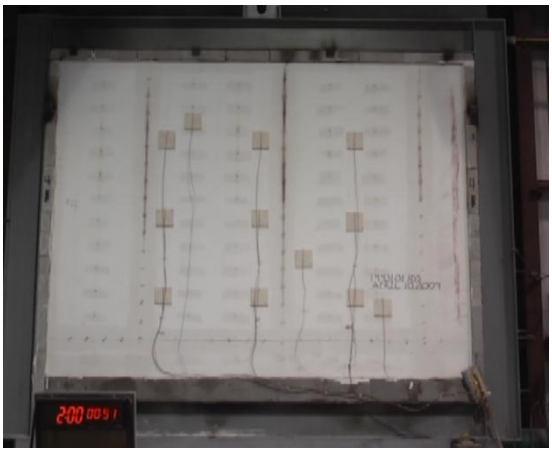


*Figure 4 At 02:00:00*

Based on the review of the hose-stream test video, no water stream was observed projecting beyond the unexposed face of the specimen.

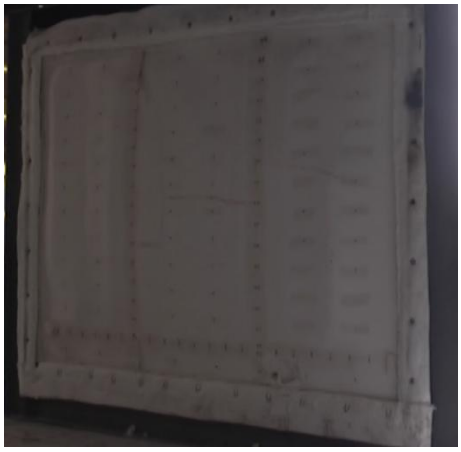


*Figure 5 Exposed side (Inside the furnace) before the application of hose stream*

*Figure 6 Hose Stream Application on the exposed side*

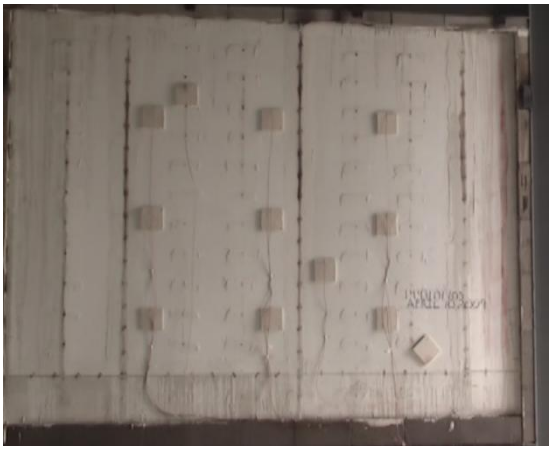


*Figure 7 Unexposed side after the application of hose stream on the exposed side, no visible failure and comparable to Figure 2 At 00:00:00*

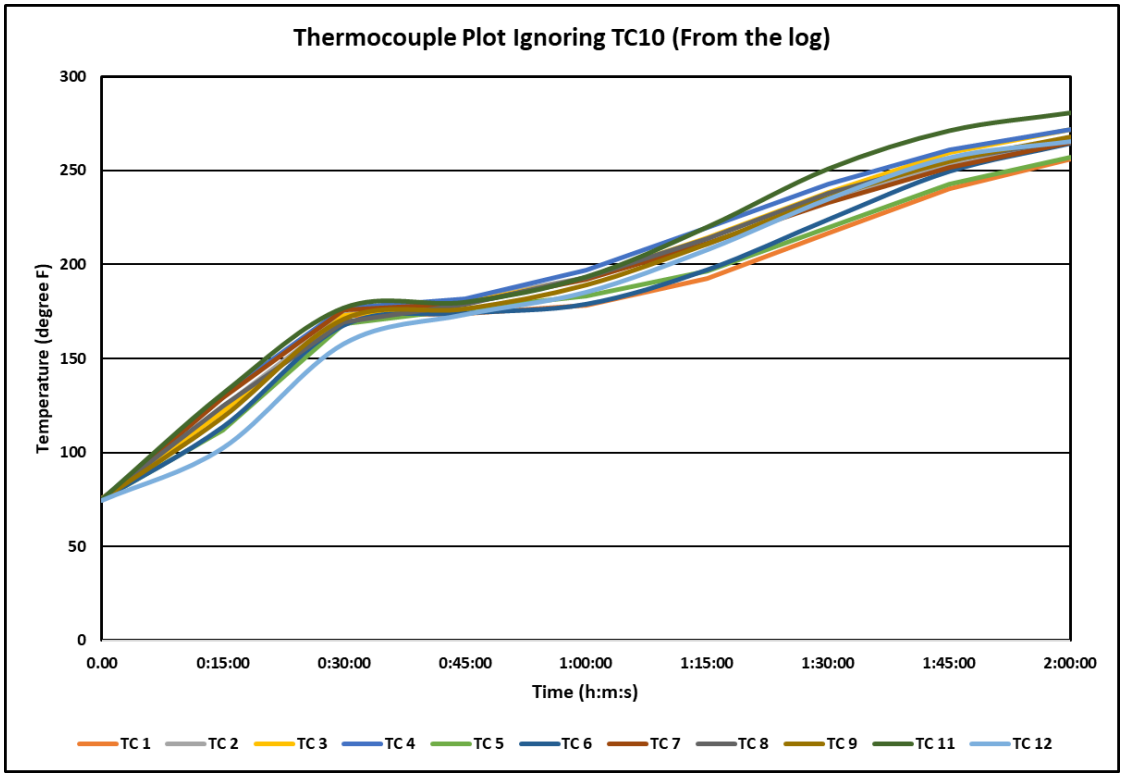



*Figure 8 Time- Temperature graph ignoring TC 10 readings from the 2-hr Test*

## 8.2. Hour ASTM E119 Test: Fire Performance Evaluation of a Magnum® Board Wall Assembly[8]

This test evaluated a non-loadbearing wall assembly per ASTM E119-08a for 1-hour fire endurance, including thermal transmission/integrity criteria and a hose stream application. During the 60-minute exposure, the report notes audible popping/spalling early and progressive bowing toward the furnace, but no thermocouple temperatures exceeded the maximum allowable limits and the test was terminated at 60 minutes. A hose stream test was then conducted for 1 min 5 s at 30 psi, and the wall did not allow any passage of water for the duration. No deviations were reported. SwRI concludes the assembly, as tested, successfully met the acceptance criteria for a 1-hour fire endurance rating when tested in accordance with ASTM E119-08a.

The tested configuration was a 9 ft × 12 ft wall built with 20-ga, 3-5/8 in galvanized steel studs at 24 in o.c., with the stud cavity insulated using 2 pcf mineral wool. The wall had one layer of 12-mm Magnum® Board on each side, attached with Hilti screws P/N 00372760, #8 × 1-5/8 in (8 in o.c. along perimeter/joints; 18 in o.c. in the field).

[8] SwRI Project No. 01.15210.01.101c, Nov. 19, 2009

Board joints were finished using joint compound and drywall joint tape, and fastener heads were covered with joint compound; lateral bracing was installed near the bottom of the assembly

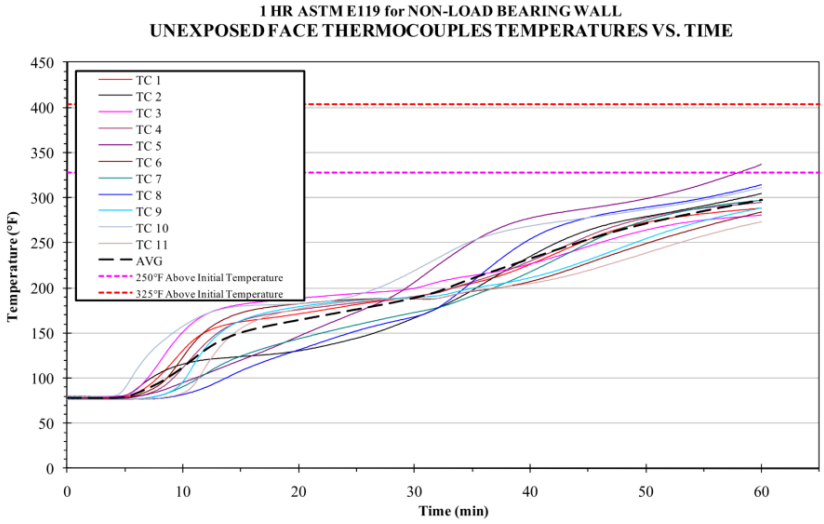



*Figure 9 The thermocouple trend from the report, reproduced*

**Figure B-1. Base Wall Layout with One Layer of Magnum® Board Installed.**

*Figure 10 Photos reproduced from the report*

Figure B-7. Condition of Wall at End of Test.

Figure B-8. Exposed Face Immediately Following Fire Test.

*Figure 11 Photos reproduced from the test report*

Figure B-9. Application of Hose Stream Test.

Figure B-10. Condition of Exposed Face Following Hose Stream Test.

*Figure 12 Photos reproduced from the test report, after hose stream application*

## 8.3. Caloric Content of "Magnum Board" / ASTM E1354 Testing of "Magnum Board"[9]

This report documents cone calorimeter testing used to determine combustibility parameters in accordance with CAN/ULC-S135-04 (ASTM E1354 referenced in the report header). Testing was performed at 50 kW/m² and the report concludes the material, at ~3 mm thickness, meets the Total Heat Release requirement in NBCC Article 3.1.5.1, reporting an average Total Heat Release of 0.9 MJ/m² and average Total Smoke Extinction Area of 0.2 m² at 50 kW/m². The NBCC proposal criteria cited in the report are ≤3 MJ/m² total heat release and ≤1.0 m² total extinction area, with test duration extended until no further heat/smoke release is evident.

The tested material was identified as MgO board ("Magnum Board"), approximately 3 mm thick (Exova sample ID 13-002-S0529-1). Specimens were approximately 100 mm × 100 mm, conditioned at 23 ± 3°C and 50 ± 5% RH prior to testing. Testing was conducted in the horizontal configuration using the specimen edge frame and a spark ignition source, the test results table notes "did not ignite" for time-to-ignition.

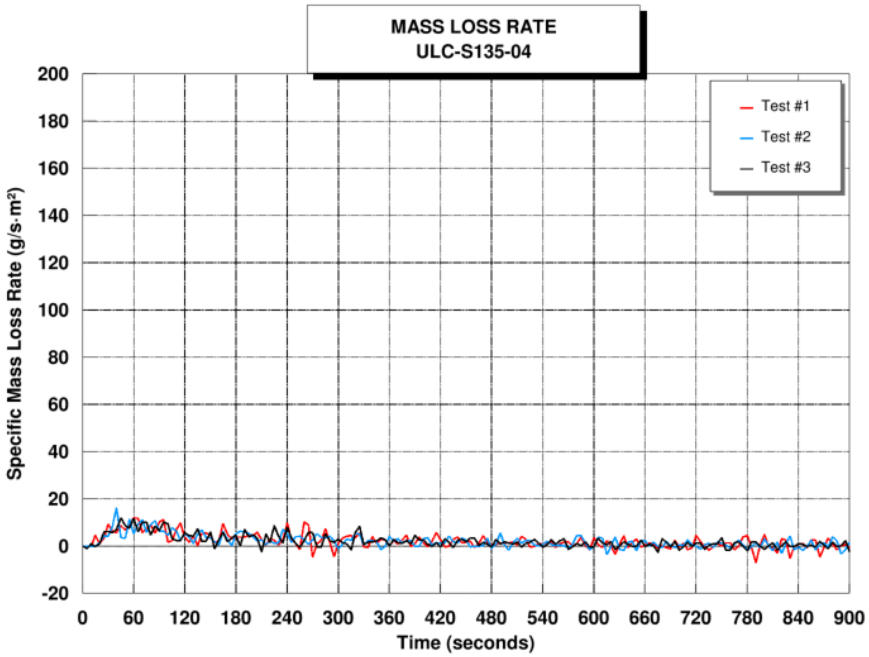



*Figure 13 Reproduced from the test report*

[9] Report No. 13-002-529(A)

### 8.4. MgO Board (ULC S135-04 Cone Calorimeter / Oxygen Consumption Calorimeter) (Intertek Verification Center)[10]

Intertek tested MgO Board to evaluate heat and smoke release characteristics in accordance with ULC S135-04 using an oxygen consumption cone calorimeter at an external heat flux of 50 kW/m². The report notes there is no inherent pass/fail criterion in ULC S135 itself, so results were compared to NBCC Division B, Article 3.1.5.1, Section 2 compliance criteria. Based on the reported results and evaluation, Intertek concludes the MgO Board met the NBCC criteria (average total heat release not more than 3 MJ/m² and average total smoke extinction area not more than 1.0 m², with test duration extended until no further release of heat/smoke was evident).

The tested material was identified as MgO Board, submitted by the client and prepared as 100 mm × 100 mm × 15 mm specimens. Samples were conditioned and tested in a horizontal orientation in the cone calorimeter system.

### 8.5. Surface Burning Characteristics of a Nominal 12 mm Magnum Board (ASTM E84-10)[11]

This test evaluated the surface burning characteristics of Magnum Board in accordance with ASTM E84-10. The reported results were Flame Spread Index (FSI) = 0 and Smoke Developed Index (SDI) = 0. Observations during the 10-minute test included no ignition, a maximum flame front advance of 0.5 ft, and no noted dripping, sagging, delamination, shrinkage, or fallout. Based on the indices reported, the material performance aligns with Class A interior finish ranges referenced in the report.

The tested material was identified as an oxy-magnesium cement board (trade name Magnum Board), described as containing MgO, MgCl, perlite, and a glass fiber mat, with a nominal thickness of 12 mm. The specimen set consisted of twelve panels, each 24 in × 24 in, received ready-to-test and conditioned for 27 days at 70°F and 50% RH. The test was conducted with the specimen installed in the ceiling position, consistent with ASTM E84 testing practice.

[10] 101433709MID-001Rev1
[11] SwRI Project No. 01.15209.01.141

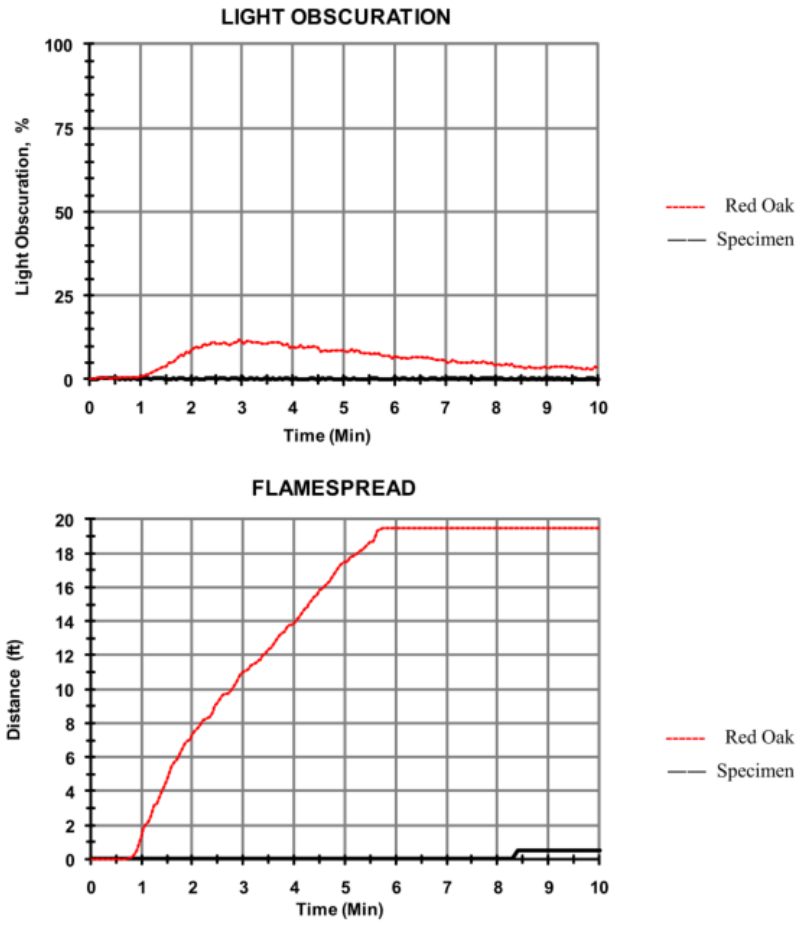



*Figure 14 Test Results reproduced from the test report*

## 8.6. Fire Performance Evaluation of Magnum Board Tested in Accordance with ASTM E 136[12]

This report evaluated the noncombustibility of Magnum Board in accordance with ASTM E136 using a vertical tube furnace operated at 750°C. SwRI conducted the required series of four test runs. As reported in the results sheets, the specimens did not produce smoke or flames, and each run met all ASTM E136 criteria (including the flaming and temperature-rise criteria applicable to the measured mass loss). SwRI's conclusion states that Magnum Board met the test criteria presented in ASTM E136 and can be classified as non-combustible.

The tested material was Magnum Board. Two blocks of material were provided and SwRI personnel prepared specimens by cutting them to approximately 40 × 40 × 50 mm. Specimens were conditioned in a controlled environment at approximately 23 ± 2°C and 50 ± 5% RH prior to testing. Testing was performed in SwRI's ASTM

[12] SwRI Project No. 01.11850.01.431

E136 hot-air vertical tube furnace, with specimen temperatures monitored (surface and center thermocouples) and mass loss recorded to determine compliance with the standard's acceptance criteria.

### 8.7. Investigation of the Surface Burning Characteristics of a 6 mm Magnum Board[13]

This test evaluated the surface burning characteristics of Magnum Board in accordance with ASTM E84-05. The reported results were Flame Spread Index (FSI) = 0 and Smoke Developed Index (SDI) = 20 (rounded to the nearest 5; unrounded SDI reported as 20.7). Observations recorded during the 10-minute test include spotty ignition at 8:30, maximum flame front advance of 5.1 ft, no dripping, and no afterflame on the top or floor. Based on the indices reported, the outcome aligns with Class A ranges referenced in the report's classification table.

The tested material was Magnum Board with a nominal thickness of 0.25 in (6 mm) and cream color. The specimen set consisted of twelve boards, each 24 in × 24 in.

### 8.8. ULC Online Directory Listing – Mineral and Fibre Boards (BQXRC.R26120)[14]

This is a ULC Online Directory listing entry for MBP-IP LLC covering "Type Magnum Boards." The listing states the product is listed to surface burning characteristics in accordance with CAN/ULC-S102, and reports a classification of Flame Spread = 0 and Smoke Developed = 0 for the listed material. The tested material is a Magnum Board, each tunnel specimen was assembled from six panels (each 1220 mm long × 557 mm wide) butted end-to-end to create a 7320 mm long specimen. Nominal 4 mm and 20 mm thick panels were evaluated. Specimens were conditioned to constant mass at 23°C and 50% RH prior to testing.

### 8.9. Fire Test Investigation of a Non-Load bearing 12 mm Magnum Wall: UL Fire Test[15]

This UL/ULC classification report documents full-scale fire endurance testing of non-load-bearing steel-stud wall assemblies sheathed with Magnum Board in accordance with ANSI/UL 263 (ASTM E119).

For both wall tests, the fire exposure was terminated at 60 minutes at the customer's request, and neither the average nor individual unexposed-surface limiting temperatures were reached during the classification period. Following each exposure, the assemblies completed the hose stream test (30 psi for 1 min 5 sec) with no through-projection of water beyond the unexposed face. UL judged the described constructions as providing 1-hour protection against flame passage and excessive heat transmission when exposed from either side, supporting the

[13] SwRI Project No. 01.11810.01.165a
[14] Tested under Project No. 11CA02086
[15] File R26120; Project 09CA09562

promulgation/revision of UL Design U061, an engineering evaluation also supported the creation of a ULC 1-hour wall design (W490) based on the referenced U061 data.

The report includes two tested configurations. Test Record No. 1: 9 ft × 12 ft wall with 3-1/2 in steel studs @ 16 in o.c., one layer nominal 16 mm Magnum Board each side, 3 in mineral wool in the cavity, and taped/compounded joints; boards fastened with #8 × 1-5/8 in wafer-head cement board screws (typically 6 in o.c. perimeter, 8 in o.c. field). Test Record No. 2, similar wall size with 3-5/8 in studs @ 24 in o.c., one layer nominal 12 mm Magnum Board each side, 2.5 in mineral wool, taped/compounded joints, and #8 × 1-5/8 in screws (typically 8 in o.c. perimeter, 18 in o.c. field).

Based on Telgian's review of the archived test records and data provided by the client, the Magnum sheathing wall assemblies evaluated demonstrated performance consistent with the stability and integrity expected of fire-rated wall assemblies. In the reviewed ASTM E119/UL 263 test evidence, the reported observations did not indicate premature assembly failure, flame passage, or collapse during the fire exposure and subsequent hose stream application. Concerns noted in some literature regarding cracking or loss of rating were not reported as governing failure modes in the referenced test records.

In addition, the referenced ASTM E84 surface burning results and ASTM E136 non-combustibility results support that Magnum Board can meet the reaction-to-fire characteristics typically required for sheathing applications, within the scope and limitations of the underlying test evidence. These results form part of the technical basis for the engineering judgement regarding suitability of Magnum Board for use in the UL designs addressed in this report, provided the product and installation conditions remain consistent with the tested configurations and stated assumptions. This judgement is offered as an expert technical opinion based on the materials made available for review.

## 9. ASTM E2032: Standard Practice for Extension of Data from Fire Resistance Tests Conducted in Accordance with ASTM E 119

ASTM E2032 provides a recognized method for supporting limited modifications to fire-resistance–rated assemblies using existing ASTM E119 test evidence and engineering judgment. The practice is useful in this project because the proposed use of Magnum Board is not being justified on "material classification" alone; instead, it is being evaluated based on how fire-resistance ratings are achieved in assemblies, through barrier continuity (integrity), thermal protection (insulation performance), and attachment/joint detailing and by tying proposed applications to a documented historical fire-testing basis for Magnum Board assemblies.

The support logic follows E2032 principles. First, the proposal defines Magnum Board use in clearly identified assembly roles and does so using design-specific build-ups (single-layer and multi-layer options) that correspond to the intended rating duration. This aligns with E2032 practice because longer fire-resistance objectives are approached by maintaining or increasing layers of the protective system rather than reducing it. Second, the design maintains the key construction parameters that materially control performance in E119-rated systems, namely continuous protective layers, proper joint treatment, and attachment schedules and treats these items as essential conditions of acceptability, since integrity and fastening/joint behavior frequently govern failure in standard furnace tests. Accordingly, E2032 supports the engineering judgment by providing a structured way to connect the available Magnum Board assembly fire-testing evidence to the proposed UL design applications, while establishing boundaries, the proposed design build-ups must be used as stated, installation details must remain consistent with the tested basis and listed design intent, and the overall assembly must remain otherwise unchanged in ways that would affect integrity, insulation, or attachment performance.

This is also consistent with the Harmathy "Rules of Fire Endurance" referenced in ASTM E2032 (Appendix X1), which are commonly used as guiding principles when extending fire-test knowledge to closely related constructions. Harmathy's principles support the idea that fire endurance is strongly influenced by the effectiveness and continuity of the protective layers and that maintaining (or increasing) the robustness of the fire-exposed barrier, through conservative protective build, reliable attachment, and sound joint detailing, is generally a rational way to preserve or improve endurance under standard furnace exposure.

It also reinforces that fire resistance is not determined by a single material property; rather, it results from how the assembly controls heat transmission and structural integrity over time, and how well the protective elements remain in place and functional during exposure.

## 10. Fire-Rated Assemblies

Based on the evaluation presented in the preceding sections, this section assesses whether the proposed assemblies are reasonably expected to achieve the required fire-resistance rating. The technical basis for this assessment combines (1) the literature review and (2) the available body of prior fire testing conducted on Magnum Board in representative assembly configurations. The fire test evidence reviewed for Magnum Board does not indicate the premature integrity issues (for example, cracking or joint opening leading to early failure) that have been reported in some published studies of other magnesium oxide board products. This distinction is important because the literature also recognizes that MgO boards are not a single uniform material class; performance can vary significantly by formulation, reinforcement, manufacturing controls, and installation detailing. Therefore, adverse behaviors reported for certain MgO products should not be assumed to apply to Magnum Board when the available test evidence for Magnum Board demonstrates stable performance under standard furnace exposure in the configurations evaluated in this report.

Consistent with the intent of the International Building Code, this engineering evaluation is provided to support acceptance of alternative materials and methods where full assembly testing of every project-specific configuration has not been performed. IBC 703.2.2 and 703.2.3 permit the use of assemblies that have not been tested exactly as constructed, provided that testing has been conducted on representative assemblies and an engineering analysis demonstrates that the proposed alternative can be expected to perform at least as well as the tested assembly for the required rating. This approach is also consistent with the alternative materials and methods provisions of IBC 104.11 (2021 IBC) and IBC 104.11 (2024 IBC), subject to approval by the AHJ.

## 10.1. UL Design L528 – Reference Assembly

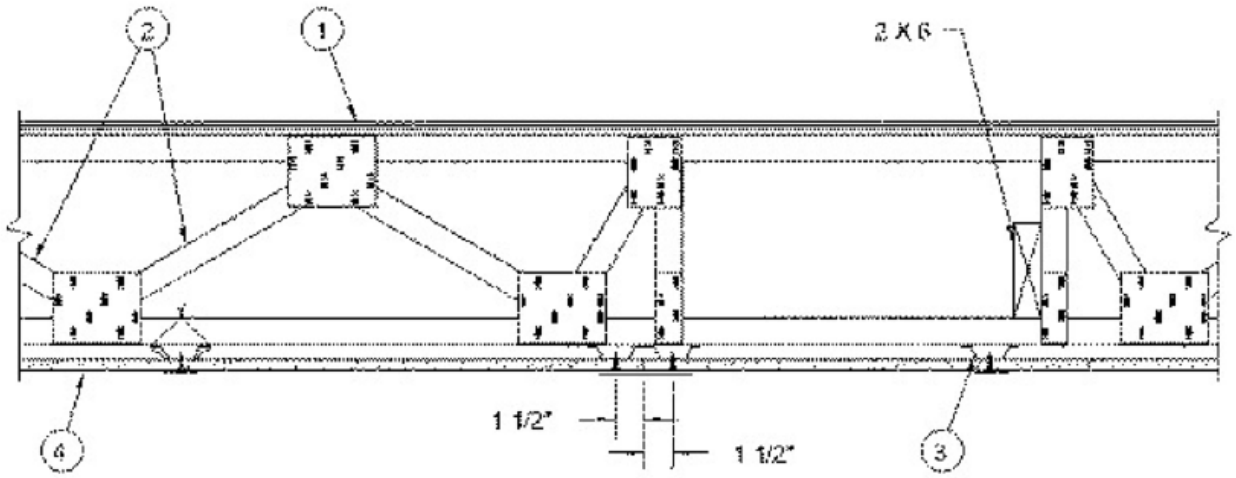



*Figure 15 Reproduced from UL L528. Available on UL Product iQ*

UL Design L528 is a wood-truss floor-ceiling assembly in which the fire-resistance rating is achieved by the full assembly (floor system, cavity conditions, and ceiling system). For fire exposure from below, the ceiling protective membrane and its fastening and joint detailing are often key performance drivers because they form the primary fire-exposed barrier and control heat transfer and integrity at the unexposed side. The L528 reference listing includes ceiling membrane options such as a single layer of 5/8 in. gypsum board attached to resilient channels with specified screw spacing and joint staggering (e.g., Item 4F). L528 also includes a flooring option that uses an MgO structural subfloor panel (System No. 24 & 34), confirming that an MgO panel concept exists within the L528 design family for the floor system (Note: UL identifies specific products in the listing).

For this analysis, Magnum Board is evaluated as a proposed substitute in an L528-based construction for a 1-hour objective (i.e., 18 mm Magnum Board T&G for the floor membrane and 12 mm Magnum Board (minimum) for the ceiling membrane). The technical basis is supported by full-scale fire-resistance evidence demonstrating Magnum Board functioning as a protective membrane in representative assemblies. Magnum Board passed a 1-hour ASTM E119 exposure, including defined fastening and joint treatment practices. In addition, UL documentation associated with Magnum Board indicates a 1-hour classification under UL 263 (ASTM E119) (reported in the UL file context as UL Design U061), supporting that the product has been evaluated within an assembly fire-resistance framework rather than only by material-level testing. This engineering judgment addresses only the substitutions

stated within the scope. All other UL Design requirements remain unchanged and must be followed; any additional deviation may require a separate engineering evaluation and AHJ acceptance.

Applying ASTM E2032 intent guidelines (extension from representative test evidence with controlled variables), the proposed Magnum Board substitution in an L528-based assembly is technically supportable provided the overall L528 assembly intent is maintained, particularly continuity of the ceiling system, comparable support/channel approach, robust fastening, appropriate joint treatment and joint staggering, consistent cavity conditions, and no reduction in protective-layer build-up relative to the proposed configuration.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| L528 (Wood Assembly) | System No - 24, 34 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | N/A | '4' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | | |

*Table 5 Reference L525 Wood Assembly & modifications*

## 10.2. UL Design L525 – Reference Assembly

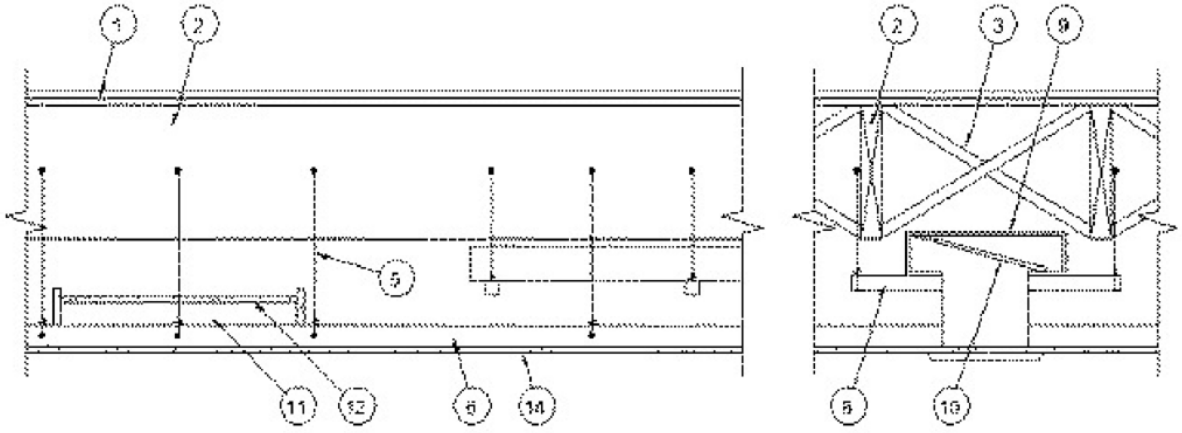



*Figure 16 Reproduced from UL L525. Available on UL Product iQ*

UL Design L525 is a wood-joist floor-ceiling assembly where the fire-resistance rating is achieved by the full assembly, including the floor system, framing/cavity conditions, and the suspended ceiling system. For fire

exposure from below, the ceiling protective membrane and its support/attachment details are typically key performance drivers because they provide the primary fire-exposed thermal barrier and must maintain integrity and continuity throughout the classification period. This engineering judgment evaluates Magnum Board as a substitute protective board in an L525-based construction while maintaining the overall L525 design intent.

For a 1-hour objective, the substitution concept aligns with the thickness configuration discussed (i.e., 18 mm Magnum Board for the floor panel and 12 mm (minimum) Magnum Board for the ceiling membrane, or thicker where desired). The technical basis for using Magnum Board as a protective membrane is supported by full-scale fire-resistance test demonstrating acceptable performance under ASTM E119 / UL 263 exposure conditions. An ASTM E119 test concludes that a wall assembly incorporating 12-mm Magnum Board met the 1-hour fire endurance acceptance criteria under ASTM E119, including hose stream observations without water passage. In addition, a UL listing shows that a steel-stud wall assembly incorporating 12-mm Magnum Board provides 1-hour protection under UL 263 (ASTM E119) and identifies the outcome in the UL design context (UL Design U061). Where thicker or multi-layer protective membrane concepts are relevant to the overall design basis, a separate technical review of archived data indicates performance consistent with a 2-hour ASTM E119 classification for an assembly using 16 mm (5/8 -in) Magnum Board on each side, supporting the general premise that increased protective build-up can improve endurance when other critical variables are controlled.

This judgment addresses only the substitutions within scope. All other UL Design L525 requirements remain unchanged and must be followed (including framing, cavity/insulation conditions, ceiling support system configuration, fastening schedules, joint treatment/finishing, and continuity details). Any additional deviation needs to be evaluated separately and remains subject to AHJ acceptance.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| L525 (Wood Assembly) | System No - 16 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | System No - 17 | | 12mm 4 x 8 Square Edge Magnum Board over wood | | |
| | N/A | '14' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | | |

*Table 6 Reference L528 Wood Assembly & modifications*

## 10.3. UL Design L502 – Reference Assembly

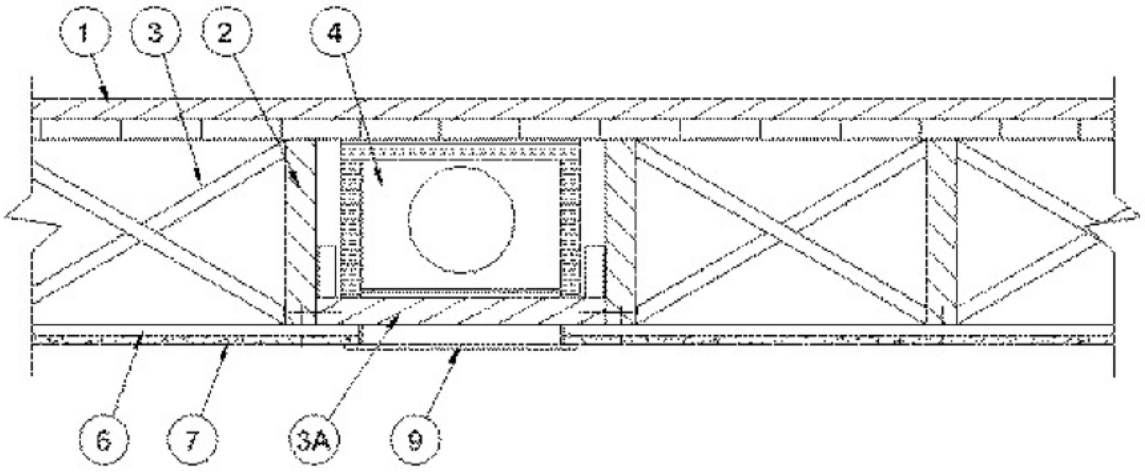



*Figure 17 Reproduced from UL L502. Available on UL Product iQ*

UL Design L502 is a floor–ceiling assembly with an unrestrained 1-hour rating achieved by the full assembly, including the floor system above the joists, the cavity conditions, and the ceiling membrane system below. The L502 floor build-up includes (by system options) a wood subfloor with a floor topping layer (per the design's listed systems), while the underside relies on a membrane system to provide the primary thermal barrier under fire exposure from below.

For this part of the analysis, Magnum Board is evaluated as a proposed substitute in an L502-based construction for a 1-hour objective, using 18 mm T&G Magnum Board for the floor and 12 mm Magnum Board for the ceiling (minimum), with an alternate ceiling option using 16 mm where a thicker membrane is desired.

The technical basis relies on representative full-scale fire-resistance evidence demonstrating Magnum Board performing as a protective membrane within a tested assembly context. A UL fire rating report concludes that a wall assembly incorporating 12 mm Magnum Board afforded 1-hour protection when evaluated in accordance with UL 263 (ASTM E119) "conditions of acceptance," supporting the premise that Magnum Board can function as an effective protective membrane when installed with appropriate fastening and joint treatment practices. This engineering judgment addresses only the substitutions stated within scope. All other UL Design L502 requirements remain unchanged and must be followed, any additional deviation may require separate evaluation and AHJ acceptance.

Consistent with the intent of ASTM E2032 (controlled extension of results from representative E119 testing), the proposed Magnum Board substitution in an L502-based assembly is technically supportable provided the overall L502 assembly intent is maintained, including comparable ceiling system continuity, robust fastening, appropriate joint treatment/joint staggering, consistent cavity conditions, and no reduction in protective-layer build-up relative to the proposed configuration.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| L502 (Wood Assembly) | System No - 17 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | N/A | '7' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | | |

*Table 7 Reference L528 Wood Assembly & modifications*

## 10.4. UL Design M500 – Reference Assembly

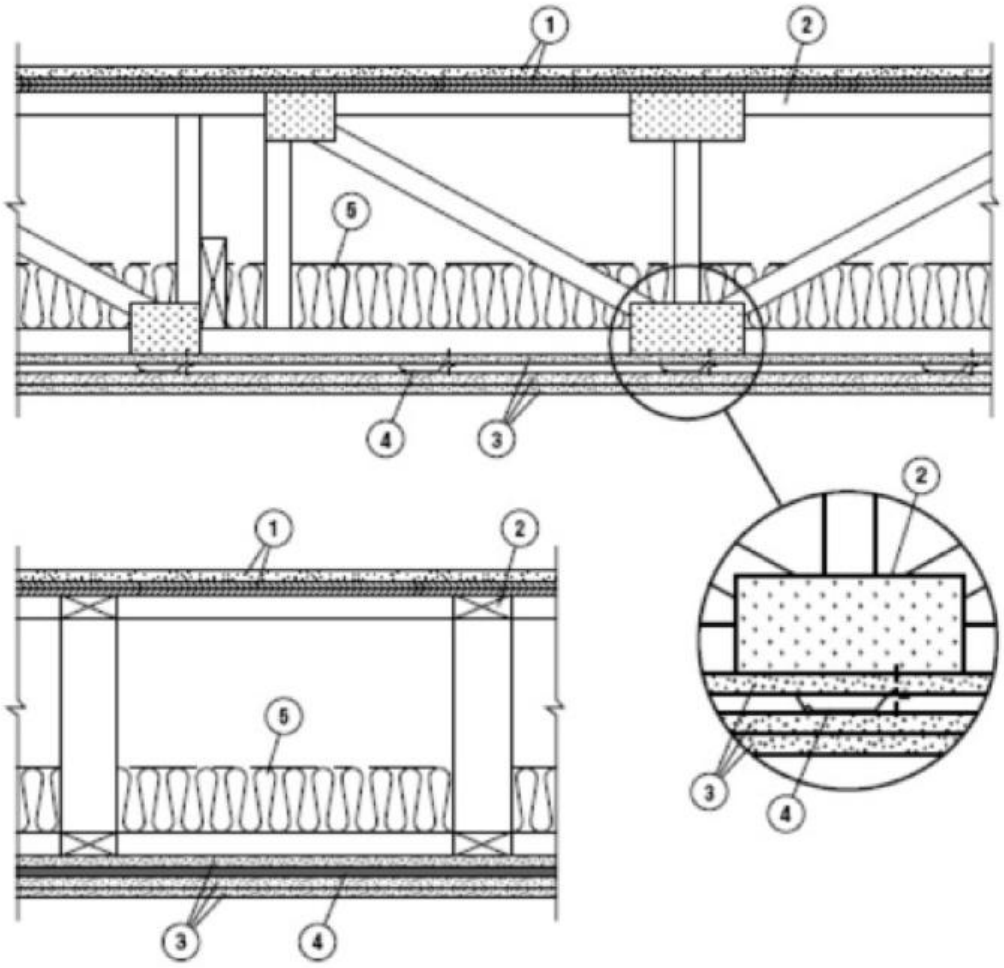



*Figure 18 Reproduced from UL M500. Available on UL Product iQ*

UL Design M500 is a wood floor–ceiling assembly intended to achieve a 2-hour fire-resistance rating through the combined performance of the flooring system (top side), the concealed cavity, and the ceiling protective membrane (fire-exposed underside).

For using Magnum board in similar M500 designs, the ceiling membrane is maintained at the proposed 16 mm Magnum Board, consistent with using the membrane thickness as the principal “rating driver” for fire exposure from below. The technical basis for relying on Magnum Board as a protective membrane is supported by full-scale fire-resistance testing in representative assemblies. (1 and 2 hr ASTM E119 tests, supporting that Magnum Board has been evaluated beyond “material-only” fire tests and into assembly-level endurance testing.)

On the floor (top) side, the design basis includes (a) an 18 mm T&G Magnum Board floor option and (b) an alternate option using 12 mm Magnum Board installed over a wood subfloor. For fire exposure from below, this alternate “12 mm over wood” floor build-up can be argued as non-penalizing to the rating intent because (1) it does not reduce the fire-exposed ceiling protection, and (2) the wood layer contributes predictable charring behavior that forms an insulating char layer as heating progresses, which can reduce heat transmission toward the walking surface. This char effect should be treated as supportive rather than the primary basis, the ceiling membrane remains the controlling protective element for the fire-exposed condition.

Per ASTM E2032 intent (extension from representative tested assemblies with controlled variables), the proposed M500 substitution approach is technically supportable, provided that all other requirements of the reference M500 assembly remain unchanged. This includes, but is not limited to, maintaining: ceiling support/channel approach (if applicable), fastening type and spacing, joint treatment and joint staggering, cavity configuration/insulation conditions, and no reductions in the specified protective-layer build-up (especially at the ceiling membrane).

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| M500 (Wood Assembly) | System No - 10 | ‘1’ - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 2 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | System No - 09 | | 12 mm 4 x 8 Square Edge Magnum Board over wood | | |
| | N/A | ‘3’ – Ceiling Membrane | 16 mm (or thicker as an alternate) 4 X 8 Magnum Board | | |

*Table 8 Reference M500 Wood Assembly & modifications*

## 10.5. UL Design P522 – Reference Assembly (Note the fire rating)

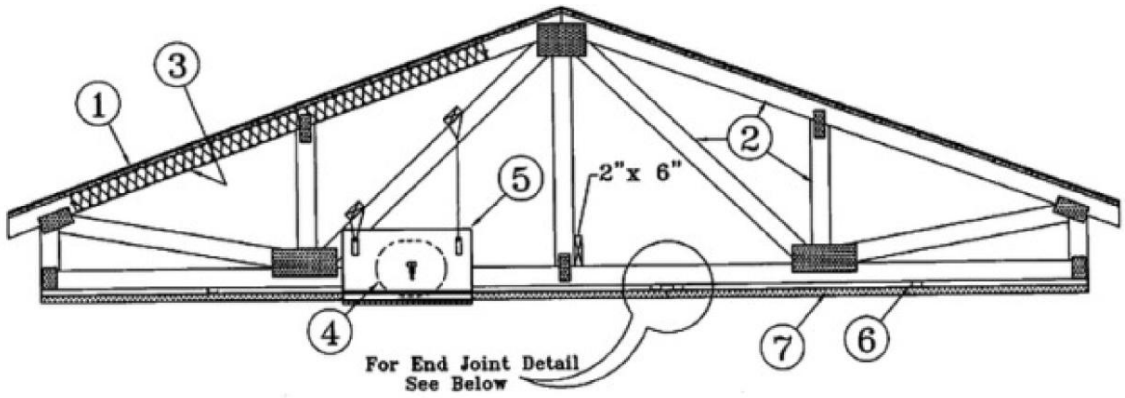



*Figure 19 Reproduced from UL P522. Available on UL Product iQ*

UL Design P522 is a wood roof-ceiling assembly consisting of a roof deck and roofing system supported by wood trusses, with a protected ceiling membrane on the underside. **The design is published with an unrestrained fire-resistance rating of 1 hour, along with a finish rating (25 min, as listed by UL)**. In this construction, the ceiling protective membrane system (including continuity, fastening schedule, joint detailing, and resilient channel configuration) is a primary driver of performance for fire exposure from below, because it provides the initial thermal barrier and must maintain integrity long enough to limit heat transfer to the framing cavity and roof deck. The P522 description includes a roof covering over wood structural panel decking, secured to the trusses using defined fastening/attachment practices, and it defines the ceiling system using resilient channels and gypsum board with specified attachment/joint practices.

For this section, Magnum Board is evaluated as a proposed substitute in P522-based constructions where Magnum Board is used (a) as the roof decking/substrate (18 mm) and (b) as the ceiling protective membrane (12 mm), while maintaining the P522 assembly intent and detailing. The technical basis relies on the documented fire-performance evidence set for Magnum Board, including full-scale fire-resistance testing consistent with ASTM E119 / ANSI/UL 263, demonstrating that Magnum Board assemblies can achieve 1-hour and 2-hour fire-resistance performance when installed as protective membranes with appropriate fastening and joint treatment.

P522 remains the reference listing (1 hour), while the 2-hour objective is an alternate construction supported by this engineering evaluation and AHJ acceptance. The technical support is based on that (1) the ceiling membrane remains continuous, robustly supported, and fastened at least as conservatively as the UL detailing (including channel spacing, screw patterns, and joint control), and (2) the Magnum Board build-up used for the 2-hour

objective is based on the Magnum Board fire-performance evidence set summarized elsewhere in representative ASTM E119 / UL 263 assembly testing. This engineering judgment addresses only the stated substitutions, and that all other P522 requirements remain unchanged, including roof deck attachment intent, truss spacing, cavity/insulation configuration, dampers/penetrations, and any other listed details.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| P522 (Wood Assembly) | N/A | '1' - Roof Membrane | 18 mm 4 X 8 Square Edge Magnum Board for roof decking | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | N/A | | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 – Hours *(Note: Current UL Listing is only for 1 hr)* | |

*Table 9 Reference P522 Wood Assembly & modifications*

## 10.6. UL Design H509 – Reference Assembly

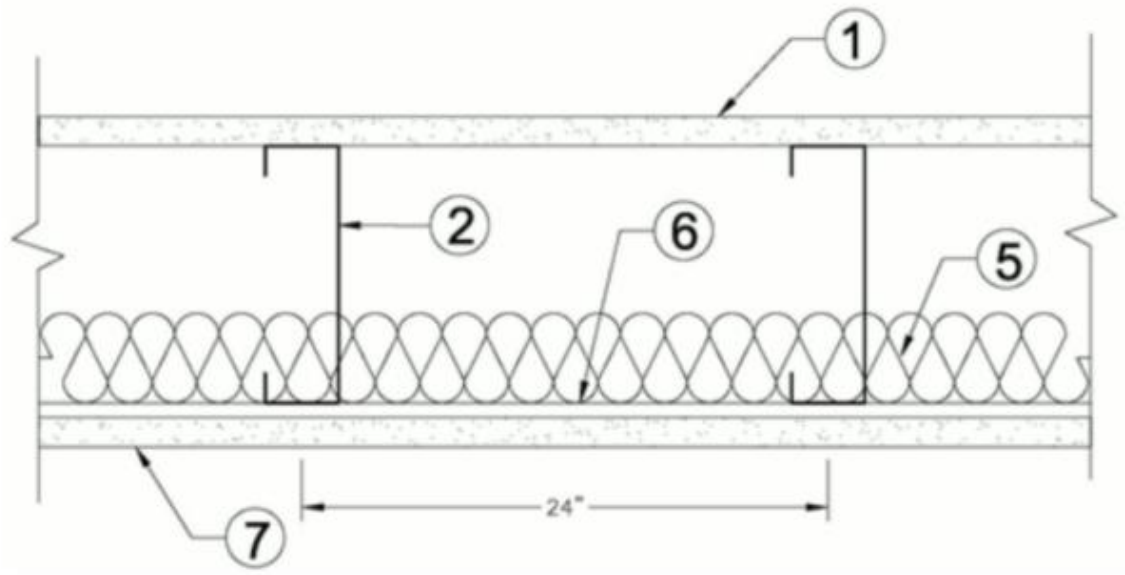



*Figure 20 Reproduced from UL H509. Available on UL Product iQ*

UL Design H509 is a steel-joist floor–ceiling system where the fire-resistance rating is achieved by the full assembly, including the structural framing, floor deck, and (for fire exposure from below) the ceiling protective membrane and its attachment/joint detailing. Under standard furnace exposure from the ceiling side, the ceiling

membrane is commonly a key performance driver because it is the primary fire-exposed thermal barrier that must maintain integrity long enough to limit heat transfer to the framing and the unexposed side.

In H509, the floor deck (Item 1) is a 3/4 in. T&G board system installed perpendicular to joists with staggered end joints and defined screw spacing to the steel joists. The ceiling membrane (Item 7) governs the listed hourly ratings; for the 2-hour rating, UL Listing specifies a two-layer gypsum panel ceiling system with defined layer thicknesses, joint offsets/staggering, and screw spacing (base layer and face layer installation/fastening requirements).

For the engineering judgment, Magnum Board is evaluated as a proposed substitute within a Design H509–type floor/ceiling construction for the fire-rating objective. (1, 1.5, or 2 hours). The substitution logic follows ASTM E2032 by relying on representative, full-scale fire-resistance evidence for Magnum Board used as a protective membrane, while maintaining the H509 construction features that control fire endurance, such as membrane continuity, fastener robustness, and joint treatment/joint staggering.

The ceiling protective membrane is treated as the primary “rating driver” under below-side fire exposure, and the Magnum Board build-up is aligned to the rating level as follows, (1) 12 mm Magnum Board for 1-hour, and for higher ratings either (1) 16 mm Magnum Board for up to 2-hour, or (2) layers of 12 mm Magnum Board for up to 2-hour ceiling membrane. This approach aligns with the general E2032/Harmathy principle that increasing protective-membrane mass and thickness (or adding layers with staggered joints) increases the thermal and integrity barrier when attachment and detailing are equivalently robust. The proposed thickness options are also supported with the Magnum Board full-scale fire-resistance evidence discussed earlier.

At the floor side, the proposed configuration uses 18 mm T&G Magnum Board as the floor deck, which is not the fire-exposed membrane under standard furnace exposure from below; however, it still must satisfy the H509 floor-deck intent (T&G continuity, end-joint staggering, and attachment schedule) so the assembly behavior is not unintentionally changed. This engineering judgment is limited to the substitutions stated in scope; all other H509 design requirements remain applicable and must be followed.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| H509 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours | |

*Table 10 Reference H509 LGS Assembly & modifications*

## 10.7. UL Design G556 – Reference Assembly

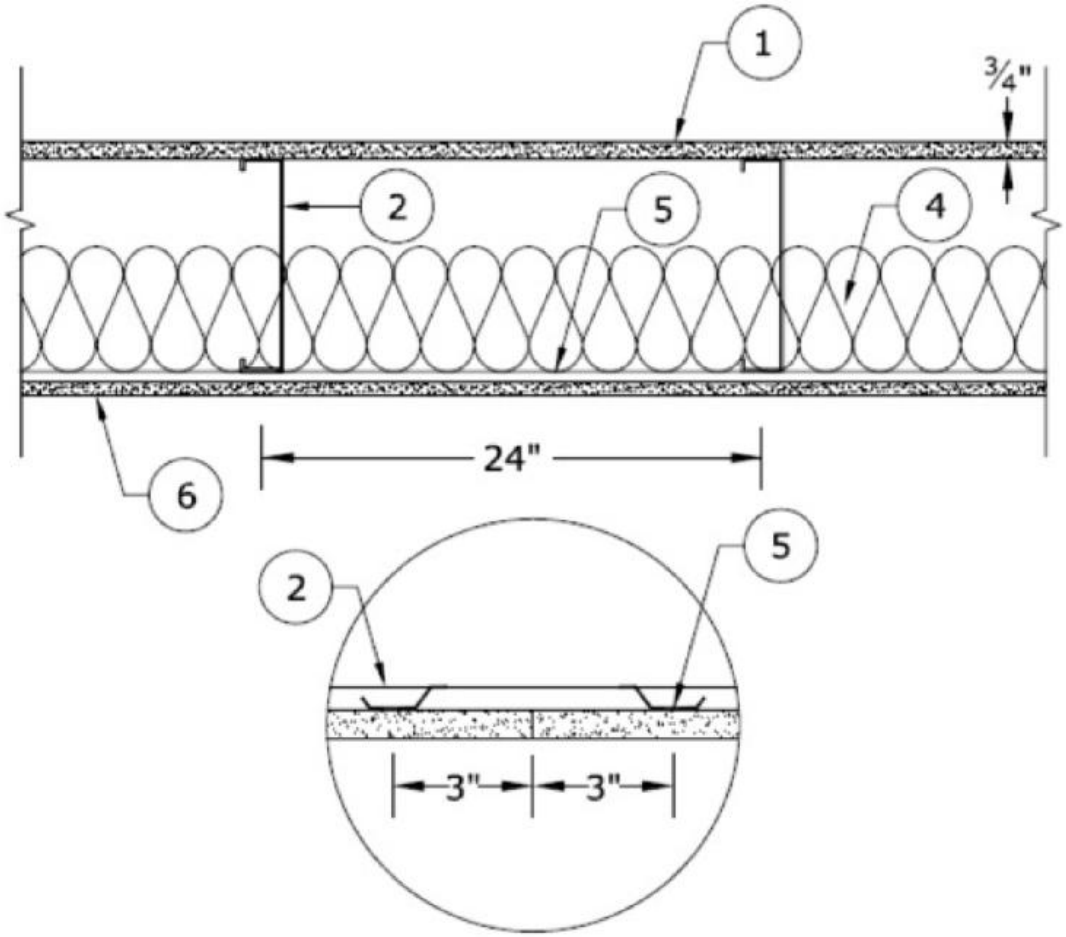



*Figure 21 Reproduced from UL G556. Available on UL Product iQ*

UL Design G556 is an unrestrained light-gauge steel floor–ceiling assembly with published 1-, 1-1/2-, and 2-hour fire-resistance ratings, with the rating dependent on the Item 1 flooring system selection. As per the reference listing, the flooring system (Item 1) is a nominal 3/4 in. structural cement-fiber tongue-and-groove panel installed perpendicular to the joists, with end joints staggered a minimum of 2 ft and centered over joists, and attached with No. 8 self-drilling/self-countersinking steel screws at 12 in. o.c. max in the field and 8 in. o.c. max at the perimeter (with edge-distance intent defined by the listing). The ceiling protective membrane (Item 6) is one layer of nominal 5/8 in. gypsum board fastened to the listed resilient/furring/suspension support option with 1 in. Type S bugle-head screws spaced 8 in. o.c., with end-joint/butt-joint support requirements that are explicitly tied to the selected support method (Items 5–5D).

For the analysis, the proposed Magnum Board substitutions, for the floor membrane (Reference Item “1”) under below-side exposure, substituting 18 mm T&G Magnum Board is technically consistent with the G556 flooring-system intent because it preserves the critical construction features that affect assembly behavior, T&G diaphragm continuity, minimum 2 ft end-joint staggering with joist-centered joints, and an attachment schedule not less than the listed fastenings. This floor-deck substitution does not replace the fire-exposed thermal barrier; therefore, it must avoid introducing unintended changes not listed.

For the ceiling membrane (Reference Item “6”) under below-side exposure, the substitution is treated as the primary performance change because Item 6 is the assembly’s initial thermal/integrity barrier and its performance is directly tied to membrane continuity, fastening, and butt-joint detailing. The proposed thickness matrix—single-layer 12 mm Magnum Board for 1-hour applications and either 2 × 12 mm Magnum Board or 16 mm Magnum Board for up to 2 hours, is based on the rating objective by providing progressively more membrane support framework. In application, Magnum Board must be installed as a complete ceiling membrane system with detailing minimum as the listed intent, including use of the listed support option (Items 5–5D as applicable), fastener spacing not exceeding the UL maximum (8 in. o.c.), and controlled joints (including the UL-required butt-joint support conditions such as two furring channels at butt joints where required and/or the listed “floating” support channel approach where applicable). This engineering judgment addresses only the stated Magnum Board substitutions for Item 1 (floor membrane) and Item 6 (ceiling membrane), based on the fire testing details.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| G556 (LGS Assembly) | System - A | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | | '6' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours | |

*Table 11 Reference G556 LGS Assembly & modifications*

## 10.8. UL Design H515 – Reference Assembly

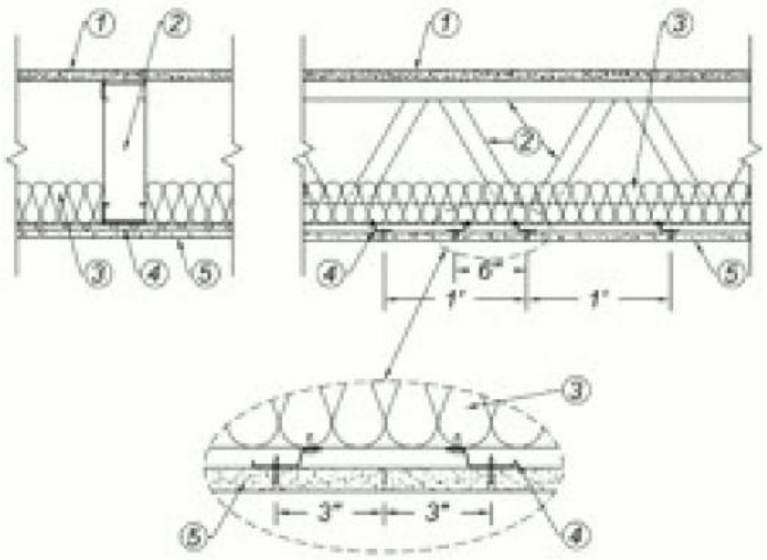



*Figure 22 Reproduced from UL H515. Available on UL Product iQ*

UL Design H515 is an unrestrained LGS floor–ceiling assembly with published 1-1/2- and 2-hour fire-resistance ratings (2-hour only where the listed Alternate Constructions are applied). As listed, the flooring system (Item 1A) is a nominal 3/4 in. structural cement-fiber tongue-and-groove panel installed perpendicular to the trusses, with end joints staggered a minimum of 2 ft and centered over the trusses, and attached with 1-5/8 in. No. 8 self-drilling, self-countersinking steel screws spaced a maximum of 12 in. o.c. in the field and 8 in. o.c. on the perimeter

The fire-exposed ceiling protective membrane is the gypsum board (Item 5), consisting of one layer of nominal 5/8 in. gypsum board fastened to the listed resilient channel or alternate suspension/furring systems (Items 4–4E) with 1 in. Type S bugle-head screws spaced 8 in. o.c., and with explicit butt-joint support requirements tied to the selected support method (e.g., two channels at butt joints where certain clip/furring options are used, and butt-joint staggering provisions for other alternate supports).

The proposed Magnum Board substitutions are supported by the report's fire-performance evidence set and literature on MgO-based linings. The past fire test data evidence shows Magnum Board is noncombustible and exhibits very low heat and smoke release (ASTM E136, ASTM E84/CAN/ULC-S102, and cone calorimeter/CAN/ULC-S135), while full-scale ASTM E119/UL 263 wall testing demonstrates that mechanically fastened Magnum Board membranes with finished joints and mineral wool can maintain integrity and limit heat transmission through 1 hour and can exhibit 2-hour thermal performance in a comparable steel-stud configuration based E119 testing. Literature further supports MgO-based boards as credible protective membranes when board integrity is maintained, while emphasizing product/formulation variability and the need to tie conclusions to product-specific evidence.

For the floor membrane (Reference Item "1") under below-side exposure, substituting 18 mm T&G Magnum Board is technically consistent with the H515 flooring-system intent because it preserves T&G continuity, minimum 2 ft end-joint staggering with truss-centered joints, and fastening robustness consistent with the listed concept, while not replacing the fire-exposed thermal barrier; therefore, no other unlisted changes may be introduced, without any further evaluation. For the ceiling membrane (Reference Item "5") under below-side exposure, the substitution is treated as a impactful change because the ceiling membrane is the initial thermal barrier; the proposed matrix—single-layer 12 mm Magnum Board for 1-hour and either 2 × 12 mm Magnum Board or 16 mm Magnum Board for up to 2 hours, provides the rating based on the fire test evidence. All other UL Design H515 requirements (including any Alternate Construction conditions associated with 2-hour ratings) remain unchanged and must be followed.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| H515 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm 4 X 8 T & G Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | | '5' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours | |

*Table 12 Reference H515 LGS Assembly & modifications*

## 10.9. UL Design U419 – Reference Assembly

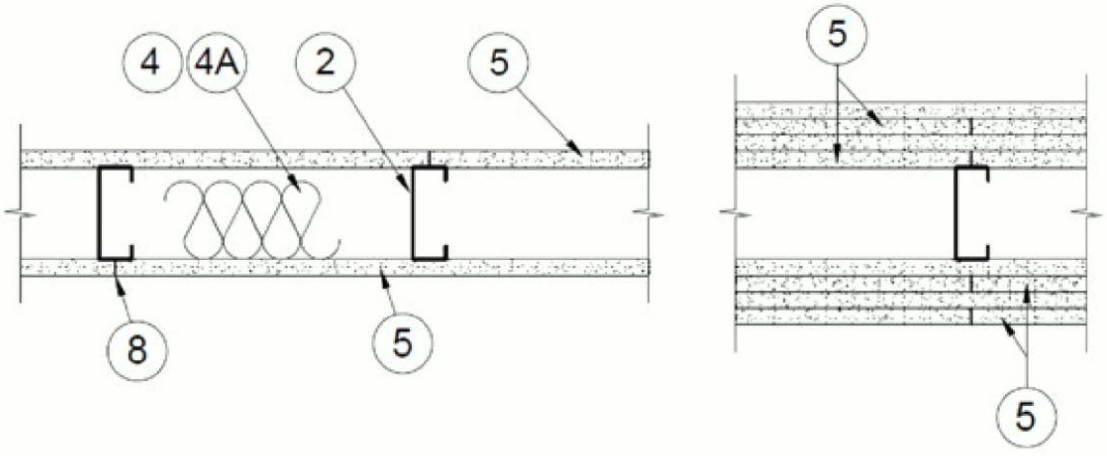



*Figure 23 Reproduced from UL U419. Available on UL Product iQ*

UL Design U419 is a nonbearing steel-stud wall assembly with published 1-, 2-, 3-, and 4-hour fire-resistance ratings, with the rating dependent on the stud option and the gypsum board membrane configuration in Item 5 (thickness and number of layers on each side), and any required cavity insulation provisions noted in the Item 5 table.

As listed, the wall uses floor and ceiling runners (Item 1 and alternates) and cold-formed steel studs (Item 2 and alternates) at up to 24 in. o.c. (with certain alternates at 16 in. o.c.), with gypsum board applied vertically or horizontally on each side and jointing/layer-staggering rules defined in Item 5; optional wood structural panel sheathing (OSB/plywood) may be used behind the gypsum on one side where permitted, and mineral wool/glass fiber insulation is required or optional depending on the specific hourly rating configuration selected.

For the analysis, the proposed Magnum Board substitution (as a replacement for the gypsum board protective membranes of Item 5) is treated as the primary performance-sensitive change because the wall rating is governed by membrane integrity/continuity, fastening, and joint/layer detailing; accordingly, the substitution is supported by the report's Magnum Board evidence set and literature context, including product-level noncombustibility and low heat/smoke release results and full-scale ASTM E119/UL 263 wall testing demonstrating that mechanically fastened Magnum Board linings with finished joints and mineral wool can maintain integrity and limit heat transmission through 1 hour (with successful hose stream) and can exhibit 2-hour thermal performance in a comparable steel-stud configuration based on archived record review. Literature further supports MgO-based linings as credible protective membranes when board integrity is maintained (noncombustible, insulating/refractory barrier behavior and representative thermal conductivity data lower than gypsum).

Magnum Board must be installed as a complete membrane system with detailing at least as required as the listed U419 intent and manufacturer's guidelines.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| U419 (LGS Assembly) | System - 1 | '5' – Wall sides | Side 1 - 12 mm 4 X 8 Magnum Board **And** Side 2 - 12 mm 4 X 8 Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | | | Side 1 – 2 X 12 mm 4 X 8 Magnum Board **And** Side 2 – 2 X 12 mm 4 X 8 Magnum Board | | |
| | | | Side 1 – 16 mm 4 X 8 Magnum Board **And** Side 2 – 16 mm 4 X 8 Magnum Board | Up to 2 - Hours | |

*Table 13 Reference U419 LGS Assembly & modifications*

## 10.10. UL Design P561 – Reference Assembly

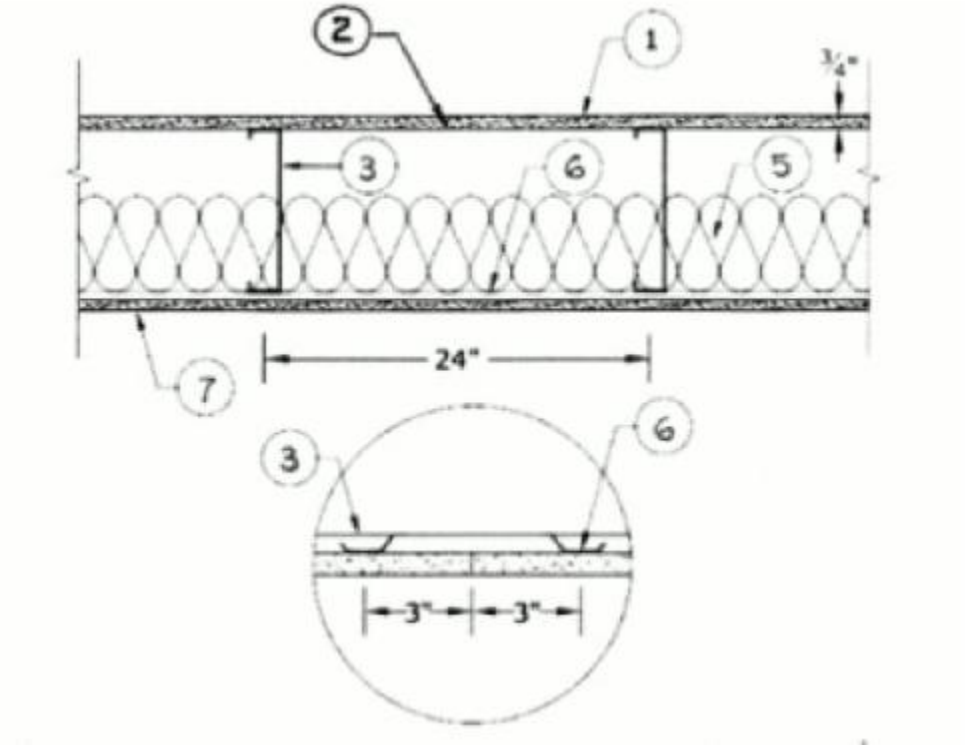



*Figure 24 Reproduced from UL P561. Available on UL Product iQ*

UL Design P561 is an unrestrained light-gauge steel floor–ceiling/roof–ceiling assembly with published 1-, 1-1/2-, and 2-hour fire-resistance ratings, with the rating dependent on the specific steel joist/truss option selected in Item 3 and the associated roof/deck and ceiling membrane requirements. As per the reference listing, the roof deck (Item 2) is a nominal 3/4 in. structural cement-fiber tongue-and-groove panel installed perpendicular to the joists, with end joints staggered a minimum of 2 ft and centered over the joists, and secured with 1-5/8 in. No. 8 self-drilling, self-countersinking steel screws spaced a maximum of 12 in. o.c. in the field and 8 in. o.c. on the perimeter.

The fire-exposed ceiling protective membrane (Item 7) is one layer of nominal 5/8 in. gypsum board installed perpendicular to the resilient/furring channels, fastened with 1 in. Type S bugle-head screws spaced 8 in. o.c., with end joints secured to both channels and with explicit butt-joint support requirements when clip/furring options are used (Items 6B/6C require butt joints supported by two furring channels closely spaced and clip-supported as detailed).

For the analysis, the proposed Magnum Board substitutions are supported by the report's test data and the literature review on MgO-based lining behavior, and are evaluated by member function while keeping controlling UL variables unchanged. The Magnum Board evidence indicates noncombustibility and very low heat/smoke release and full-scale ASTM E119/UL 263 wall testing shows that mechanically fastened Magnum Board membranes with finished joints and mineral wool can maintain integrity and limit heat transmission through 1 hour and can exhibit 2-hour thermal performance in a comparable steel-stud configuration based on archived record review.

For the roof deck substitution (Reference Item "2"), substituting 18 mm T&G Magnum Board for the structural cement-fiber T&G deck is consistent with the listed deck intent because it preserves T&G diaphragm continuity, minimum 2 ft end-joint staggering with joist-centered joints, and a fastening approach not less robust than the listed concept, this deck substitution does not replace the fire-exposed thermal barrier and therefore must not introduce unlisted changes that could increase deflection or impose greater demand on the ceiling membrane during furnace exposure. For the ceiling membrane substitution (Reference Item "7") under below-side exposure, a single-layer 12 mm Magnum Board for 1-hour applications and either 2 × 12 mm Magnum Board or 16 mm Magnum Board for up to 2 hours, aligns with the rating objective based on the tests. This engineering judgment addresses only the stated Magnum Board substitutions for the deck and ceiling membranes; all other UL Design P561 requirements remain unchanged.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Fire Rating | Test Reference |
|---|---|---|---|---|---|
| P561 (LGS Assembly) | N/A | '2' – Roof deck | 18mm 4x8 Square Edge Magnum Board | 1 - Hour | Supported by the Magnum Board, the fire-performance evidence set is summarized in this report. Refer to Review of Past Test Data |
| | N/A | | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours | |

*Table 14 Reference P561 LGS Assembly & modifications*

## 11. Conclusions

This report provides engineering judgments for substituting Magnum Board™ into the following referenced UL assemblies evaluated in wood and LGS assemblies, L528, L525, L502, M500, P522, H509, G556, H515, U419, and P561.

The judgments are based on reviewed product-level and selected assembly-level fire-performance evidence. Standardized fire tests evaluate specimens in the condition tested and do not, by themselves, qualify long-term durability or post-installation effects (e.g., moisture exposure, corrosion potential, aging, workmanship variability) unless such conditions are explicitly incorporated into the specimen and/or pre-test conditioning. Because the reviewed evidence set does not include such data, these post-installation effects were not evaluated.

The proposed substitutions generally address (a) floor/roof deck or floor membrane elements (typically T&G panel substitutions where shown), and (b) fire-exposed protective membrane elements (ceiling or wall membrane substitutions), using a thickness of single-layer 12 mm Magnum Board for 1-hour and either 2 × 12 mm or 16 mm Magnum Board for objectives up to 2 hours, as applicable to each design table.

The technical basis includes product-level fire characterization indicating noncombustibility (ASTM E136), very low flame spread/smoke development (ASTM E84 and CAN/ULC-S102), and low heat/smoke release (ASTM E1354/CAN/ULC-S135), together with assembly-level ASTM E119/UL 263 wall evidence demonstrating 1-hour endurance (with hose stream) and archived record review indicating performance consistent with 2-hour thermal criteria in a comparable mechanically fastened, joint-finished Magnum Board wall configuration.

The literature review further supports MgO-based boards as credible fire-exposed protective linings when integrity and detailing are maintained (noncombustible refractory barrier behavior, insulating characteristics, and reported cases of MgO-lined steel wall systems achieving fire-resistance times comparable to or greater than gypsum in certain configurations), while emphasizing that MgO-board performance is product- and formulation-dependent and therefore must be tied to product-specific evidence and controlled manufacturing/quality. These judgments apply only to the scoped Magnum Board ® substitutions identified in this report (not to any MgO based products); no other deviations from the applicable UL designs are evaluated (including framing type/spacing, insulation, support/channel systems, fastening schedules, joint treatment, and all other construction details), and any change beyond scope may requires separate evaluation and AHJ acceptance. It is not a UL listing or guarantee of performance. This engineering judgment provides technical support for the limited substitutions stated in this

report, It does not prevent or replace the need for project-specific testing or additional assembly-level fire testing where required for a UL Listing.

| Reference UL Assembly | Reference System No | Reference item | Proposed Substitution | Expected Fire Rating |
|---|---|---|---|---|
| P561 (LGS Assembly) | N/A | '2' – Roof deck | 18mm 4x8 Square Edge Magnum Board | 1 - Hour |
| | N/A | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| U419 (LGS Assembly) | System - 1 | '5' – Wall sides | Side 1 - 12 mm 4 X 8 Magnum Board **And** Side 2 - 12 mm 4 X 8 Magnum Board | 1 - Hour |
| | | | Side 1 – 2 X 12 mm 4 X 8 Magnum Board **And** Side 2 – 2 X 12 mm 4 X 8 Magnum Board | |
| | | | Side 1 – 16 mm 4 X 8 Magnum Board **And** Side 2 – 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| H515 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm 4 X 8 T & G Magnum Board | 1 - Hour |
| | | '5' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| G556 (LGS Assembly) | System - A | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour |
| | | '6' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |

| | | | | |
|---|---|---|---|---|
| H509 (LGS Assembly) | System - 1 | '1' - Floor Membrane | 18 mm T & G Magnum Board | 1 - Hour |
| | | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 - Hours |
| P522 (Wood Assembly) | N/A | '1' - Roof Membrane | 18 mm 4 X 8 Square Edge Magnum Board for roof decking | 1 - Hour |
| | N/A | | | |
| | N/A | '7' – Ceiling Membrane | 12 mm 4 X 8 Magnum Board | |
| | | | 2 X 12mm 4 X 8 Magnum Board Or 16 mm 4 X 8 Magnum Board | Up to 2 – Hours *(Note: Current UL Listing is only for 1 hr)* |
| M500 (Wood Assembly) | System No -10 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 2 - Hour |
| | System No -09 | | 12 mm 4 x 8 Square Edge Magnum Board over wood | |
| | N/A | '3' – Ceiling Membrane | 16 mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L502 (Wood Assembly) | System No -17 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | N/A | '7' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L525 (Wood Assembly) | System No -16 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | System No -17 | | 12mm 4 x 8 Square Edge Magnum Board over wood | |

| | | | | |
|---|---|---|---|---|
| | N/A | '14' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |
| L528 (Wood Assembly) | System No -24, 34 | '1' - Floor Membrane | 18 mm 4 X 8 T&G Magnum Board | 1 - Hour |
| | N/A | '4' – Ceiling Membrane | 12mm (or thicker as an alternate) 4 X 8 Magnum Board | |

*Table 15 Summary of evaluated modifications*

## 12. Appendix

Refer to https://iq.ulprospector.com/en

- BXUV.G556 _ Product iQ
- BXUV.H509 _ Product iQ
- BXUV.H515 _ Product iQ
- BXUV.L502 _ Product iQ
- BXUV.L525 _ Product iQ
- BXUV.L528 _ Product iQ
- BXUV.M500 _ Product iQ
- BXUV.P522 _ Product iQ
- BXUV.P561 _ Product iQ
- BXUV.U419 _ Product iQ

## Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

# BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
# BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

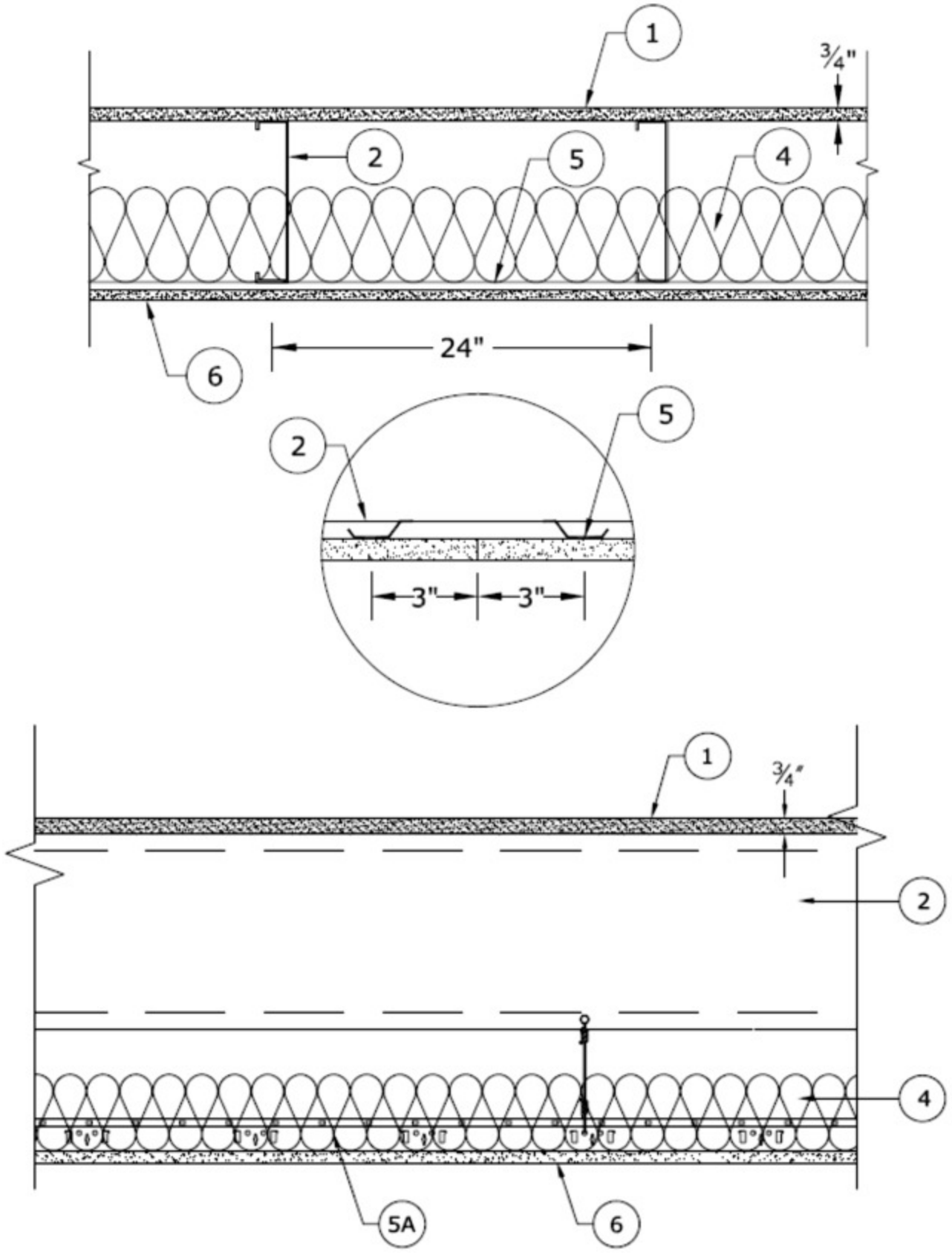
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

## Design No. G556

July 4, 2025

**Unrestrained Assembly Rating — 1, 1-1/2 and 2 Hr (See Item 1)**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




1. **Flooring System —**

**1 or 1-1/2 Hr Rating**

**1A. Structural Cement-Fiber Units*** — Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in.

OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.

As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled A36 steel sections for joist specified in Item 2I:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

**Unrestrained Assembly Rating is 1 hour when Item 2A or 2B is used. Unrestrained Assembly Rating is 1-1/2 hour when Item 2 is used.**

**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

**2 Hr Rating**
**System A**

1A. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled A36 steel sections for joist specified in Item 2I:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

1B. **Gypsum Board* (Not Shown) —** Min 1/4 in. thick, 4 ft by 4 ft gypsum board underlayment, Classified as to Surface Burning Characteristics. Bonded and attached to Structural Cement Fiber Unites (Item 1A) with a mortar applied with a 1/4 in. by 1/4 in. notched trowel, and 1-1/4 in. long coarse thread screws spaced max 8 in. OC. Joints between Structural Cement Fiber Units and of Gypsum Board staggered a min of 6 in.
**UNITED STATES GYPSUM CO** — Type FRX-G

1C. **Floor Mat Materials* —** (Optional) — Floor mat material loosely laid over Structural Cement-Fiber Units (Item 1A). Gypsum Board Item 1B loosely laid over floor mat material with joints of bottom layer of Gypsum Board staggered a minimum of 12 in. in both directions.
**KINETICS NOISE CONTROL INC** — Type Soundmatt

**PLITEQ INC** — Types GenieMat RST02, GenieMat RST05

**System B**

1A. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled A36 steel sections for joist specified in Item 2I:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

1B. **Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**USG MEXICO S A DE C V** — Types LRK, HSLRK, CSD

**Floor Mat Materials* —** (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

**Alternate Floor Mat Materials* —** (Optional) - Floor mat material nom 3/8 in. thick loose laid over the subfloor. Floor topping thickness a min 3/4 in. over the floor mat.
**GRASSWORX L L C** — Type SC50

**Alternate Floor Mat Materials* -** (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**FORMULATED MATERIALS LLC** – Treadstone Elite Max

2. **Steel Joists —** Channel-shaped, min 10 in. deep with min 1-5/8 in. wide flanges and 1/2 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 50,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2A. **Steel Joists —** (Not Shown) -As an alternate to Item 2 - For maximum clear spans not exceeded 8 ft. Channel-shaped, min 6 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges.

Fabricated from min No. 18 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2B. **Steel Joists —** (Not Shown) -As an alternate to Item 2 - Channel-shaped, min 8 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

2C. **Steel Joists —** As an alternate to item 2 only - The joists are channel-shaped, 10 in. min depth. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to rim joist with a minimum of three #10 3/4 in. long self-drilling screws at the rim track clip to the outside of the web joist, and a #10 1/2 in. long screw through the top and bottom flange of the joists to the top and bottom flange of the rim track. At rim joist splices bearing on supports, rim joists are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with a minimum of six 3/4 in. long self-drilling #10 screws to each rim piece. For use with item 3C.
**CEMCO, LLC** — Type SSCJ floor joists, SSRT rim joists or Type SSTT rim joists. When Type SSTT rim joists are used, secured to preformed clip tabs in accordance with manufacturers installation instructions.

2D. **Clip Angles —** No. 16 MSG, 9-3/4 in. long steel angles with 2 in. legs. Secured to track and joist with eight No.10, 3/4 in. long, self drilling, hex head screws, located 1 in. from each end of clip angle, with the other two screws on each leg evenly spaced. Only one clip angle per joist end.

2E. **Clip Angles —** (Not Shown) - As an alternate to Item 2C, for use with 6 or 8 in. deep joists (Item 2A or 2B). No. 16 MSG, 5-1/2 in. long steel angles with 1-1/2 in. legs for 6 in. deep joists and No. 18 MSG, 7-1/4 in. long steel angles with 1-1/2 in. legs for 8 in. deep joists. Secured to track and joist with six No.10, 3/4 in. long, self drilling, hex head screws, located 1 in. from each end of the clip angle and at the centerline. Only one clip angle per joist end.

2F. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 2, 2a, 2b and 2c - Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel chord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness spaced a maximum of 24 in. OC.
**AEGIS METAL FRAMING, DIV OF MITEK** — Ultra-Span, Pre-fabricated Light Gauge Steel Truss System

**TRUSSTEEL, DIV OF ITW BUILDING COMPONENTS INC** — TrusSteel

2G. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 2, 2a, 2b,2c and 2f - Pre-fabricated steel truss system consisting of cold-formed, galvanized steel chord and web sections. Truss top and bottom chords min. 4 in. high by 1-11/16 in. wide by 18 ga. Truss webs min. 1-1/2 in. by 1-1/2 in. by 20 ga. square tube bent and triangulated as shown. Chords and web connected by fillet welds. Overall truss depth min. 12 in. Trusses spaced a max of 24 in. OC. Truss ends placed over and secured to Bearing Seats (Item 2G1) with two min. #10 by 3/4 in. long screws on each side of Bearing Seats. Allowable loading must be calculated so as to stress the steel trusses to a maximum of 98% of the stress calculated in accordance with the allowable stress design approach outlined in the manufacturer's load tables.

**EISEN PANEL SYSTEMS L L C** — Type Gateway Panel pre-fabricated steel truss system.

2G1. **Bearing Seats* —** (Not Shown) — Galvanized steel tube, min. 1 in. by 2-1/2 in. by 13 ga., oriented vertically and welded to min. 4 in. by 4 in. by 10 ga., galvanized steel plate. Bearing seats spaced 24 in. OC and attached to bearing supports by welding or screw attaching the steel plate to the bearing supports.

**EISEN PANEL SYSTEMS L L C** — Type Gateway Panel bearing seat.

2G2. **Bracing —** (Not Shown) - For use with Item 2G — Galvanized channel-shaped steel sections, min. 1-1/2 in. wide with 1/4 in. flanges, min. 16 ga. Bracing attached to underside of trusses with min. #10 by 3/4 in. long screws through truss bottom chord. Bracing installed in truss cavities by scoring, bending and flattening the ends to form a tab for attachment to truss top and bottom chords. Two pieces of bracing crossed and tabs secured to truss chords with min. #10 by 3/4 in. long screws. Location and spacing of underside and crossed bracing to be specified on truss engineering.

2H. **Steel Trusses —** As an alternate to Items 2, 2A, 2B, 2C, 2F and 2G - Cold-formed galvanized steel truss chord and web sections manufactured from steel conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chord and web sections as required by design to meet governing code requirements. Truss members connected together with No. 10-16 (min size) self-drilling screws or equivalent. Truss chord and web members to be designed in accordance with the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members, 1996 Edition. Trusses spaced a max of 24 in. OC. Where the truss intersects with the interior face of the exterior walls, the min truss depth shall be 12 in.

2I. **Steel Joists —** As an alternate to Items 2, 2A, 2B, 2C, 2F, 2G and 2H, minimum 12K1, spaced a max 24 in. OC.

2J. **Structural Steel Members* —** As an alternate to Item 2 - Limited to the 1 Hour Ratings. Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel cord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness. Trusses spaced a max of 24 in. OC. Location of lateral bracing for truss chord and web sections to be specified on truss engineering.
**TRUSS LINK INC** — Truss Link

3. **Joist Bridging —** (Not Shown) - For use with Item 2 and 2B - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of joist sections cut to length and placed between outer supports, adjacent to openings and at mid span with 8 ft OC max spacing. Bridging channels are screw-attached at each end to joist web using angle clips. V-bracing of 1-1/2 in. by 20-ga galvanized steel is screw-attached to bottom joist flange between bridging channels.

3A. **Joist Bridging —** (Not Shown) - For use with Item 2A - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of rim track sections cut to length, with two 4 in. long folded back flanges, and placed between outer supports, adjacent to openings and at mid

span with 10 ft OC max spacing. Bridging channels are screw-attached to each of the four top and bottom joist flanges with two No. 8 by 1/2 in. long wafer head steel screws.

3B. **Joist Bridging —** (Not Shown) - For use with Item 2A and 2B - 1-1/2 in. wide strips formed from 20 MSG - The structural bridging is installed perpendicular to and on the bottom surface of the joists at mid-span with one #10 x 3/4 in. long hex head steel screw at each interface.

3C. **Joist Bridging —** Not shown — For use with item 2C. Installed immediately after joists are erected and before construction loads are applied. The structural bridging, Type CEMCO Sure Bridging, consisting of No. 18 MSG galv steel, 2-1/2 in. wide by 25-1/2 in. long with 1-5/16 in. long legs structural bridging staggered between the steel joists and attached to the bottom joist flange with two #10 1/2 in. long self-drilling screws at each end tab of bridging. Solid bridging consisting of cut to length joist sections placed between outer joists and at center joist with 8 ft OC max spacing. Solid bridging is seated in the structural bridging and is screw-attached at joist web using Type CEMCO Sure-Support Clips (1-1/2 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg on one side and the other side with Type CEMCO Sure-Support Clips (4 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg.

3D. **Bridging —** (Not Shown)—For use with Item 2F - Location of lateral bracing for truss chord and web sections to be specified on truss engineering.

4. **Batts and Blankets* —** 3-5/8 in. thick glass fiber batt insulation draped over the resilient channels (Item 5) or suspension system grid (Item 5A). Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics having a flame spread index of 25 or less and a smoke developed index of 50 or less may be used. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

5. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two channels, spaced 6 in. OC, oriented opposite each gypsum board end joint as shown on the illustration above. Additional channels shall extend min 6 in. beyond each side edge of board.

5A. **Steel Framing Members* —** (Optional, Not Shown) — When it is desired to drop the ceiling below the bottom plane of the structural steel members (Item 2), a suspension system may be used in lieu of the resilient channels. Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long , 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC a min of 4 in. below bottom flange of joists, twist tied to #10 - 3/4 in. long screws installed in the web, 1/2 in. from the bottom flange of the steel joists. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft or 12 ft long, installed perpendicular to main runners, spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.
**CGC INC** — Type DGL or RX

**USG INTERIORS LLC** — Type DGL or RX.

5B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.
**PLITEQ INC** — Type Genie Clip

5C. **Alternate Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Items 5 to 5B, furring channels and Steel Framing Members as described below.

a. **Furring channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the steel joists (Item 2). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No.

8 x 2-1/2 in. coarse drywall screw through the center grommet. RSIC-Si-X secured to alternating joints with No. 10 x 2-1/2 in. self drilling screws. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 6.

**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-Si-X or RSIC-1 (2.75)

5D. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —**
Formed of No. 25 MSG galv steel, 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b.

b. **Steel Framing Members* —**
Used to attach furring channels (Item a) to the steel joists (Item 2). Clips spaced at 48 in. OC and secured to the bottom of the joists with one 2-1/2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 6.

**REGUPOL AMERICA** — Type SonusClip

6. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels, furring channels or cross tees of suspension system. Gypsum panels secured to resilient/furring channels or drywall suspension system with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel midspan, and 1-1/2 in. from side edges of the board. End joints secured to both resilient/furring channels as shown in end joint detail. When **Steel Framing Members** (Item 5B or 5C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.
When **Steel Framing Members** (Item 5D) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, an additional single length of furring channel shall be installed and be spaced approximately 3 in. from the butt joint (6 in. from the continuous furring channels) to support the floating end of the gypsum board. Each of these shorter sections of furring channel shall extend one joist beyond the width of the gypsum panel and be attached to the adjacent joists with one SonusClip at every joist involved with the butt joint.

**CGC INC** — Types C, IP-X2, IPC-AR, ULIX

**NATIONAL GYPSUM CO** — Type FSW-C

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, ULIX

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

6A. **Gypsum Board* —** For use when Steel Framing Members* (Item 5A) are used - One layer of 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side edges centered over main runners and joints centered over cross tees or channels. Fastened to cross tees or channels with 1 in. long Type S screws bugle-head screws spaced 8 in. OC with the screws located 4 in. from the midspan of the cross tee or channel, and 1-1/2 in. from side edges of gypsum panel. Fastened to main runners with 1 in. long Type S bugle-head screws spaced midway between cross tees or channels. End joints of gypsum panels shall be staggered not less than 4 ft OC with adjacent gypsum panels end joints.
**CGC INC** — Types C, IP-X2, IPC-AR, ULIX

**NATIONAL GYPSUM CO** — Type FSW-C

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, ULIX

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

7. **Finishing System - (Not Shown) —** Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-07-04

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

## Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

# BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

# BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

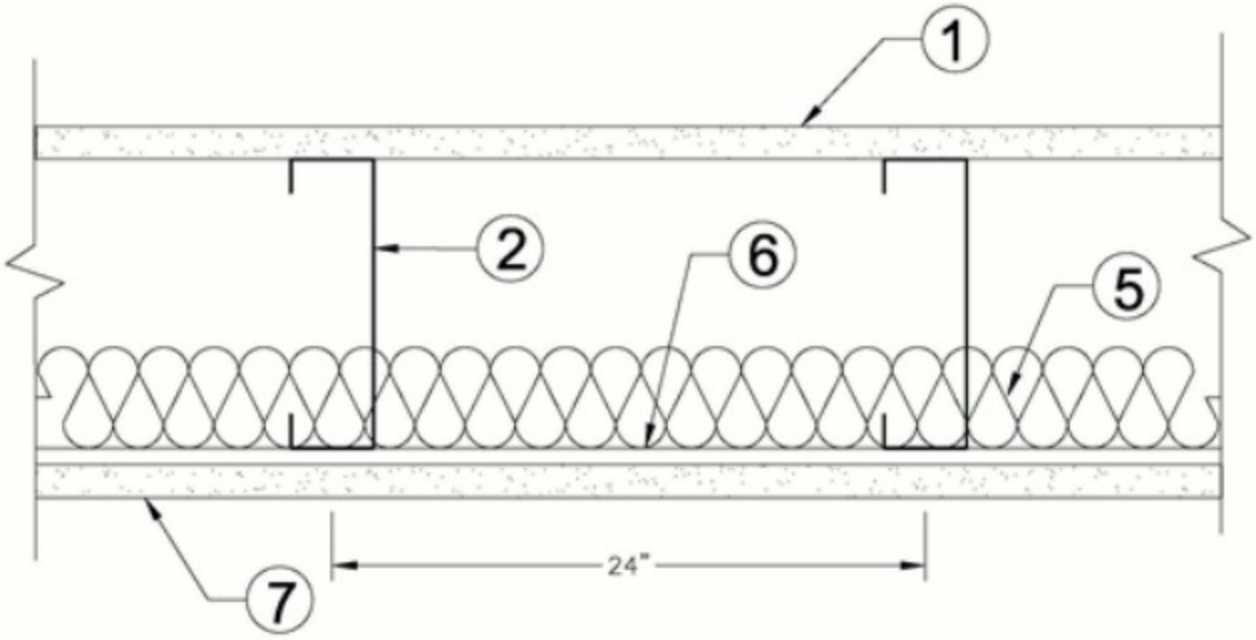
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

### Design No. H509

January 26, 2021

**Unrestrained Assembly Rating — 1, 1-1/2 and 2 Hr. (See Item 7)**
**Loading Determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit State Design Provisions of Part 4 of the National Building Code of Canada.**
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




1. **Flooring System - Building Units* —** Nom 3/4 in. thick, tongue and grooved boards. Long dimension of boards to be perpendicular to joists with end joints staggered a min of 4 ft. and centered over the joists. Boards secured to steel joists with 1-1/4 in. long self-drilling, self-countersinking, bugle head steel screws spaced a max of 12 in. OC in the field with screws located 1 in. from long edge, and max 8 in. OC along the end joints with screws located 1/2 in. from end joint.
**ECTEK INTERNATIONAL INC** — Type MegaBoard

2. **Structural Steel Members —** C-shaped, galvanized steel section, min 10 in. deep with min 1-5/8 in. flanges and min 1/2 in. returns. Joists fabricated from min No. 16 MSG galv steel with Yield Strength of 50,000 psi. Joists spaced max 24 in. OC. At joist rim splices bearing on supports, joists rims are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with four 3/4 in. long No. 10 self-drilling steel TEK screws to each rim piece.

**Alternates to Item 2:**

2A. **Structural Steel Members —** Cold-formed, Min 16 MSG galvanized steel truss chord and web sections manufactured from steel conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chord and web sections as required by design to meet governing code requirements. Truss members connected together with No. 10-16 (min size) self-drilling screws or equivalent. Truss chord and web members to be designed in accordance with the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members, 1996 Edition. Trusses spaced a max of 24 in. OC. Minimum truss depth 12.

2B. **Structural Steel Members* —** Pre-fabricated steel truss system consisting of chord and web sections fabricated from min 16 MSG cold-formed, galvanized steel. Min. depth 12 in. Trusses spaced a max of 24 in. OC.
**KEYMARK ENTERPRISES L L C** — KeyTruss system

2C. **Structural Steel Members* —** Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel chord and web sections. Minimum truss depth 12. Min 16 MSG. Trusses spaced a maximum of 24 in. OC.
**AEGIS METAL FRAMING, DIV OF MITEK** — Ultra-Span, Pre-fabricated Light Gauge Steel Truss System

**TRUSSTEEL, DIV OF ITW BUILDING COMPONENTS INC** — TrusSteel

2D. **Structural Steel Members* —** Pre-fabricated light gauge steel truss system consisting of cold-formed, galvanized steel cord and web sections. Trusses fabricated from min 16 MSG steel. Trusses minimum 12 in. deep, spaced a max of 24 in. OC.
**DOUGLASS COLONY GROUP INC** — Type FRAMECAD

3. **Joist Bridging —** Not Shown — Installed at the center of the joist span immediately after joists are erected and before construction loads are applied. Bridging consisting of cut-to-length joist sections (Item 2) placed between the joists with a max spacing of 8 ft. OC.

4. **Angle Clips —** Not Shown — 1-1/2 x 4 x 9-1/4 in. long, No 16 ga clips used to fasten joists to joist rim track. 4 in. side of clip placed against outside web of joists and 1-1/2in. side placed against joist rim track. Each side secured with three #10-3/4 in. TEK screws. 1-1/2 x 4 x 8 in., No. 16 ga clips used to fasten joist bridging with clip located on the web/flange side of the joist. Clip fastened with two #10-3/4 in. TEK screws per leg per clip. 1-1/2 x 1-1/2 x 8 in, No 16 ga clips used to fasten joist bridging with clip located on the web/non-flange side of the joist. Clip fastened with two #10-3/4 in. TEK screws per leg per clip.

4A. **Web Stiffeners —** Not shown —Web stiffeners, min 3-5/8 in. wide with min 9/16 in. flange and min 1-1/4 in. flange, having the same depth as the joists. Fabricated from min 16 MSG galv steel. Secured to each joist at support ends with four #10 by 3/4 in. long self-drilling screws

5. **Batts and Blankets* —** 3-1/2 in. thick glass fiber batt insulation of nominal 0.5 pcf density, draped over the resilient channels (Item 6). Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics having a flame spread index of 25 or less and a smoke developed index of 50 or less may be used. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

6. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two additional channels spaced 6 in. OC, oriented opposite each gypsum board end joint. The additional channels shall extend min 12 in. beyond each side edge of board.

6A. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring channels used at end joints of gypsum board (Item 7), each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels —** 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to joists, friction-fitted into the channel caddy on the Steel Framing Members (Item 6Ac) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Steel Framing Members* —** Spaced 48 in. OC. max along joist, and secured to the joist on alternating joists with two, No. 10-16 TEK screws through mounting holes on the hanger bracket.
**PAC INTERNATIONAL L L C** — Type RSIC-SI-CRC EZ Clip

6B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC perpendicular to joists and friction fit into Steel Framing Members (Item 6Bb). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels used at end joints of gypsum board (Item 7). Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Steel Framing Members* —** Used to attach furring channels (Item 6Ba) to joists. Clips spaced 48 in. OC and secured along joist webs at each furring channel intersection with min. 3/4 in. long self-drilling No. 10-16 TEK screws through each of the provided hole locations. Furring channels are friction fitted into clips.

**PAC INTERNATIONAL L L C** — Type RSIC-S1-1 Ultra

7. **Gypsum Board* —** (For 1 and 1-1/2 hour ratings - one layer of board). Nom 5/8 in. thick, 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels. End joints centered on resilient channels. Gypsum panels secured with 1 in. long Type S bugle-head screws spaced 12 in. OC in the field and 8 in. OC at the end joints. Screws located 1-1/4 in. and 4 in. from the end joints and 1-1/2 in. from side edges of the panels.
(For 2 hour rating - two layers of board). Base Layer : Nom 5/8 in. thick, 48 in. wide gypsum panels. Base layer installed with long dimension perpendicular to resilient channels, secured with 1 in. long Type S bugle-head screws spaced 12 in. OC, with screws located 6 in. from and on each side of the gypsum panel, in both the field and the perimeter, and 1-1/2 in. from side edges of the panels. Face Layer : Nom 1/2 in. thick, 48 in. wide gypsum panels. Face layer installed with long dimension perpendicular to resilient channels with joints offset 24 in. from base layer, secured with 1-5/8 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel, in both the field and the perimeter, and 1-1/2 in. from side edges of the panel. Butt joints of face layer panels secured to base layer with 1-5/8 in. long Type S screws spaced 8 in. OC and 1-1/2 in. from side edges of the panels, with butt joints centered over resilient channels. Butt joints of face panels staggered a minimum of 12 in. from butt joints of base layer.

When **Steel Framing Members** (Item 6A) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 7 as per hourly ratings. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 6B) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 7 as per hourly ratings. Butt joints staggered minimum 24 in. OC.

**NATIONAL GYPSUM CO** — Type FSW-C

**CGC INC** — Type C

**UNITED STATES GYPSUM CO** — Type C

7A. **Gypsum Board* (As an alternative to Item 7) —** Nom 5/8 in. thick, 48 in. wide gypsum board, installed and secured as described in Item 7 with max screw spacing 8 in. OC.
**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — ULIX

8. **Finishing System - (Not Shown) —** Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

## Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

# BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

# BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

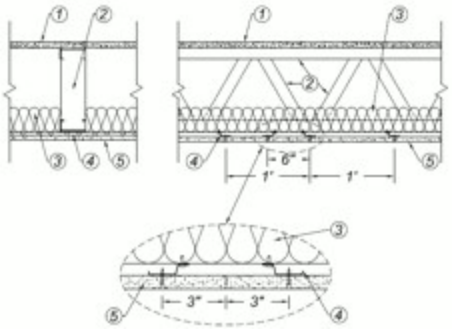
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

### Design No. H515

November 12, 2019

**Unrestrained Assembly Rating —1-1/2 or 2 Hr (For 2 Hr. See Alternate Constructions) This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Flooring System —**

## 1-1/2 Hr Rating

1A. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE or USGSP

2. **Structural Steel Members* —** Pre-fabricated light gauge steel truss system consisting of cold-formed, galvanized steel cord and web sections. Trusses fabricated in various sizes, depths, and from various steel thickness. Trusses minimum 12 in. deep, spaced a max of 24 in. OC.
**DOUGLASS COLONY GROUP INC** — Type FRAMECAD

3. **Batts and Blankets* —** 3-1/2 in. thick glass fiber batt insulation draped over the resilient channels. Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics having a flame spread index of 25 or less and a smoke developed index of 50 or less may be used. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

4. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 6 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two channels, spaced 6 in. OC, oriented opposite each gypsum board end joint as shown on the illustration above. Additional channels shall extend min 6 in. beyond each side edge of board.

4A. **Steel Framing Members* —** (Optional, Not Shown) — As an Alternate to Item 4 - When it is desired to drop the ceiling below the bottom plane of the structural steel members (Item 2), a suspension system may be used in lieu of the resilient channels. Main runners, cross tees, cross channels and wall

angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long , 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC a min of 4 in. below bottom flange of joists, twist tied to #10 - 3/4 in. long screws installed in the web, 1/2 in. from the bottom flange of the steel joists. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 12 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft or 12 ft long, installed perpendicular to main runners, spaced 12 in. OC.

d. **Wall Angle or Channel —** — Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.
**USG INTERIORS LLC** — Type DGL or RX.

4B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 4 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.
**PLITEQ INC** — Type Genie Clip

4C. **Alternate Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 4, furring channels and Steel Framing Members as described below.

a. **Furring channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the steel joists (Item 2). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 6.
**PAC INTERNATIONAL L L C** — Types RSIC-1 or RSIC-1 (2.75)

4D. **Steel Framing Members* —** — (Optional, Not Shown) — As an alternate to Item 4.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to trusses. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring channels used at end joints of gypsum board (Item 5), each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels —** -1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to trusses, friction-fitted into the channel caddy on the Steel Framing Members (Item 4Dd) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Blocking —** Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 3-5/8 in. x 20 ga. steel stud (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 4Dd) location with minimum 2-1/2 in. screws.

d. **Steel Framing Members* —** Spaced 48 in. OC. max along truss, and secured to the truss on alternating trusses with two, No. 10-16 TEK screws through mounting holes on the hanger bracket.

**PAC INTERNATIONAL L L C** — Type RSIC-SI-CRC EZ Clip

4E. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 4.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC perpendicular to trusses and friction fit into Steel Framing Members (Item 4Ec). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels used at end joints of gypsum board (Item 5). Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Blocking —** Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 3-5/8 in. x 20 ga. steel stud (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 4Ec) location with minimum 2-1/2 in. screws.

c. **Steel Framing Members* —** Used to attach furring channels (Item 4Ea) to trusses. Clips spaced 48 in. OC and secured along truss webs at each furring channel intersection with min. 3/4 in. long self-drilling No. 10-16 TEK screws through each of the provided hole locations. Furring channels are friction fitted into clips.
**PAC INTERNATIONAL L L C** — Type RSIC-S1-1 Ultra

5. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels or cross tees of suspension system (Item 4A).Gypsum panels secured to resilient channels or drywall suspension system with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located minimum of 1 in. from the side joints and 3 in. from the end joints. End joints secured to both resilient channels as shown in end joint detail. When **Steel Framing Members** (Item 4B or 4C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.
When **Steel Framing Members** (Item 4D) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 5. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 4E) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 5. Butt joints staggered minimum 24 in. OC.

**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — Type ULIX

6. **Finishing System - (Not Shown) —** Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

**MODIFICATIONS TO INCREASE RATING TO 2 HR (Not Shown):**

## ALTERNATE CONSTRUCTION: 2 Hr Rating

1B. **Gypsum Board* (Not Shown) —** Two layers of min 1/4 in. thick, 4 ft by 4 ft gypsum board underlayment, Classified as to Surface Burning Characteristics. Bonded and attached to each other with a mortar applied with a 1/4 in. by 1/4 in. notched trowel, and min 1/2 in. long staples spaced max 8 in. OC in the field and 4 in. OC along the perimeter. Joints between two layers of Gypsum Board staggered a min of 12 in. in both directions.
**UNITED STATES GYPSUM CO** — Type FRX-G

1C. **Floor Mat Materials* (Not Shown) —** Floor mat material loosely laid over Structural Cement-Fiber Units (Item 1A). Gypsum Board Item 1B loosely laid over floor mat material with joints of bottom layer of Gypsum Board staggered a minimum of 12 in. in both directions.
**KINETICS NOISE CONTROL INC** — Type Soundmatt

**PLITEQ INC** — Types GenieMat RST02, GenieMat RST05

## ALTERNATE CONSTRUCTION: 2 Hr Rating

1B. **Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi installed over Structural Cement Fiber Unites (Item 1A) Refer to manufacturer's instructions accompanying the material for specific mix design.
**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**Floor Mat Materials* —** (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

## ALTERNATE CONSTRUCTION: 2 Hr Rating

5. **Gypsum Board* — Two Layers —** Nom 5/8 in. thick, 48 in. wide gypsum panels. Base layer installed with long dimension perpendicular to resilient channels, furring channels or cross tees, secured with 1-1/4 in. long Type S bugle-head screws spaced 12 in. OC, with screws located 6 in. from and on each side of the gypsum panel, in both the field and the perimeter, and 1-1/2 in. from side edges of the panels. Face layer installed with long dimension perpendicular to resilient/furring channels or cross tees with joints offset 24 in. from base layer, secured with 1-5/8 in. long Type S bugle-head screws spaced 8 in. OC in both the field and the perimeter, and 1-1/2 in. from side edges of the panel. Butt joints of face layer panels secured to base layer with 1-1/2 in. long Type G screws spaced 8 in. OC and 1-1/2 in. from side edges of the panels, with butt joints located between resilient/furring channels. Butt joints of face panels staggered a minimum of 12 in. from butt joints of base layer. When **Steel Framing Members** (Item 4B or 4C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.
When **Steel Framing Members** (Item 4D) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 5. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 4E) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 5. Butt joints staggered minimum 24 in. OC.

**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — Type ULIX

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2019-11-12

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

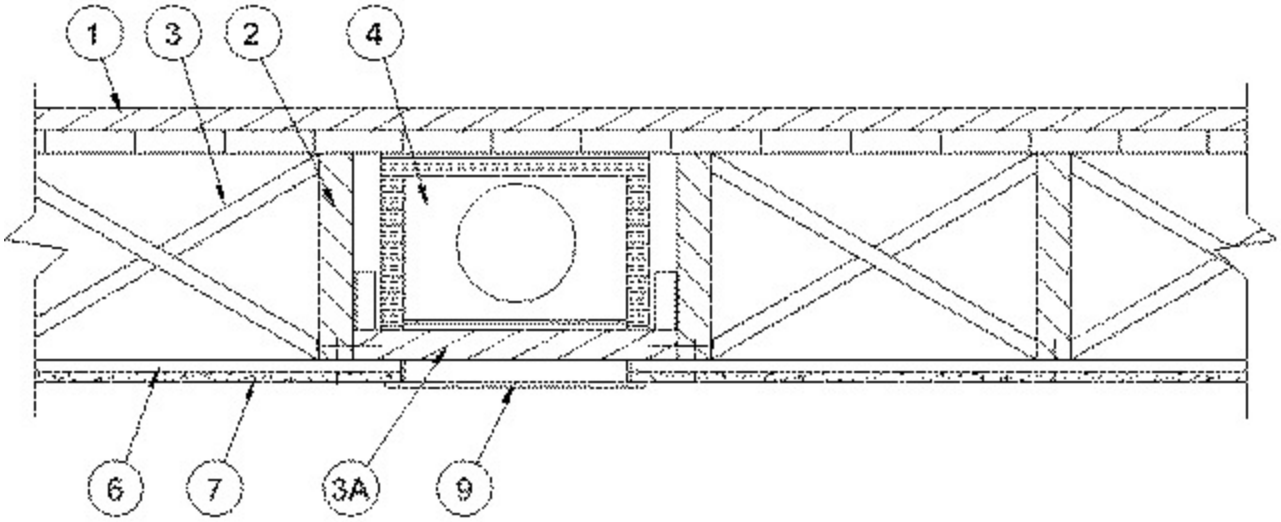
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

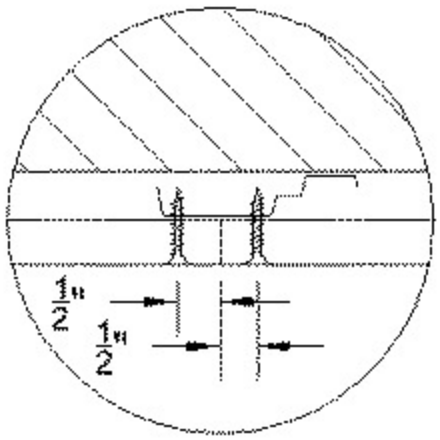
## Design No. **L502**

November 13, 2025

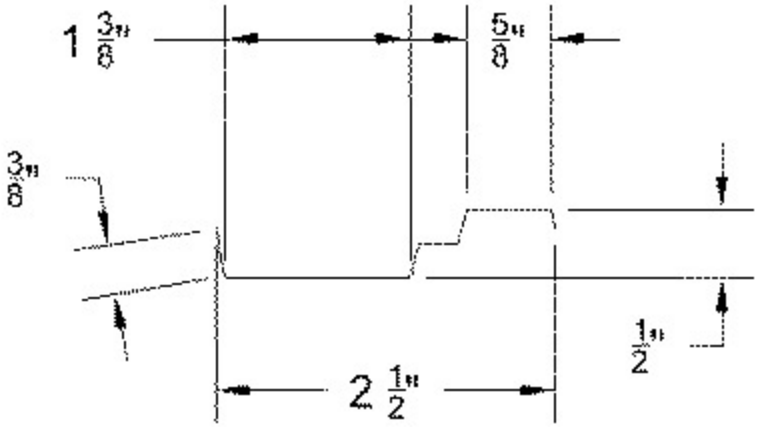
**Unrestrained Assembly Rating — 1 Hr**
**Finish Rating — 22 Min. or (16 Min. See Item 7D)**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




End Joint




Resilient Channel Detail

1. **Finish Flooring —** The flooring system shall consist of one of the following:

**System No. 1**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring** — Min 1 by 4 in. T & G lumber fastened diagonally to joists, or min 19/32 in. wood structural panels, min grade "Underlayment" or "Single Floor". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered.

**System No. 2**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 1-1/2 in. thickness of floor topping mixture having a min compressive strength of 1000 psi and a cast density of 100 plus or minus 5 pcf. Foam concentrate mixed 40:1 by volume with water and expanded at 100 psi through nozzle. Mixture shall consist of 1.4 cu feet of preformed foam concentrate to 94 lbs Type I Portland cement, 300 lbs of sand with 5-1/2 gal of water.

**ELASTIZELL CORP OF AMERICA** — Type FF

**System No. 3**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Floor Mat Materials* — (Optional)** — Floor mat material nom 1/8 in. (3 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — Type FIRM-FILL SCM 125

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 1/4 in. (6 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 250 and FIRM-FILL SCM 250+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/8 in. (10 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/4 in. (32 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 400 and FIRM-FILL SCM 400+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/4 in. (19 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in. (38 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 750 and FIRM-FILL SCM 750+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 5/64 in. (2 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 1/4 in. (6 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. (32 mm) of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat II

**Metal Lath (Optional)** — For use with 3/8 in. (10 mm) floor mat materials, 3/8 in. expanded steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material. Hacker Floor Primer to be applied prior to the placement of the metal lath. When metal lath is used, floor topping thickness a nom 1-1/4 in. over the floor mat.

**Finish Flooring — Floor Topping Mixture*** — Min 1 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

**HACKER INDUSTRIES INC** — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Gyp-Span Radiant

**System No. 4**

Deleted.

**System No. 5**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 1-1/2 in. thickness of floor topping mixture having a min compressive strength of 1000 psi and a cast density of 100 plus or minus 5 pcf. Foam concentrate mixed 40:1 by volume with water and expanded at 100 psi through nozzle. Mixture shall consist of 1.2 cu feet of preformed foam concentrate to 94 lbs Type I Portland cement, 300 lbs of sand with 5.5 gal of water.

**AERIX INDUSTRIES** — Floor-Topping Mixture

**System No. 6**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 1 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Mixture shall consist of 5 to 8 gal of water to 80 lbs of floor topping mixture to 2.1 cu ft of sand.

**ULTRA QUIET FLOORS** — Types UQF-A, UQF-Super Blend, UQF-Plus 200

**System No. 7**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**MAXXON CORP** — Types Maxxon Standard and Maxxon High Strength

**Floor Mat Materials* — (Optional)** — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**MAXXON CORP** — Type Encapsulated Sound Mat.

**Floor Mat Reinforcement** — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) — 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** - (Optional, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

**System No. 8**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**FORMULATED MATERIALS LLC** — Types FR-25, FR-30, SiteMix, and Treadstone Advantage

**Alternate Floor Mat Material*** — (Optional) — Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 1 in.

**FORMULATED MATERIALS LLC** — Types M1, M2, M3, Elite, Duo, R1, and R2.

**System No. 9**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Floor — Mineral and Fiber Board*** — Min 1/2 in. thick, supplied in sizes ranging from 3 ft by 4 ft to 8 ft by 12 ft. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.

**HOMASOTE CO** — Type 440-32 Mineral and Fiber Board

**System No. 10**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**USG MEXICO S A DE C V** — Types LRK, HSLRK, CSD

**Floor Mat Materials* —** (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

**Alternate Floor Mat Materials* — (Optional)** — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding minimum thickness of floor topping over floor mat.

**GRASSWORX L L C** — SC Types

**Alternate Floor Mat Material*** — (Optional) — Floor mat material nominal 3/8 in. thick loose laid over the subfloor. Floor topping shall be a min 1 in. thick.

**System No. 11**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ARCOSA SPECIALTY MATERIALS** — AccuCrete® Types NexGen, Green, Prime and PrePour, AccuRadiant®, AccuLevel® Types G40, G50 and SD30

**Alternate Floor Mat Material*** - (Optional) - Floor mat material nominal 5/64 in. - 16/64 in. thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.

**ARCOSA SPECIALTY MATERIALS**— AccuQuiet® Types D13, D-18, D25, EM.125, EM.125S, EM.250, EM.250S.

**Alternate Floor Mat Material*** - (Optional) — Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 1 in.

**ARCOSA SPECIALTY MATERIALS** — AccuQuiet Types D25, DX38, EM.250, EM.250S, EM.375, EM.375S, EM.750, and EM.750S.

**System No. 12**

**Subflooring** — 15/32 or 19/32 in. thick wood structural panels, min. grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 or 1 in. thickness of floor topping mixture for 19/32 or 15/32 in. thick wood structural panels respectively, having a min compressive strength of 2100 psi. Refer to manufacturer's instructions accompanying the material for specific mix design. Refer to the manufacturer’s instructions accompanying the material and/or contact the manufacturer’s technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**System No. 13**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) - Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 14**

**Subflooring** — Min 23/32 in. thick T&G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the joists with end joints staggered 4 ft. Panels secured to joists with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each joist. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Gypsum Board*** — One layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1 in. long No. 6 Type W bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**Floor Mat Materials*** — (As an alternate to the single layer gypsum board) — Floor mat material loose laid over the subfloor.

**MAXXON CORP** — Type Encapsulated Sound Mat

**Gypsum Board*** — (For use when floor mat is used) Two layers of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists on top of the floor mat material. Gypsum

board secured to each other with 1 in. long No. 6 Type G bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches in between layers and from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**System No. 15**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**DEPENDABLE LLC** — GSL M3.4, GSL K2.6, GSL-CSD and GSL RH

**Floor Mat Materials***— (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 16**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials*** — (Optional) — Nom 3/32 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat RST02

**Floor Mat Materials*** — (Optional) — Nom 3/16 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat FF03NP

**Floor Mat Materials*** — (Optional) — Nom 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat FF06

**Floor Mat Materials*** — (Optional) — Nom 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**PLITEQ INC** — Type GenieMat FF10

**Floor Mat Materials*** — (Optional) — Nom 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**PLITEQ INC** — Type GenieMat FF17

**Floor Mat Materials*** — (Optional) — Nom 1 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**PLITEQ INC** — Type GenieMat FF25

**System No. 17**

**Subflooring — Building Units* —** Nom 3/4 in. thick, tongue and grooved boards. Long dimension of boards to be perpendicular to joists with end joints staggered a min of 4 ft. and centered over the joists. Boards secured to joists with 2 in. long self-drilling, self- tapping screws or 2 in. x 0.113 in. Ring Shank nails spaced a max of 12 in. OC in the field with screws/nails located 1 in. from long edge, and max 8 in. OC along the end joints with screws/nails located 1/2 in. from end joint.
**ECTEK INTERNATIONAL INC** — Type MegaBoard

**Vapor Barrier (Optional) —** Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring —** Min 1 by 4 in. T & G lumber fastened diagonally to joists, or min 19/32 in. wood structural panels, min grade "Underlayment" or "Single Floor". Face grain of plywood or strength axis of panels to be

perpendicular to joists with joints staggered.
Finish Flooring is optional when the alternate subfloor Type MegaBoard is used.

**System No. 18**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Finish Flooring* — Floor Topping Materials —** Min 3/4 in. to 1-1/2 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance with a minimum compressive strength of 1500 psi.

> See **Floor- and Roof-Topping Mixtures** (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional) — Floor mat material nom 1/8 in. to 3/4 in. thick. Loose laid over the subfloor. When used, Acousti-flor CSM (crack suppression mat) is loose laid over the floor mat material. Floor topping material thickness is dependent on thickness of floor mat used.
**WALFLOR INDUSTRIES INC** — Type Acousti-flor, Acousti-flor CSM. Floor topping thickness depends on products used as follows:

Acousti-flor (1/8 in. thick) - Floor topping thickness shall be a minimum of 3/4 in.

Acousti-flor (1/4 in. thick) - Floor topping thickness shall be a minimum of 1 in.

Acousti-flor (3/8 in. thick) - Floor topping thickness shall be a minimum of 1 in.

Acousti-flor (3/4 in. thick) - Floor topping thickness shall be a minimum of 1-1/2 in.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 19**

**Subflooring —** Min 15/32 in. thick wood structural panels, min grade "C-D" or "sheathing." Face grain of plywood or strength axis of panels to be perpendicular to the joist with joints staggered.

**Wall and Partition Facings and Accessories* - Sound Barrier (Optional) —** Acoustic Sleeper pads stapled to the top of the subfloor, the bottom of the finish floor, or to 5/16 in. thick by 1-1/2 in. wide wood strips and

centered over wood joist. Acoustic Sleeper pads are to be spaced appropriately so that the finish floor panels are fastened through Acoustic Sleeper pads to the joist.
**STC ARCHITECTURAL PRODUCTS L L C DBA STC SOUND CONTROL** — Acoustic Sleeper

**Finish Floor —** Min 19/32 in. wood structural panels min grade "Underlayment" or "Single Floor". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered and panels fastened through to joist. Butt joints of panels have the option of being sealed with any UL Classified caulk or sealant found under - Fill, Void or Cavity Materials* (XHHW).

**System No. 20**

**Subflooring —** Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier —** (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier —** (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring — Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**ARCOSA SPECIALTY MATERIALS** — AccuCrete® Types NexGen, Green, Prime, and PrePour, AccuRadiant®, AccuLevel® Types G40, G50 and SD30.

**Alternate Floor Mat Material* —** (Optional) - Floor mat material nominal 5/64 in. - 16/64 in. thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.
**ARCOSA SPECIALTY MATERIALS** — AccuQuiet® Types D-18, D25, EM.125, EM.125S, EM.250, EM.250S.

**Alternate Floor Mat Material* —** (Optional) - Floor mat material nominal 17/64 - 48/64 in. thick loose laid over the subfloor. Floor topping shall be a min of 1 in.
**ARCOSA SPECIALTY MATERIALS** — AccuQuiet® Types DX38, EM.375, EM.375S, EM.750, and EM.750S.

**System No. 21**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 4500 psi. Refer to manufacturer's instructions accompanying the material for

specific mix design.
**SIKA DEUTSCHLAND GMBH** — Type SCHONOX AP Rapid Plus

**System No. 22**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier —** (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier —** (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**Freudenberg Performance Materials LP** — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750, and 750 Plus.

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 23**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.030 in. thick commercial asphalt saturated felt.

**Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**GRASSWORX L L C** — SC Types

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 24**

**Subflooring — Subflooring** — Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Wood structural panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails.

**Finish Floor - Building Units* —** Min 1/2 in. thick magnesium oxide panels installed parallel, perpendicular, or diagonally to trusses with panel edges offset a min of 4 in. between subfloor and magnesium oxide panels. Panels secured to subfloor with construction adhesive and corrosion resistant fasteners, spaced max 12 in. OC around the perimeter and in the field of the panel. Fasteners must be placed no closer than 1/2 in. from all panel edges and no closer than 2 in. from panel corners. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails.

**HUBER ENGINEERED WOODS L L C** — Type 1/2 in. Square Edge Exacor™ Board

**System No. 25**

**Building Units* —**Nom 3/4 in. thick. Long dimension of panels to be perpendicular to trusses with end joints staggered a min of 4 ft. and joints centered over the joists. Panels secured to wood joists with 2 in. x 0.113 in. Ring Shank nails spaced a max of 12 in. OC in the field and on the perimeter. Fasteners must be placed no closer than 1/2 in. from all panel edges and no closer than 2 in. from panel corners. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails. When used, **Batts and Blankets***, Item 5C are required and Gypsum Wallboard* thickness increased to 5/8 in. with gypsum board fasteners increased in length by 1/8 in. from that specified for ½ in. thick gypsum board.

**HUBER ENGINEERED WOODS L L C** — Type 3/4 in. Tongue and Groove Exacor™ Board

**System No. 26**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ALPHAGYP, LLC** — Type AlphaGyp

**Floor Mat Materials***— (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 27**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Floor Mat Materials*** — (Optional) — Any Floor Mat Material bearing the UL Classification Marking as to Fire Resistance. See Floor Mat Materials (CCQU) category for names of Classified Companies. Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**Metal Lath —** (Optional) — 3.4 lbs/sq yd expanded galvanized steel diamond lath. Refer to manufacturer’s instructions regarding installation recommendations.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**LATICRETE INTERNATIONAL INC** — Type LAT

**System No. 28**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be

perpendicular to the joists with joints staggered.

**Vapor Barrier — (Optional)** — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**BoldStep** — Types BoldStep Regular and BoldStep High Strength

**Floor Mat Materials* — (Optional)** — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**BoldStep** — Type Sound Mat

**Floor Mat Reinforcement** — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) — 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** — (Optional, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

**System No. 29**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**Apex Minerals LLC** — Type Apex Multi Underlayment

2. **Wood Joists —** Min 2 by 10, spaced 16 in. OC and effectively fireblocked in accordance with local codes.

3. **Cross Bridging —** Min 1 by 3 in. or min 2 by 10 solid blocking.

3A. **Horizontal Bridging —** Used in lieu of Item 3 in same joist bay as ceiling damper (Item 4), when ceiling damper is employed. Wood 2 by 4 in. secured between joists with nails.

4. **Ceiling Damper* — (Optional) —** Max nom area shall be 198 sq in. Max rectangular size shall be 12 in. wide by 16-1/2 in. long. Max height of damper shall be 8-3/4 in. Aggregate damper openings shall not exceed 99 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 9) shall be installed in accordance with installation instructions.

**AIR BALANCE INC** — Type 299 (See Item 7D)

**CENTRAL VENTILATION SYSTEMS CO L L C** — Models C-S/R-HC(-A), C-RD-HC(-A); Models CD-S/R-HC, CD-RD-HC

**JAMIL ALI NASSER AL-ZADJALI FOR INDUSTRY**— Models C-S/R-HC(-A), C-RD-HC(-A); Models CD-S/R-HC, CD-RD-HC

**BADR & ASFOUR COMPANY FOR ENGINEERING AND METAL INDUSTRIES** — Models C-S/R-HC(-A), C-RD-HC(-A)

**GREENHECK FAN CORP** — Model CRD-1WJ

**METAL-FAB INC** — Models MSCDHC, MRCDHC

**BRISK MFG INC** — Model BMI-50-CRD-S/R-WT

**PRICE INDUSTRIES LTD** — Models CD-S/R-HC, CD-RD-HC

**RUSKIN COMPANY** — Model CFD7

**UNITED ENERTECH CORP** — Models C-S/R-HC(-A), C-RD-HC(-A)

5. **Batts and Blankets* — (Optional, Not Shown) —** For use with **Steel Framing Members*** (Items 6C and 6G only) and **Gypsum Board*** (Items 7A and 7B). Any thickness mineral wool or glass fiber insulation bearing the UL Classification Marking for Surface Burning Characteristics, having a flame spread index of 25 or less and a smoke developed index of 50 or less. Insulation fitted in the concealed space, draped over the steel framing members/gypsum board ceiling membrane.

5A. **Batts and Blankets* —** For use with Items 6G and 7C only - Glass fiber insulation draped over the resilient channel/gypsum panel ceiling membrane. Max. 3-1/2 in. thickness of glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance having a min. density of 0.5 pcf.

5B. **Batts and Blankets* —** For use with **Steel Framing Members*** (Item 6K) and **Gypsum Board*** (Item 7E) - Min. 3-1/2 in. thick, min. density 0.9 lb/ft$^3$ unfaced fiberglass batt insulation bearing the UL Classification Marking for Surface Burning Characteristics, having a flame spread value of 25 or less and a smoke spread value of 50 or less. Insulation fitted in the concealed space, draped over steel framing members/gypsum board ceiling membrane and light fixture protection.

5C. **Batts and Blankets* —** Specified for use with **System No. 25**. 3-1/2 in. thick, min 0.62 pcf glass fiber batt insulation draped over the resilient channels. Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics or fire Resistance may be used. See **Batts and Blankets* (BKNV or BZJZ)** category in the Fire Resistance Directory for names of manufacturers.

5D. **Batts and Blankets* —** (Not Shown) For Use with Item 6Q — Glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. There is no limit in the overall thickness of insulation, and the insulation can be secured against the subflooring, held suspended in the concealed space or draped over the Steel Framing Members and gypsum panel membrane. When draped over the furring channels the furring channel spacing shall be reduced to 12 in OC.

6. **Resilient Channels —** Resilient channels, formed from No. 25 MSG galv steel and shaped as shown, spaced 24 in. OC perpendicular to joist. Channels overlapped 4 in. at splices and secured to each joist with one 6d common nail. Min end clearance of channels to wall to be 1/2 in. Additional resilient channels positioned so as to coincide with end joints of gypsum board (Item 7). Additional channels shall extend min 6 in. beyond each side edge of board.

6A. **Steel Framing Members* — (Not Shown) —** As an alternate to Item 6, main runners nom 12 ft long spaced 48 in. OC. Cross tees nom 4 ft long installed perpendicular to main runners and spaced 16 in. OC. Additional cross tees located 8 in. from and on each side of gypsum board end joints. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runner/cross tee intersections. Hanger wires wrapped and twist-tied on 16d nails driven into the side of joists at least 5 in. above the joist bottom face.
**ROXUL USA INC. D/B/A ROCKFON** — Types 650, 650C, 670, 670C, 670D

6B. **Steel Framing Members* — (Not Shown) —** As an alternate to Item 6, main runners nom 12 ft long, spaced 48 in. OC. Ends of main runners at walls to rest on wall angle, without attachment, with 1/2 to 3/4 in. end clearance. Primary cross tees (1-1/2 in. wide across flange) or cross channels, nom 4 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional primary cross tees or cross channels required at each gypsum board end joint and 8 in. from and on each side of gypsum board end joint.
**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000

6C. **Steel Framing Members* — (Not Shown) —** As an alternate to Item 6, main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runner/cross tee intersections. Hanger wires wrapped and twist-tied on 16d nails driven in to the side of joists at least 5 in. above the bottom face.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. When **Batts and Blankets*** (Item 5) are used, cross tees spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum board end

joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft long, installed perpendicular to main runners, spaced 16 in. OC. When **Batts and Blankets*** (Item 5) are used, cross channels spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum board.
**CGC INC** — Type DGL or RX

**USG INTERIORS LLC** — Type DGL or RX

6D. **Steel Framing Members* —** (Not Shown) As an alternate to Item 6, furring channels and **Steel Framing Members** as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-9/16 in. or 2-23/32 in wide by 7/8 in. deep, spaced 24 in. OC perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 48 in. OC., and secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clip for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clip for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.
**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-1 (2.75)

6E. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6. For use in corridors or rooms having a maximum width dimension of 14 ft. Steel framing members consist of grid runners, locking angle wall molding and hanger bars. Locking angle wall molding secured to walls with steel nails or screws spaced max 24 in. OC. Slots of locking angle wall molding parallel with hanger bars to be aligned with tabbed cutouts in bottom edge of hanger bars. Hanger bars spaced max 50 in. OC and suspended with No. 12 AWG steel hanger wires spaced max 48 in. OC. Adjoining lengths of hanger bar to overlap 12 in. and to be secured together and suspended by a shared hanger wire. A min clearance of 1/4 in. shall be maintained between the ends of the hanger bars and the walls. Grid runners cut-to-length and installed perpendicular to hanger bars and spaced max 24 in. OC with additional grid runners installed 8 in. OC at gypsum board end joints. Grid runners parallel with walls to be spaced max 16 in. from wall. Ends of grid runners to rest on and engage slots of locking angle wall molding with a clearance of 3/8 in. to 1/2 in. maintained between each end of the grid runner and the wall. Bulb of grid runner to be captured by tabbed cutouts in bottom edge of hanger bars.

**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000-SS

6F. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6. Main runners nom 12 ft long, spaced 72 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000

6G. **Resilient Channels —** (Not Shown) - As an alternate to Item 6. Resilient channels, formed from No. 25 MSG galv steel and shaped as shown, spaced 12 in. OC perpendicular to joist. Channels overlapped 4 in. at splices and secured to each joist with 1-1/4 in. Type S screws. Min end clearance of channels to wall to be 1/2 in. Additional resilient channels positioned so as to coincide with end joints of gypsum board (Item 7B or 7C).

6H. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6, furring channels and Steel Framing Members as described below.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in deep, spaced 24 in OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the wood joists (Item 2). Clips spaced 48 in. OC., and secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.
**PLITEQ INC** — Type Genie Clip

6I. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6, furring channels and Steel Framing Members as described below.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-5/8 in. wide by 7/8 in deep, spaced 24 in OC, perpendicular to joists. Channels secured to joists as described in Item b.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the wood joists (Item 2). Clips spaced at 48 in. OC and secured to the bottom of the joists with one 2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG

galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 7.
**STUDCO BUILDING SYSTEMS** — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

6J. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6 Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
**USG INTERIORS LLC** — Type DGL or RX

6K. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6 Main runners nom 12 ft long, spaced 48 in. OC. Cross tees, nom 4 ft. long, installed perpendicular to main runners and spaced 24 in. OC. Additional 4 ft. long cross tees required at 6 in. from each side of butted gypsum board end joints. When **Batts and Blankets*** (Item 5B) are used, cross tees spaced 16 in. OC with additional cross tees 8 in. away from each side of butted gypsum board end joints. The cross tees shall be riveted with 1/8 in. dia. rivets to the wall angle and to the main tee where the cross tee does not align with slot in the main tee. Galvanized steel wall angle with 1-1/2 in. legs attached to walls at perimeter of ceiling with fasteners at 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.
**CERTAINTEED CORP** — Types DWS12-13-20, DWS4.16-13-20, DWS4-13-20, DWS2-13-20, DWS2.16-13-20 and DWA1.5-1.5

**CERTAINTEED CORP** — Types EZDWS12-13-18, EZDWS4.16-13-18, EZDWS4-13-18, EZDWS2-13-18, EZDWS2.16-13-18 and DWA1.5-1.5

6L. **Framing Members* —** (Not Shown) — As an alternate to Item 6. Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
**ROXUL USA INC. D/B/A ROCKFON** — Type 670C, 670D

6M. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6, furring channels and Steel Framing Members as described below.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-1/2 in. wide by 7/8 in deep, spaced 24 in OC, perpendicular to joists. Channels secured to joists as described in Item b.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the wood joists (Item 2). Clips spaced at 48 in. OC and secured to the bottom of the joists with one 2-1/2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG

galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 7.
**REGUPOL AMERICA** — Type SonusClip

6M. **Steel Framing Members* —** — (Not Shown) As an alternate to Item 6, furring channels and **Steel Framing Members** as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-23/32 in wide by 7/8 in.or 1-1/2 in. deep, spaced 24 in. OC perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 48 in. OC., and secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.
**CLARKDIETRICH BUILDING SYSTEMS** — Type ClarkDietrich Sound Clip

6N. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC, perpendicular to the joists. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring channels positioned 3 in. OC, 1-1/2 in. on each side of gypsum board (Item 7) end joints, each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels —** 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to joists, friction-fitted into the channel caddy on the Steel Framing Members (Item 6Nc) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Steel Framing Members* —** Spaced 48 in. OC. max along joist, and secured to the joist on alternating joists with two, #10 x 1-1/2 in. screws through mounting holes on the hanger bracket.
**PAC INTERNATIONAL L L C** — Type RSIC-SI-CRC EZ Clip

6O. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to joists and friction fit into Steel Framing Members (Item 6Ob). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels positioned 6 in. OC, 3 in. on each side of gypsum board (Item 7) end joints. Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Steel Framing Members* —** Used to attach furring channels (Item 6Oa) to joists. Clips spaced 48 in. OC and secured along joist webs at each furring channel intersection with min. 3/4 in. long self-drilling #10 x 1-1/2 in. screws through each of the provided hole locations. Furring channels are friction fitted into clips.
**PAC INTERNATIONAL L L C** — Type RSIC-S1-1 Ultra

6P. **Steel Framing Members* —** (Optional, Not Shown) — Used as an alternate method to attach resilient channels to structural members. A resilient sound isolation accessory shall be used at each attachment point of the resilient channels and spaced max 16 in. O.C. Channel ends butted and centered under the structural members and attached with one accessory at each end. Additional accessories used to hold resilient channels that support the gypsum board end joints, as described in Item 7. The accessory envelops the mounting edge of the resilient channel. The accessory and resilient channel are fastened to the structural members with the screws supplied with the accessory and per the accessory manufacturer's installation instructions. Gypsum Board butt joints staggered minimum 24 in. OC and Gypsum Board screws spaced 8 in. OC when used.
**PAC INTERNATIONAL L L C** — Types RC-1 Boost

6Q. **Steel Framing Members* —** (Optional, not shown )— As an alternate to Item 6) — Furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-23/32 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Gypsum board attached to furring channels as described in Item 7.

b. **Steel Framing Members* —** Used to attach furring channels (Item 6Qa) to joists. Clips spaced maximum 48 in. OC. Clips secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips.

At gypsum board butt joints continuous back to back channels installed with clips installed on every truss.

**ISOTECH INDUSTRIES INC.** — Type ISOSTUD

6R. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6 Main runners nom 12 ft long, spaced 48 in. OC. Cross tees, nom 4 ft. long, installed perpendicular to main runners and spaced 24 in. OC. Additional 4 ft. long cross tees required at 6 in. from each side of butted gypsum board end joints. When **Batts and Blankets*** (Item 5B) are used, cross tees spaced 16 in. OC with additional cross tees 8 in. away from each side of butted gypsum board end joints. The cross tees shall be riveted with 1/8 in. dia. rivets to the wall angle and to the main tee where the cross tee does not align with slot in the main tee. Galvanized steel wall angle with 1-1/2 in. legs attached to walls at perimeter of ceiling with fasteners at 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.

**BAILEY METAL PRODUCTS —** Types BMP-DWA1.5-1.5, BMP-DWS12-13-20, BMP-DWS2.16-13-20, BMP-DWS2-13-20, BMP-DWS4.16-13-20 and BMP-DWS4-13-20

**BAILEY METAL PRODUCTS —** Types BMP-EZDWS12-13-18, BMP-EZDWS2.16-13-18, BMP-EZDWS2-13-18, BMP-EZDWS4.16-13-18, BMP-EZDWS4-13-18 and BMP-DWA1.5-1.5

7. **Gypsum Board* —** Nom 1/2 in. thick, 4 ft wide gypsum board. When resilient channels (Item 6) are used, gypsum board installed with long dimension perpendicular to resilient channels and side joints of sheet located between joists. Nom 1 in. long No. 6 Type S bugle head screws are driven through channel spaced 12 in. OC. End joints of gypsum board similarly fastened to additional resilient channels positioned at end joint locations. Screws shall be spaced 1/2 in. from end joints.
When **Steel Framing Members*** (Item 6A, 6B, 6C) are used, nom 1/2 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Gypsum board secured to cross tees with 1 in. long No. 6 Type S bugle head screws spaced 12 in. OC in the field and 8 in OC along end joints. Adjacent gypsum board sheets held to the end joint furring channel by means of one 1 in. long No. 6 Type S bugle head screw on each side of the end joints. All edge screws located 3/8 to 1/2-in. min distance from edges of gypsum board sheets to main runners with 1 in. long No. 6 Type S bugle head screws spaced 16 in. OC, midway between cross tees. Screws along sides and ends of boards spaced 1/2 in. from board edge. End joints of the sheets shall be staggered with spacing between joints on adjacent boards not less than 4 ft OC.

When **Steel Framing Members*** (Item 6D, 6H) are used, nom 1/2 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to furring channels and side joints of sheet located beneath joists. Nom 1 in. long No. 6 Type S bugle head screws are driven through channel spaced 12 in. OC in the field. Gypsum board butt joints shall be staggered min. 2 ft. within the assembly, and occur between the main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 6 in. on each end. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to the joist with one clip at each end of the channel. Screw spacing along the butt joint to attach the gypsum board to the furring channels shall be 8 in. OC. Joint treatment not required for this rating, except for tapered, rounded-edge gypsum board where edge joints are covered with paper tape and joint compound. As an alternate, nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard. Joints reinforced.

When alternate **Steel Framing Members*** (Item 6E) are used, nom 1/2 in. thick, 4 ft wide gypsum board sheets installed with long dimension (side joints) perpendicular to the grid runners with the end joints staggered min 4 ft and centered between grid runners which are spaced 8 in. OC. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide by 48 in. long pieces of gypsum board are to be laid atop the grid runner flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the grid runners at opposite corners of the backer strip to

prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to grid runners with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When alternate **Steel Framing Members*** (Item 6F) are used, nom 1/2 in. thick, 4 ft wide gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When **Steel Framing Members** (Item 6I) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 3 in. on each end. The two support furring channels shall be spaced approximately 3 in. in from joint. Screw spacing along the gypsum board butt joint and along both additional channels shall be 8 in. OC. Additional screws shall be placed in the adjacent section of gypsum board into the aforementioned 3 in. extension of the extra butt joint channels as well as into the main channel that runs between butt joint furring channels shall be attached with one RESILMOUNT Sound Isolation Clip at each end of the channel.

When alternate **Steel Framing Members*** (Item 6J or 6L) are used, nom 1/2 in. thick, 4 ft wide gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip with hold down clips to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with 1 in. drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When **Steel Framing Members** (Item 6M) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, an additional single length of furring channel shall be installed and be spaced approximately 3 in. from the butt joint (6 in. from the continuous furring channels) to support the floating end of the gypsum board. Each of these shorter sections of furring channel shall extend one joist beyond the width of the gypsum panel and be attached to the adjacent joists with one SonusClip at every joist involved with the butt joint.

When **Steel Framing Members** (Item 6N) are used, one layer of nom 1/2 in. thick, 4 ft wide gypsum board, installed as described in Item 7. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 6O) are used, one layer of nom 1/2 in. thick, 4 ft wide gypsum board, installed as described in Item 7. Butt joints staggered minimum 24 in. OC.

When **Steel Framing Members** (Item 6Q) are used, nom 5/8 in. thick, 4 ft wide gypsum board installed perpendicular to furring channels with butt joints centered between continuous back to back channels and secured to all channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC. Butt joints staggered minimum 48 in. OC.

**AMERICAN GYPSUM CO** — Type AG-C

**CABOT MANUFACTURING ULC** — Type C

**CERTAINTEED GYPSUM INC** — Type C

**CGC INC** — Types C, IP-X2, IPC-AR, WRC

**GEORGIA-PACIFIC GYPSUM L L C** — Types 5, C, GPFS1, DAP, DA, DAPC, TG-C

**NATIONAL GYPSUM CO** — Types eXP-C, FSK-C, FSW-C

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Types PG-1, PG-3, PG-C

**THAI GYPSUM PRODUCTS PCL** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, WRC

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR, WRC

7A. **Gypsum Board* —** For use when **Batts and Blankets*** (Item 5) and **Steel Framing Members*** (Item 6C) are used. Nom 5/8 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Fastened to cross tees with 1 in. long No. 6 Type S bugle head screws spaced 8 in. OC in the field and 8 in. OC along end joints. Fastened to main runners with 1 in. long No. 6 Type S bugle head screws spaced midway between cross tees. Screws along sides and ends of boards spaced 3/8 to 1/2 in. from board edge. End joints of the sheets shall be staggered with spacing between joints on adjacent boards not less than 4 ft OC.

**CGC INC** — Types C, IP-X2, IPC-AR, WRC

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, WRC

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR, WRC

7B. **Gypsum Board* —** For use when **Batts and Blankets*** (Item 5) and Resilient Channels (Item 6G) are used. Nom 5/8 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to resilient channels. Nom 1 in. long No. Type S bugle head screws are driven through channel spaced 8 in. OC. End joints of gypsum board similarly fastened to additional resilient channels positioned at end joint locations.
**CERTAINTEED GYPSUM INC** — Type C

7C. **Gypsum Board* —** For use when **Batts and Blankets*** (Item 5A) and Resilient Channels (Item 6G) are used. Nom 5/8 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to resilient channels. Nom 1 in. long No. Type S bugle head screws are driven through channel spaced 8 in. OC. End joints of gypsum board similarly fastened to additional resilient channels positioned at end joint locations.
**AMERICAN GYPSUM CO** — Type AG-C

7D. **Gypsum Board* —** (Finish Rating - 16 min.) Required when Air Balance Inc. Type 299 ceiling damper (Item 4) is installed. Nom 5/8 in. thick, 48 in. wide gypsum board, installed and secured as described in items 7 and 7A.

**UNITED STATES GYPSUM CO** — Type C

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Type C
7E. **Gypsum Board* —** For use when alternate **Steel Framing Members*** (Item 6K) are used - 1/2 in. thick, 4 ft. wide; installed with long dimension parallel to main runners and perpendicular to the 4 ft. long cross tees with the end joints centered between cross tees which are spaced 6 in. OC. Sheets are attached to cross tees with screws spaced 8 in. OC on the ends and 12 in. OC in the field with additional screws located 1-1/2 in, from the side edges. Sheets are attached to the main tees with screws spaced 8 in. OC with additional screws located 4 in. OC from the edges. Screws on the sides are located 1/2 in. from the side edge of the gypsum board. When **Batts and Blankets*** (Item 5B) are used - 5/8 in. thick, 4 ft. wide; installed with long dimension parallel to main runners and perpendicular to cross tees and attached with screws spaced 8 in. OC on the ends and 8 in. OC in the field with additional screws located 1-1/2 in. from the side edges. Sheets are attached to main tees with screws spaced 8 in. OC with additional screws located 4 in. OC from the side edges. Screws on the sides located 3/4 in. from the side edge of the gypsum board, and screws at the end of the gypsum board located 1/2 in. from the board ends. Joints to be covered with paper tape and joint compound.

**CERTAINTEED GYPSUM INC** — Type C

7F. **Gypsum Board* —** As an alternate to Items 7, 7A and 7D. Nom 5/8 in. thick, 4 ft wide gypsum boards installed as described in Item 7 with screws spaced at max. 8 in. OC.
**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — Type ULIX

7G. **Gypsum Board* (As an alternate to Item 7) —** Nom 5/8 in. thick, 4 ft. wide gypsum board, installed and secured as described in Item 7 with screws spaced max. 8 in. OC.

**NATIONAL GYPSUM CO** — Type FSLX

8. **Finishing System (Not Shown) —** Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

9. **Grille —** Steel grille installed in accordance with the installation instructions provided with the ceiling damper.

10. **Discrete Products Installed in Air-handling Spaces* —** Automatic Balancing Valve/Damper — (Not Shown - Optional) — For use with item 4, Ruskin Company's Model CFD7 damper (CABS). Ceiling damper to be provided with plenum box per damper manufacturer's instructions with side outlet only. Entire assembly to be installed into any UL Class 0 or Class 1 flexible air duct in accordance with the instructions provided by the automatic balancing valve/damper manufacturer.
**METAL INDUSTRIES INC** — Model ABV-4, ABV-5, ABV-6

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-11-13

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States Design Criteria and Allowable Variances

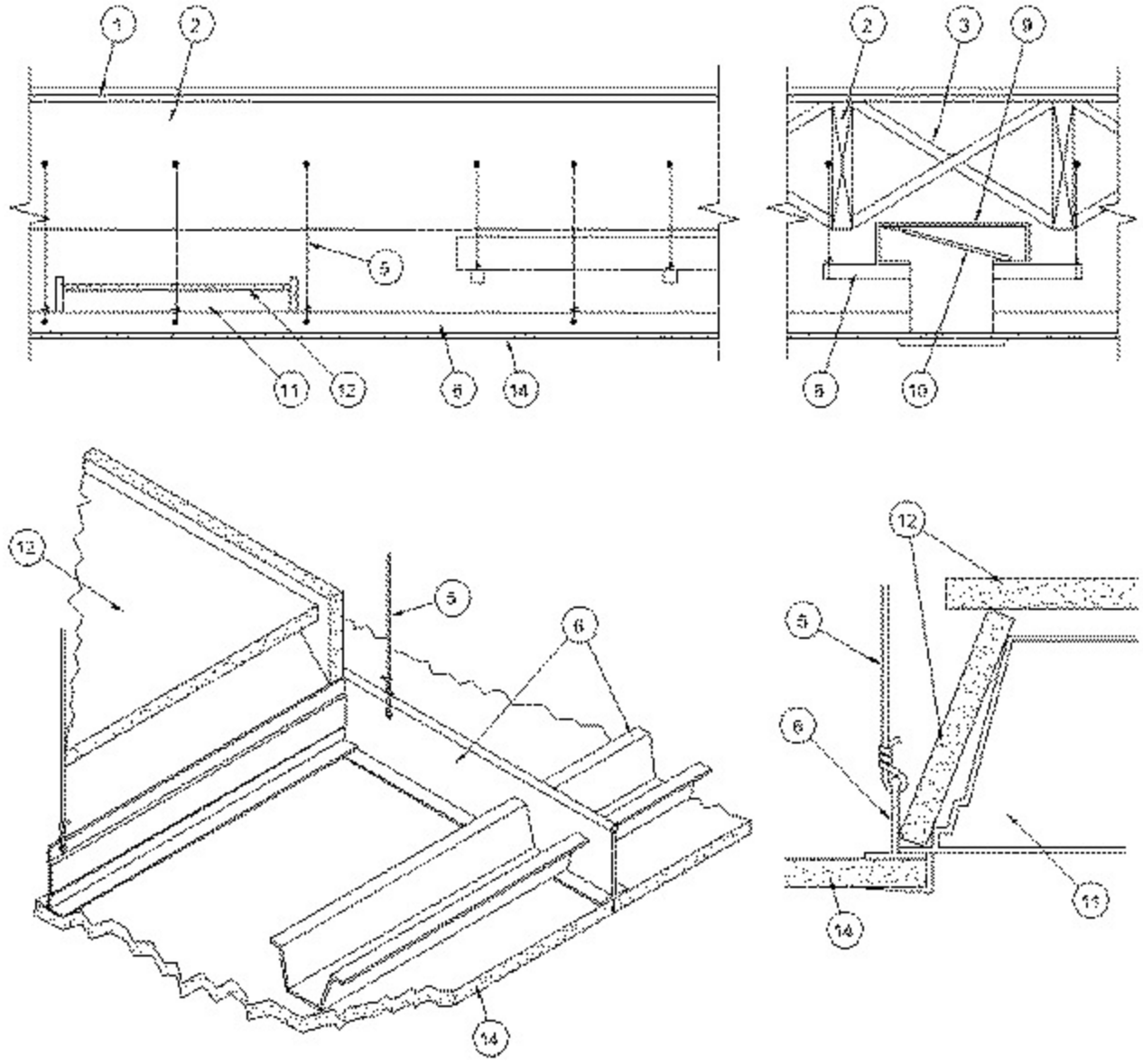
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances

## Design No. **L525**

November 13, 2025

**Unrestrained Assembly Rating — 1 Hr.**
**Finish Rating — 21 Min.**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




1. **Flooring System —** The flooring system shall consist of one of the following:

**System No. 1**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered. Panels secured to joists with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each joist. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier** — (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring** — Min 1 by 4 in. T&G lumber installed perpendicular to trusses, or min 19/32 in. thick wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered.

**System No. 2**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Floor Mat Materials* — (Optional)** — Floor mat material nom 1/8 in. (3 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — FIRM-FILL SCM 125

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 1/4 in. (6 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 250 and FIRM-FILL SCM 250+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/8 in. (10 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/4 in. (32 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 400 and FIRM-FILL SCM 400+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/4 in. (19 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in. (38 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 750 and FIRM-FILL SCM 750+

**Alternate Floor Mat Materials** — (Optional) — Floor mat material nom 5/64 in. (2 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat.

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 1/4 in. (6 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. (32 mm) of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat II

**Metal Lath (Optional)** — For use with 3/8 in. (10 mm) floor mat materials, 3/8 in. expanded steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material. Hacker Floor Primer to be applied prior to the placement of the metal lath. When metal lath is used, floor topping thickness a nom 1-1/4 in. over the floor mat.

**Finish Flooring — Floor Topping Mixture*** — Min 1 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

**HACKER INDUSTRIES INC** — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Gyp-Span Radiant

**System No. 3**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**USG MEXICO S A DE C V** — Types LRK, HSLRK, CSD

**Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

**Alternate Floor Mat Materials*** — (Optional) — Nom 3/8 in. thick floor mat material loose laid over the subfloor. Floor topping thickness shall be as specified under Floor Topping Mixture.

**GRASSWORX L L C** — Type SC50

**System No. 4**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Mixture shall consist of 5 to 8 gal of water to 80 lbs of floor topping mixture to 2.1 cu ft of sand. Refer to the manufacturer’s instructions accompanying the material and/or contact the manufacturer’s technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**ULTRA QUIET FLOORS** — Types UQF-A, UQF-Super Blend, UQF-Plus 2000

**System No. 5**

**Subflooring** — Min 19/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**MAXXON CORP** — Types Maxxon Standard and Maxxon High Strength

**Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**MAXXON CORP** — Type Top Encapsulated Sound Mat.

**Floor Mat Reinforcement** — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) — 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** - (Optional, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

**System No. 6**

**Subflooring —** Min 15/32 in. thick wood structural panels, min grade C-D or Sheathing. Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier —** (Optional) Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture* —**Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**FORMULATED MATERIALS LLC** — Types FR-25, FR-30, SiteMix, and Treadstone Advantage

**Alternate Floor Mat Material* —** (Optional) Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**FORMULATED MATERIALS LLC** — Types M1, M2, M3, Elite, Duo, R1, R2, and Treadstone Elite Max

**System No. 7**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Floor - Mineral and Fiber Board*** — Min 1/2 in. thick, supplied in sizes ranging from 3 ft by 4 ft to 8 ft by 12 ft. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.

**HOMASOTE CO** — Type 440-32 Mineral and Fiber Board

**System No. 8**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 or 1 in. thickness of floor topping mixture for 19/32 or 15/32 in. thick wood structural panels respectively, having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ARCOSA SPECIALTY MATERIALS** — AccuCrete® Types NexGen, Green, Prime and PrePour, AccuRadiant®, AccuLevel® Types G40, G50 and SD30

**Alternate Floor Mat Material*** — (Optional) — Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in. or 1 in. thickness of floor topping mixture for 19/32 or

15/32 in. thick wood structural panels respectively.

**ARCOSA SPECIALTY MATERIALS** — AccuQuiet® Types D13, D-18, D25, DX38, EM.125, EM.125S, EM.250, EM.250S, EM.375, EM.375S, EM.750, and EM.750S.

**System No. 9**

**Subflooring** — 15/32 or 19/32 in. thick wood structural panels, min. grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier — (Optional)** — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 or 1 in. thickness of floor topping mixture for 19/32 or 15/32 in. thick wood structural panels respectively, having a min compressive strength of 2100 psi. Refer to manufacturer's instructions accompanying the material for specific mix design. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

1. **Flooring System —** The flooring system shall consist of one of the following:

**System No. 10**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 11**

**Subflooring** — Min 23/32 in. thick T&G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints, secured as described in System No. 1.

**Gypsum Board*** — One layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1 in. long No. 6 Type W bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**Floor Mat Materials*** — (As an alternate to the single layer gypsum board) — Floor mat material loose laid over the subfloor.

**MAXXON CORP** — Type Encapsulated Sound Mat.

**Gypsum Board*** — (For use when floor mat is used) Two layers of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists on top of the floor mat material. Gypsum board secured to each other with 1 in. long No. 6 Type G bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches in between layers and from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**System No. 12**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier** — (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 or 1 in. thickness of floor topping mixture for 19/32 or 15/32 in. thick wood structural panels respectively, having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**DEPENDABLE LLC** — GSL M3.4, GSL K2.6, GSL-CSD and GSL RH

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 13**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Finish Flooring* — Floor Topping Materials —** Min 3/4 in. to 1-1/2 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance with a minimum compressive strength of 1500 psi.

See **Floor- and Roof-Topping Mixtures** (CCOX) category for names of Classified Companies.

**Floor Mat Materials* —** (Optional) — Floor mat material nom 1/8 in. to 3/4 in. thick. Loose laid over the subfloor. When used, Acousti-flor CSM (crack suppression mat) is loose laid over the floor mat material. Floor topping material thickness is dependent on thickness of floor mat used. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).
**WALFLOR INDUSTRIES INC** — Type Acousti-flor, Acousti-flor CSM. Floor topping thickness depends on products used as follows:

Acousti-flor (1/8 in. thick) - Floor topping thickness shall be a minimum of 3/4 in.

Acousti-flor (1/4 in. thick) - Floor topping thickness shall be a minimum of 1 in.

Acousti-flor (3/8 in. thick) - Floor topping thickness shall be a minimum of 1 in.

Acousti-flor (3/4 in. thick) - Floor topping thickness shall be a minimum of 1-1/2 in.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 14**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 4500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**SIKA DEUTSCHLAND GMBH** — Type SCHONOX AP Rapid Plus

**System No. 15**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Vapor Barrier —** (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier —** (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer’s instructions accompanying the material and/or contact the manufacturer’s technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**Freudenberg Performance Materials LP** — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750, and 750 Plus.

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 16**

**Subflooring — Subflooring** — Min 23/32 in. thick T&G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the joists with end joints staggered, secured as described in System No. 1.

**Finish Floor - Building Units* —** Min 1/2 in. thick magnesium oxide panels installed parallel, perpendicular, or diagonally to trusses with panel edges offset a min of 4 in. between subfloor and magnesium oxide panels. Panels secured to subfloor with construction adhesive and corrosion

resistant fasteners, spaced 12 in. OC around the perimeter and in the field of the panel. Fasteners must be placed no closer than 1/2 in. from all panel edges and no closer than 2 in. from panel corners.

**HUBER ENGINEERED WOODS L L C** — Type 1/2 in. Square Edge Exacor™ Board

**System No. 17**

1. **Building Units* —**Nom 3/4 in. thick. Long dimension of panels to be perpendicular to trusses with end joints staggered a min of 4 ft. and joints centered over the joists. Panels secured to wood joists with 2 in. x 0.113 in. Ring Shank nails spaced a max of 12 in. OC in the field and on the perimeter. Nails located 2 in. from side edges, and 1/2 in. from butt joint edges. Insulation (Item13B) is required.

**HUBER ENGINEERED WOODS L L C** — Type 3/4 in. Tongue and Groove Exacor™ Board

**System No. 18**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 900 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**TECNODRY SA DE CV** — Types SURFACE-GYP

**System No. 19**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be

perpendicular to joists with joints staggered, secured as described in System No. 1.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ALPHAGYP, LLC** — Type AlphaGyp

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 20**

**Subflooring —** Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered, secured as described in System No. 1.

**Floor Mat Materials*** — (Optional) — Any Floor Mat Material bearing the UL Classification Marking as to Fire Resistance. See Floor Mat Materials (CCQU) category for names of Classified Companies. Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**Metal Lath —** (Optional) — 3.4 lbs/sq yd expanded galvanized steel diamond lath. Refer to manufacturer’s instructions regarding installation recommendations.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**LATICRETE INTERNATIONAL INC** — Type LAT

**System No. 21**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered. Panels secured to joists with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each joist. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring – Floor Topping Mixture*** — Min 1 in. thickness of floor topping mixture having a min compressive strength of 2000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**YESERA COMERCIAL S.A.** — Type MAX-CRETE Complete

**System No. 22**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to joists, or min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to joists with joints staggered. Panels secured to joists with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each joist. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**Apex Minerals LLC** — Type Apex Multi Underlayment

2. **Wood Joists —** Min 2 by 10, spaced 16 in. OC and effectively fireblocked in accordance with local codes.

3. **Cross Bridging —** Min 1 by 3 in., or min 2 by 10 solid blocking.

4. **Wood Hanger Block —** (Not Shown) — Nom 2 by 4 in. installed between and perpendicular to wood joists, and centered 4-1/2 in. below subflooring. Secured to wood joists with two 16d nails at each end. Located as required to provide attachment provisions for hanger wire (Item 5).

5. **Hanger Wire —** No. 12 SWG galv steel wire. Hanger wires spaced max 48 in. OC along main runners and located at ends of main runners at walls and at corners and midspan along 4 ft sides of light fixtures. Hanger wires supported from 16d nails driven through wood joists 4-1/2 in. below subflooring and bent upward at both ends for positive support. Where hanger wire locations occur between joists, hanger wires shall be supported from wood hanger blocks.

6. **Steel Framing Members* —** Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft. long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC.

b. **Cross Tees —** Nom 4 ft. long, 1-1/2 in. wide face or 15/16 in. wide face installed at sides of light fixtures (Item 11), installed perpendicular to the main runners, spaced 24 in. OC. When **Batts and Blankets*** (Item 13) are used, cross tees spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum board end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation. When NEMA Type F (Item 11B) light fixtures are used, nom 4ft long cross tees, 1-1/2 in wide face, installed perpendicular to main runners and spaced nom 50 in. O.C. Two nom 50 in. long cross tees, 1-1/2 inch wide face, spaced nom 14 in. O.C. to accommodate nom 1 by 2 ft or 1 by 4 ft NEMA Type F fixture or spaced 26 in. O.C. to accommodate nom 2 by 2 ft NEMA or 2 by 4 ft NEMA Type F fixture. When nom 2 by 2 ft NEMA Type F fixture is used, nom 26 in. long cross tees to be used to form nom 26 in. module at the center of the nom 50 in. long cross tees. Two additional nom 4 ft cross tees, 1-1/2 in. wide face are installed perpendicular to the main runners outside each end of fixture opening to support the end pieces of drywall fixture protection. Small cutoff pieces of cross tees were installed at the center of the nom 50 in. long cross tees and main runners by inserting the dip end into a cross tee slot on the main runner and securing the other end with a pop rivet to the nom 50 in. long cross tee.

c. **Cross Channels —** Nom 4 ft. long, installed perpendicular to main runners, spaced 24 in. OC. When **Batts and Blankets*** (Item 13) are used, cross channels spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or 1-9/16 in. deep painted or galv steel channel with 1 in. legs attached to walls at perimeter of ceiling with fasteners 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.
**CGC INC** — Type DGL or RX

**USG INTERIORS LLC** — Type DGL or RX

6A. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Item 6, nom 12 ft long main runners spaced 48 in. OC. Nom 4 ft long cross tees installed perpendicular to main runners and spaced 24 in. OC. Additional cross tees located 8 in. from and on both sides of each gypsum board end joint and each recessed light fixture.
**ROXUL USA INC. D/B/A ROCKFON** — Types 650, 650C, 670D

6B. **Alternate Steel Framing Members* —** (Not Shown) — Main runners nom 12 ft long, spaced 48 in. OC. Primary cross tees (1-1/2 in. wide across flange) or cross channels, nom 4 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional primary cross tees or cross channels required at each gypsum board end joint, 8 in. from and on each side of gypsum board end joint, and 8 in. from each side of NEMA Type G (Item 11) light fixtures. Secondary cross tees (15/16 in. wide across flange), nom 4 ft long, installed at sides of NEMA Type G light fixtures. When NEMA Type F (Item 11A) light fixtures are used, nom 4 ft long primary cross tees installed perpendicular to main runners and spaced nom 50 in. OC. Two nom 50 in. long primary cross tees installed perpendicular to nom 4 ft long primary cross tees and spaced nom 14 in. OC to accommodate nom 1 by 2 ft or 1 by 4 ft NEMA Type F fixture or spaced 26 in. OC to accommodate nom 2 by 2 ft or 2 by 4 ft NEMA Type F fixture. When nom 1 by 2 ft or 2 by 2 ft NEMA Type F fixtures are used, nom 14 in. or 26 in. long primary cross tees to be used to form nom 26 in. long modules at the center of the nom 50 in. long primary cross tees. Additional lengths of primary cross tee to be

installed at each end of each nominal 50 in. long primary cross tee to create a nominal 14 or 26 in. by 22 or 24 in. module at each end of light fixture module. Ends of these additional lengths of primary cross tee are to engage cross tee routs at end of fixture and are to be riveted to nom 4 ft long cross tee at opposite end. Additional short lengths of primary cross tee to be installed perpendicular to main runners near center of nom 50 in. long cross tee on each side of light fixture. Ends of these additional short lengths of cross tee are to engage rout of main runner at one end and are to be riveted to nom 50 in. long primary cross tee at opposite end. The main runners, cross tees or cross channels may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000

6C. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6, 6A and 6B. For use with 1/2 in thick gypsum board only. Nom 12 ft long main runners spaced 48 in. OC. Nom 4 ft long cross channels installed perpendicular to main runners and spaced 24 in. OC. Additional cross channels required 8 in. from and on each side of gypsum board end joints, and 8 in. from each side of light fixtures. Nom 4 ft long cross tees installed perpendicular to main runners to support the 4 ft sides of light fixtures. J-shaped metal trim molding installed at perimeter of light fixture to cover and support the exposed gypsum board edges.
**ROXUL USA INC. D/B/A ROCKFON** — Types 650, 650C, 670, 670C, 670D

6D. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6, 6A, 6B and 6C. For use in corridors or rooms having a maximum width dimension of 14 ft. Steel framing members consist of grid runners, locking angle wall molding and hanger bars. Locking angle wall molding secured to walls with steel nails or screws spaced max 24 in. OC. Slots of locking angle wall molding parallel with hanger bars to be aligned with tabbed cutouts in bottom edge of hanger bars. Hanger bars spaced max 50 in. OC and suspended with No. 12 AWG steel hanger wires spaced max 48 in. OC. Adjoining lengths of hanger bar to overlap 12 in. and to be secured together and suspended by a shared hanger wire. A min clearance of 1/4 in. shall be maintained between the ends of the hanger bars and the walls. Grid runners cut-to-length and installed perpendicular to hanger bars and spaced max 24 in. OC with additional grid runners installed 8 in. OC at gypsum board end joints and adjacent to each side of nom 2 by 2 ft or nom 2 by 4 ft NEMA Type F light fixtures (Item 11A). Grid runners parallel with walls to be spaced max 16 in. from wall. Ends of grid runners to rest on and engage slots of locking angle wall molding with a clearance of 3/8 in. to 1/2 in. maintained between each end of the grid runner and the wall. Bulb of grid runner to be captured by tabbed cutouts in bottom edge of hanger bars. When NEMA Type F light fixtures are used, flange of grid runner on each side of fixture module is to be slit and bent upward 90 deg along the length dimension of the fixture. Nom 24 in. long cross tees with tabbed ends bent 90 deg are to be formed from lengths of grid runner and are to be secured to the grid runner at each end of the fixture module using steel screws or rivets. Additional cross tees, nom 8 in. long with tabbed ends bent 90 deg, are to be formed from lengths of grid runner and are to be secured to the grid runners at the corners and center of each side of the fixture module using steel screws or rivets.
**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000-SS

6E. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6, 6A, 6B, 6C and 6D. Main runners nom 12 ft long, spaced 72 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. When NEMA Type F (Item 11A) light fixtures are used, nom 6 ft long cross tees installed perpendicular to main runners and spaced nom 14 in., 26 in. or 50 in. OC, dependent upon fixture size and orientation. Nominal 14 in., 26 in.

and/or 50 in. cross tees used in combination with the 6 ft long cross tees to create modules to accommodate nom 1 by 2 ft, 1 by 4 ft, 2 by 2 ft and 2 by 4 ft NEMA Type F fixtures. Additional lengths of cross tee to be installed between the 6 ft long cross tees at each end of each nominal 14 in., 26 in. or 50 in. long cross tee forming a light fixture module. Ends of these additional lengths of cross tee are to engage cross tee routs at end of fixture and are to be riveted to nom 6 ft long cross tee at opposite end. Additional short lengths of cross tee to be installed perpendicular to main runners near center of nom 50 in. long cross tee on each side of 1 by 4 ft or 2 by 4 ft light fixture which is installed with its long dimension parallel with the main runners. Ends of these additional short lengths of cross tee are to engage rout of main runner at one end and are to be riveted to nom 50 in. long cross tee at opposite end. The main runners and cross tees may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
**ARMSTRONG WORLD INDUSTRIES INC** — Type DFR-8000

6F. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6 through 6E- Main runners nom 12 ft long, spaced 72 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. When NEMA Type F (Item 11A) light fixtures are used, nom 6 ft long cross tees installed perpendicular to main runners and spaced nom 14 in., 26 in. or 50 in. OC, dependent upon fixture size and orientation. Nominal 14 in., 26 in. and/or 50 in. cross tees used in combination with the 6 ft long cross tees to create modules to accommodate nom 1 by 2 ft, 1 by 4 ft, 2 by 2 ft and 2 by 4 ft NEMA Type F fixtures. Additional lengths of cross tee to be installed between the 6 ft long cross tees at each end of each nominal 14 in., 26 in. or 50 in. long cross tee forming a light fixture module. Ends of these additional lengths of cross tee are to engage cross tee routs at end of fixture and are to be riveted to nom 6 ft long cross tee at opposite end. Additional short lengths of cross tee to be installed perpendicular to main runners near center of nom 50 in. long cross tee on each side of 1 by 4 ft or 2 by 4 ft light fixture which is installed with its long dimension parallel with the main runners. Ends of these additional short lengths of cross tee are to engage rout of main runner at one end and are to be riveted to nom 50 in. long cross tee at opposite end. The main runners and cross tees may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
**USG INTERIORS LLC** — Type DGL or RX

6G. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6 through 6F - Main runners nom 12 ft long, spaced 48 in. OC. Cross tees, nom 4 ft. long, installed perpendicular to main runners and spaced 24 in. OC. Additional 4 ft. long cross tees required at 6 in. from each side of butted gypsum board end joints. When Batts and Blankets* (Item 13A) are used, cross tees spaced 16 in. OC with additional cross tees 8 in. away from each side of butted gypsum board end joints. The cross tees shall be riveted with 1/8 in. dia. rivets to the wall angle and to the main tee where the cross tee does not align with slot in the main tee. When NEMA Type F (Item 11A) light fixtures are used, nom 4ft long cross tees, 1-1/2 in wide face, installed perpendicular to main runners and spaced nom 50 in. O.C. Two nom 50 in. long cross tees, 1-1/2 inch wide face, spaced nom 14 in. O.C. to accommodate nom 1 by 2 ft or 1 by 4 ft NEMA Type F fixture or spaced 26 in. O.C. to accommodate nom 2 by 2 ft NEMA or 2 by 4 ft NEMA Type F fixture. When nom 2 by 2 ft NEMA Type F fixture is used, nom 26 in. long cross tees to be used to form nom 26 in. module at the center of the nom 50 in. long cross tees. Two additional nom 4 ft cross tees, 1-1/2 in. wide face are installed perpendicular to the main runners outside each end of fixture opening to support the end pieces of drywall fixture protection. Small cutoff pieces of cross tees are installed at the center of the nom 50 in. long cross tees and main runners by inserting the dip end into a cross tee slot on the main runner and securing the other end with a pop rivet to the nom 50 in. long cross tee. Galvanized steel wall

angle with 1-1/2 in. legs attached to walls at perimeter of ceiling with fasteners at 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.
**CERTAINTEED CORP** — Types DWS12-13-20, DWS4.16-13-20, DWS4-13-20, DWS2-13-20, DWS2.16-13-20 and DWA1.5-1.5

**CERTAINTEED CORP** — Types EZDWS12-13-18, EZDWS4.16-13-18, EZDWS4-13-18, EZDWS2-13-18, EZDWS2.16-13-18 and DWA1.5-1.5

6H. **Alternate Framing Members* —** (Not Shown) — As an alternate to Items 6 through 6G. Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
**ROXUL USA INC. D/B/A ROCKFON** — Type 670C, 670D

6I. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 6 through 6H - Main runners nom 12 ft long, spaced 48 in. OC. Cross tees, nom 4 ft. long, installed perpendicular to main runners and spaced 24 in. OC. Additional 4 ft. long cross tees required at 6 in. from each side of butted gypsum board end joints. When Batts and Blankets* (Item 13A) are used, cross tees spaced 16 in. OC with additional cross tees 8 in. away from each side of butted gypsum board end joints. The cross tees shall be riveted with 1/8 in. dia. rivets to the wall angle and to the main tee where the cross tee does not align with slot in the main tee. When NEMA Type F (Item 11A) light fixtures are used, nom 4ft long cross tees, 1-1/2 in wide face, installed perpendicular to main runners and spaced nom 50 in. O.C. Two nom 50 in. long cross tees, 1-1/2 inch wide face, spaced nom 14 in. O.C. to accommodate nom 1 by 2 ft or 1 by 4 ft NEMA Type F fixture or spaced 26 in. O.C. to accommodate nom 2 by 2 ft NEMA or 2 by 4 ft NEMA Type F fixture. When nom 2 by 2 ft NEMA Type F fixture is used, nom 26 in. long cross tees to be used to form nom 26 in. module at the center of the nom 50 in. long cross tees. Two additional nom 4 ft cross tees, 1-1/2 in. wide face are installed perpendicular to the main runners outside each end of fixture opening to support the end pieces of drywall fixture protection. Small cutoff pieces of cross tees are installed at the center of the nom 50 in. long cross tees and main runners by inserting the dip end into a cross tee slot on the main runner and securing the other end with a pop rivet to the nom 50 in. long cross tee. Galvanized steel wall angle with 1-1/2 in. legs attached to walls at perimeter of ceiling with fasteners at 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.

**BAILEY METAL PRODUCTS LTD —** Types BMP-DWA1.5-1.5, BMP-DWS12-13-20, BMP-DWS2.16-13-20, BMP-DWS2-13-20, BMP-DWS4.16-13-20 and BMP-DWS4-13-20

**BAILEY METAL PRODUCTS LTD —** Types BMP-EZDWS12-13-18, BMP-EZDWS2.16-13-18, BMP-EZDWS2-13-18, BMP-EZDWS4.16-13-18, BMP-EZDWS4-13-18 and BMP-DWA1.5-1.5

7. **Wall Angle —** (Not Shown) — No. 26 MSG angle with 1-1/8 in. legs, nailed to the walls along perimeter of ceiling to support steel framing member ends and for screw-attachment of the gypsum board.

8. **Cold Rolled Channels —** No. 16 MSG cold-rolled steel, 1-1/2 in. deep, spaced approx 24 in. OC.

9. **Air Duct —** No. 20 MSG galv steel. Total area of duct openings not to exceed 57 sq in. per 100 sq ft of ceiling area. Area of individual duct opening not to exceed 113 sq in. Max dimension of opening is 12 in. Duct supported by cold rolled channels, spaced approx 24 in. OC.

10. **Damper —** Nom 16 by 16 in. damper, formed from No. 16 MSG galv steel, protected on both surfaces with 1/16 inch thick ceramic fiber paper and held open with Fusible Link (Bearing the UL Listing Mark). Damper to overlap duct outlet a min 1 in.

11. **Fixtures, Recessed Light —** (Bearing the UL Listing Mark) — Nom 2 by 4 ft recessed light fixture with steel housing. Fixtures spaced so their area does not exceed 24 sq ft per 100 sq ft of ceiling area. Fixture wired in conformance with the National Electric Code. Fixtures and ballasts must be considered for these ambient temperature conditions before installation.

11A. **Alternate Fixtures, Recessed Light —** For Use with Steel Framing Members, Item 6B, 6D, 6E, 6F, 6G - (Bearing the UL Listing Mark). Recessed light fixture with NEMA Type F steel housing, 1 by 2 ft, 1 by 4 ft, 2 by 2 ft or 2 by 4 ft size. Fixtures provided with swing-out steel support hooks near each corner designed to engage the bulb of the steel framing member cross tees. Size of steel framing member module to be nominally 2 in. wider and longer than the nominal fixture size. Fixtures to be additionally screw-attached to the web of the cross tees near the center of each long side and at both ends using No. 6 by 2-5/8 in. long (sides) and No. 6 by 1-5/8 in. long (ends) steel drywall screws. Fixtures spaced so their area does not exceed 24 sq ft per each 100 sq ft of ceiling area. Wired in conformance with the National Electrical Code.

11B. **Alternate Fixtures, Recessed Light —** For Use with Steel Framing Members, Item 6- (Bearing the UL Listing Mark). Recessed light fixture with NEMA Type F steel housing, 1 by 2 ft, 1 by 4 ft, 2 by 2 ft or 2 by 4 ft size. Fixtures provided with swing-out steel support hooks near each corner designed to engage the bulb of the steel framing member cross tees. Fixtures to be additionally screw-attached to the cross tees near the center of each long side and at both ends using 2 in. long Type S-12 (sides) and 3 in. long Type S-12 (ends) steel screws. Fixtures spaced so their area does not exceed 24 sq ft per each 100 sq ft of ceiling area. Wired in conformance with the National Electrical Code.

12. **Fixture Protection — Gypsum Board* —** Nom 1/2 or 5/8 in. thick gypsum board, same as Item 14, 14A or 14B. Sheets cut into pieces to form a five sided enclosure for fixture (Item 11), trapezoidal in cross section, approx 1/2 in. longer and wider than the fixture with sufficient depth to provide at least 1/2 in. clearance between the fixture and enclosure.

12A. **Fixture Protection — Gypsum Board* —** For Use with Steel Framing Members, Item 6B, 6D, 6E, 6F, 6G - 5/8 in. thick, same as Item 14, 14A, 14B, or 14C. Cut to form a five-sided enclosure, rectangular in cross-section, at least 1-1/4 in. higher than the NEMA Type F light fixture housing (Item 11A). The fixture protection enclosure is to be installed in the grid module prior to installation of the NEMA Type F light fixture. The fixture protection side pieces are to be provided with nominal 1-1/4 in. wide by 3-1/2 in. long cutouts to accommodate the swing-out steel support hooks near each corner of the fixture. The fixture protection side and end pieces rest on the flanges of the primary cross tees and are screw-attached to the web of the cross tee with No. 6 by 1-5/8 in. long steel drywall screws. The top piece rests on the top edges of the side and end pieces without mechanical attachment. The dimensions of the fixture protection pieces for the various sizes of NEMA Type F fixtures are tabulated below:

| NEMA Type F Fixture Size | 1 by 2 ft | 1 by 4 ft | 2 by 2 ft | 2 by 4 ft |
|---|---|---|---|---|
| Top Piece, in. | 13-1/2 x 25-1/2 | 13-1/2 x 49-1/2 | 25-1/2 x 25-1/2 | 25-1/2 x 49-1/2 |
| Side Piece, in. | 7 x 25-1/2 | 7 x 49-1/2 | 7 x 25-1/2 | 7 x 49-1/2 |
| End Piece, in. | 7 x 12-1/4 | 7 x 12-1/4 | 7 x 24-1/4 | 7 x 24-1/4 |

12B. **Fixture Protection — Gypsum Board* —** For Use with Steel Framing Members, Item 6 - 1/2 or 5/8 in. thick, same as Item 14, 14A or 14B. Cut to form a five-sided enclosure, rectangular in cross section, for the NEMA Type F light fixture (Item 11B). The fixture protection enclosure is installed around the grid module prior to installation of the NEMA Type F light fixture. The end pieces of the light fixture protection rest upon the flanges additional nom 4 ft long cross tees placed at each end of light fixture opening. The pieces of gypsum board are secured to both cross tees with three 1 in. long Type S screws, one at the center of the cross tee and the remaining two screws spaced 12 in. O.C. in both directions. The end clips of the two additional cross tees are removed and the cross tee/gypsum board combinations are placed at each end of the module facing the light fixture opening with the ends of the cross tees resting on the flanges of the main runner. Two side pieces of the gypsum board protection are notched at the bottom with three 1/4 in. wide by 1-9/16 in. long notches to accommodate the cross-tee bulbs. On each side the pieces are installed vertically, resting on the three cross tees intersecting the 50 in. long cross tees and placed 1-1/4 in from the edge of the 50 in. cross tees. The four side pieces of the light fixture protection box are secured together with 6d nails, one at mid-height, and one at each of the four corners. The top piece of gypsum board is loosely-laid on top of the four-sided box and secured at each of the four corners with 6d nails. Holes are drilled through the top piece of gypsum board for the attachment of the hanger wires specified in Item 5. Two 4 ft long cross-tees are placed on top of the fixture protection box, equally spaced and secured from the underside of the fixture protection box with three 1 in. long Type S screws equally spaced. The dimensions of the fixture protection pieces for the various sizes of NEMA Type F fixtures are listed below:

| NEMA Type F Fixture Size | 1 by 2 ft | 1 by 4 ft | 2 by 2 ft | 2 by 4 ft |
|---|---|---|---|---|
| Top piece, in. | 19 x 31 | 19 x 55 | 31 x 31 | 31 x 55 |
| Side pieces, in | 6 x 30 | 6 x 54 | 6 x 30 | 6 x 54 |
| End pieces, in | 6 x 19 | 6 x 19 | 6 x 31 | 6 x 31 |

13. **Batts and Blankets* —** (Optional, Not Shown) — For use with **Steel Framing Members*** (specifically Item 6) and **Gypsum Board*** (specifically Item 14B) - Any thickness mineral wool or glass fiber insulation bearing the UL Classification Marking for Surface Burning Characteristics, having a flame spread value of 25 or less and a smoke spread value of 50 or less. Insulation fitted in the concealed space, draped over steel framing members/gypsum wallboard ceiling membrane.

13A. **Batts and Blankets* —** (Optional, Not Shown) — For use with **Steel Framing Members*** (specifically Item 6G) and **Gypsum Board*** (specifically Item 14C) - min. 3-1/2 in. thick, min. density 0.9 lb/ft$^3$ unfaced fiberglass batt insulation bearing the UL Classification Marking for Surface Burning Characteristics, having a flame spread value of 25 or less and a smoke spread value of 50 or less. Insulation fitted in the

concealed space, draped over steel framing members/gypsum board ceiling membrane and light fixture protection.

13B. **Batts and Blankets* —** (For use with System 17) - 3-1/2 in. thick, min 0.62 pcf glass fiber batt insulation draped over the resilient channels. Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics or fire Resistance may be used. See **Batts and Blankets* (BKNV or BZJZ)** category in the Fire Resistance Directory for names of manufacturers.

14. **Gypsum Board* —** (For use with **Steel Framing Members*** described in Items 6 and 6B) — Nom 1/2 and 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to cross channels with side joints centered along main runners. Gypsum board fastened to cross channels with 1 in. long No. 8 Type S-12 bugle head screws located 1/2 in. from end joints and 1-3/4 in. from each side joint and spaced 12 in. OC along the end joints and in the field. End joints of adjacent gypsum board sheets shall be staggered not less than 4 ft OC. Gypsum board sheets screw-attached to leg of wall angle with drywall screws spaced 12 in. OC.
When alternate **Steel Framing Members*** (Item 6C) are used, gypsum board installed with long dimension (side joints) perpendicular to the cross channels and 4 ft cross tees, and with the side joints centered along the main runners. Gypsum board fastened to cross channels with five 1 in. long No. 8 Type S-12 bugle head screws located 1/2 in. from butted end joints, with one screw located at the midspan of the cross channel, one screw located 12 in. from and on each side of the channel midspan, and one screw located 2-3/4 in. from each side joint. End joints of the sheets shall be staggered as described above.

When alternate **Steel Framing Members*** (Item 6D) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the grid runners with the end joints staggered min 4 ft and centered between grid runners which are spaced 8 in. OC. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide by 48 in. long pieces of gypsum board are to be laid atop the grid runner flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the grid runners at opposite corners of the backer strip to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to grid runners with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When alternate **Steel Framing Members*** (Item 6E) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When alternate **Steel Framing Members*** (Item 6F and 6H) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and

centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip with hold down clips to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with 1 in. drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

**AMERICAN GYPSUM CO** — Type AG-C

**CABOT MANUFACTURING ULC** — 1/2 in. Type C, 5/8 in. Type C.

**CERTAINTEED GYPSUM INC** — Type C

**CGC INC** — Type C, IP-X2

**GEORGIA-PACIFIC GYPSUM L L C** — Types 5, DAPC, TG-C

**NATIONAL GYPSUM CO** — Types eXP-C, FSK-C, FSW-C

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Types C, PG-C

**PANEL REY S A** — Types PRC, PRC2

**THAI GYPSUM PRODUCTS PCL** — Type C

**UNITED STATES GYPSUM CO** — Type C

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Type C

14A. **Gypsum Board* —** (For use with **Steel Framing Member*** described in Item 6A) - Nom 1/2 and 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to cross tees with side joints centered along main runners. Gypsum board fastened to each cross tee with five 1 in. long No. 8 Type S-12 bugle head screws with one screw located at the midspan of the cross tee, one screw located 12 in. from and on each side of the cross tee midspan, and one screw located 1-1/2 in. from each gypsum board side joint. Except at gypsum board end joints, screws shall be located on alternating sides of cross tee flange. At gypsum board end joints, screws shall be located 1/2 in. from the joint. Gypsum board fastened to main runners with 1 in. long No. 8 Type S-12 bugle head screws, 1/2 in. from side joints, midway between intersections with cross tees (24 in. OC). End joints of adjacent gypsum board sheets shall be staggered not less than 4 ft OC. Gypsum board also screw attached to leg of wall angle with 1 in. long No. 8 Type S bugle head screws spaced 12 in. OC.

**AMERICAN GYPSUM CO** — Type AG-C

**CABOT MANUFACTURING ULC** — 1/2 in. Type C , 5/8 in. Type C.

**CERTAINTEED GYPSUM INC** — Type C

**CGC INC** — Type C, IP-X2

**GEORGIA-PACIFIC GYPSUM L L C** — Types 5, DAPC, TG-C

**NATIONAL GYPSUM CO** — Types eXP-C, FSK-C, FSW-C

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Types C, PG-C

**PANEL REY S A** — Types PRC, PRC2, 5/8 in. Type PRX2

**THAI GYPSUM PRODUCTS PCL** — Type C

**UNITED STATES GYPSUM CO** — Type C

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Type C

14B. **Gypsum Board* —** (For use with **Batts and Blankets*** and **Steel Framing Members*** described in Items 13 and 6, respectively) — Nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Gypsum board fastened to cross tees with 1 in. long No. 8 Type S-12 bugle head screws spaced 8 in. OC in the field and 8 in. OC along end joints. Gypsum board fastened to main runners with 1 in. long No. 8 Type S-12 bugle head screws spaced midway between cross tees. Screws along sides and ends of boards spaced 3/8 to 1/2 in. from board edge. End joints shall be staggered with spacing between joints on adjacent boards not less than 4 ft OC.

**CGC INC** — Type C

**UNITED STATES GYPSUM CO** — Type C

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Type C

14C. **Gypsum Board* —** For use when alternate **Steel Framing Members*** (Item 6G) are used - 1/2 in. thick, 4 ft. wide; installed with long dimension parallel to main runners and perpendicular to the 4 ft. long cross tees with the end joints centered between cross tees which are spaced 6 in. OC. Sheets are attached to cross tees with screws spaced 8 in. OC on the ends and 12 in. OC in the field with additional screws located 1-1/2 in, from the side edges. Sheets are attached to the main tees with screws spaced 8 in. OC with additional screws located 4 in. OC from the edges. Screws on the sides are located 1/2 in. from the side edge of the gypsum board. When **Batts and Blankets*** (Item 13A) are used - 5/8 in. thick, 4 ft wide; installed with long dimension parallel to main runners and perpendicular to cross tees and attached with screws spaced 8 in. OC on the ends and 8 in. OC in the field with additional screws located 1-1/2 in. from the side edges. Sheets are attached to main tees with screws spaced 8 in. OC with additional screws located 4 in. OC from the side edges. Screws on the sides located 3/4 in. from the side edge of the gypsum board, and screws at the end of the gypsum board located 1/2 in. from the board ends. Joints to be covered with paper tape and joint compound.

**CERTAINTEED GYPSUM INC** — Type C

14D. **Gypsum Board* (As an alternative to Items 14, 14A and 14B) —** Nom 5/8 in. thick, 48 in. wide gypsum board, installed and secured as described in Items 14, 14A and 14B with max screw spacing 8 in. OC.

**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — ULIX

14E. **Gypsum Board* (As an alternate to Item 14) —** Nom 5/8 in. thick, 4 ft. wide gypsum board, installed and secured as described in Item 14 with screws spaced max. 8 in. OC.

**NATIONAL GYPSUM CO** — Type FSLX

14E. **Gypsum Board* (As an alternative to Items 14, 14A, 14B, 14C, and 14D) —** For use with System No. 18 – Two layers of Nom. 5/8 in. thick, 48 in. wide gypsum board, base layer installed as detailed in Item 14. Face layer fastened through base layers with 2 in. long No. 8 Type S-12 bugle head screws. All joints and fastener spacing to be consistent with base layer requirements, except staggered with those in base layers. Any Gypsum Board listed in Item 14.

15. **Metal Trim Molding —** No. 22 MSG molding channel, measuring 5/8 in. wide with 9/16 and 1-3/8 in. long legs. Placed on gypsum board edges around light fixtures and secured to the cross tees and main runners with 1 in. long No. 8 Type S bugle head screws. Spacing of screws approx 8 in. OC along 4 ft side and 10 in. OC along 2 ft side of light fixtures.

16. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-11-13

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

## BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
## BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

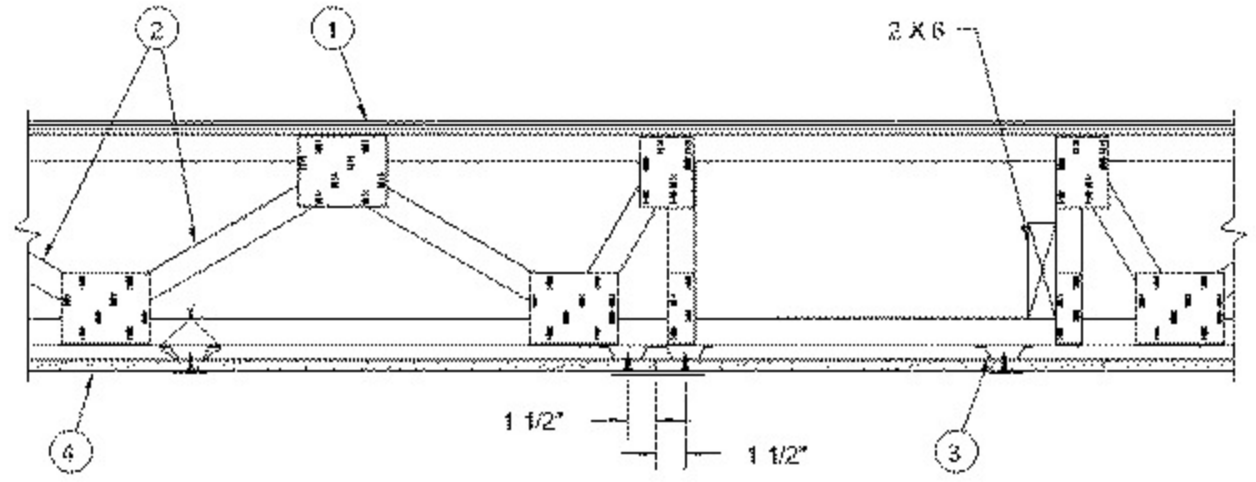
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

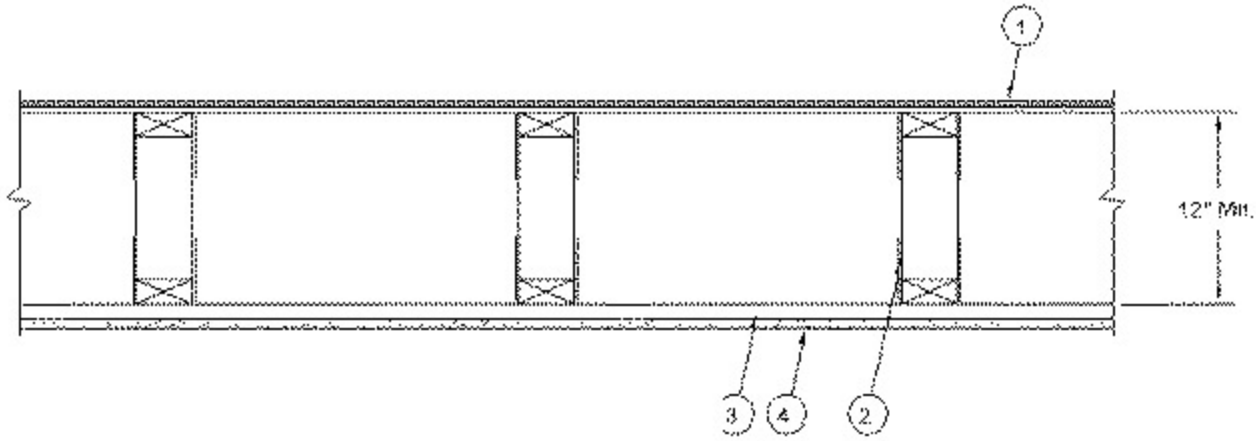
## Design No. **L528**

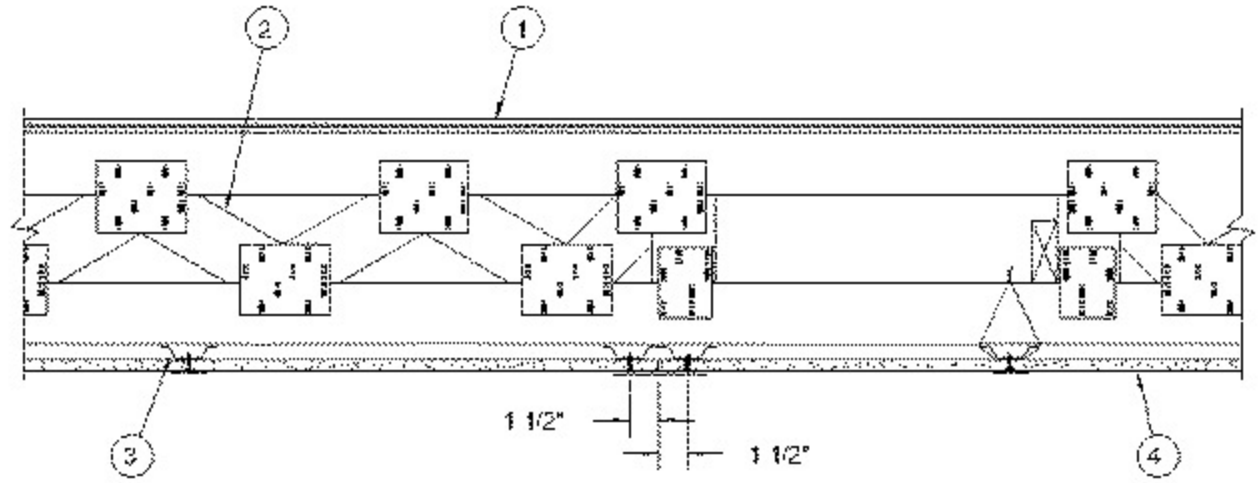
November 13, 2025

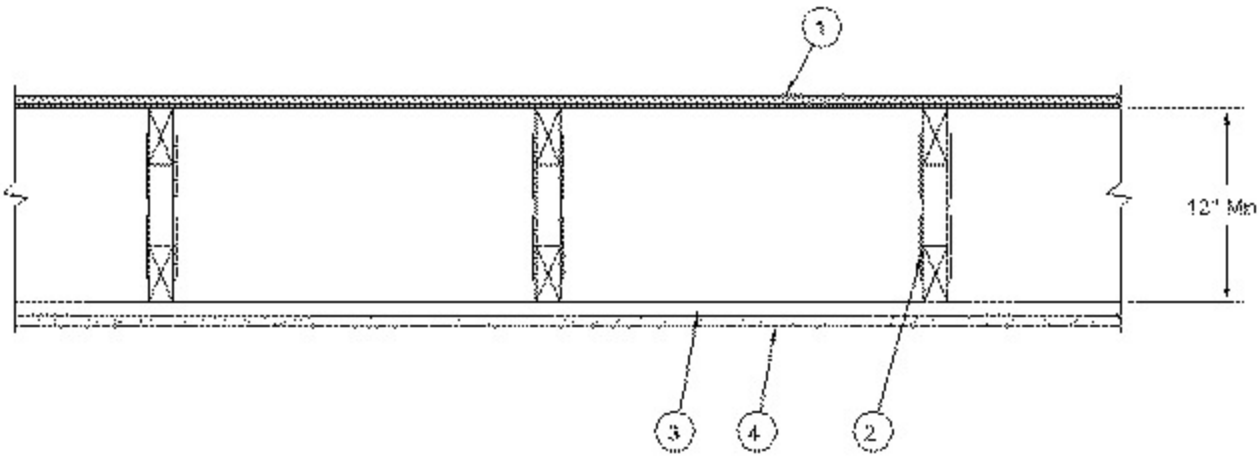
**Unrestrained Assembly Rating - 1 Hr.**
**Finish Rating - 22 Min.**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

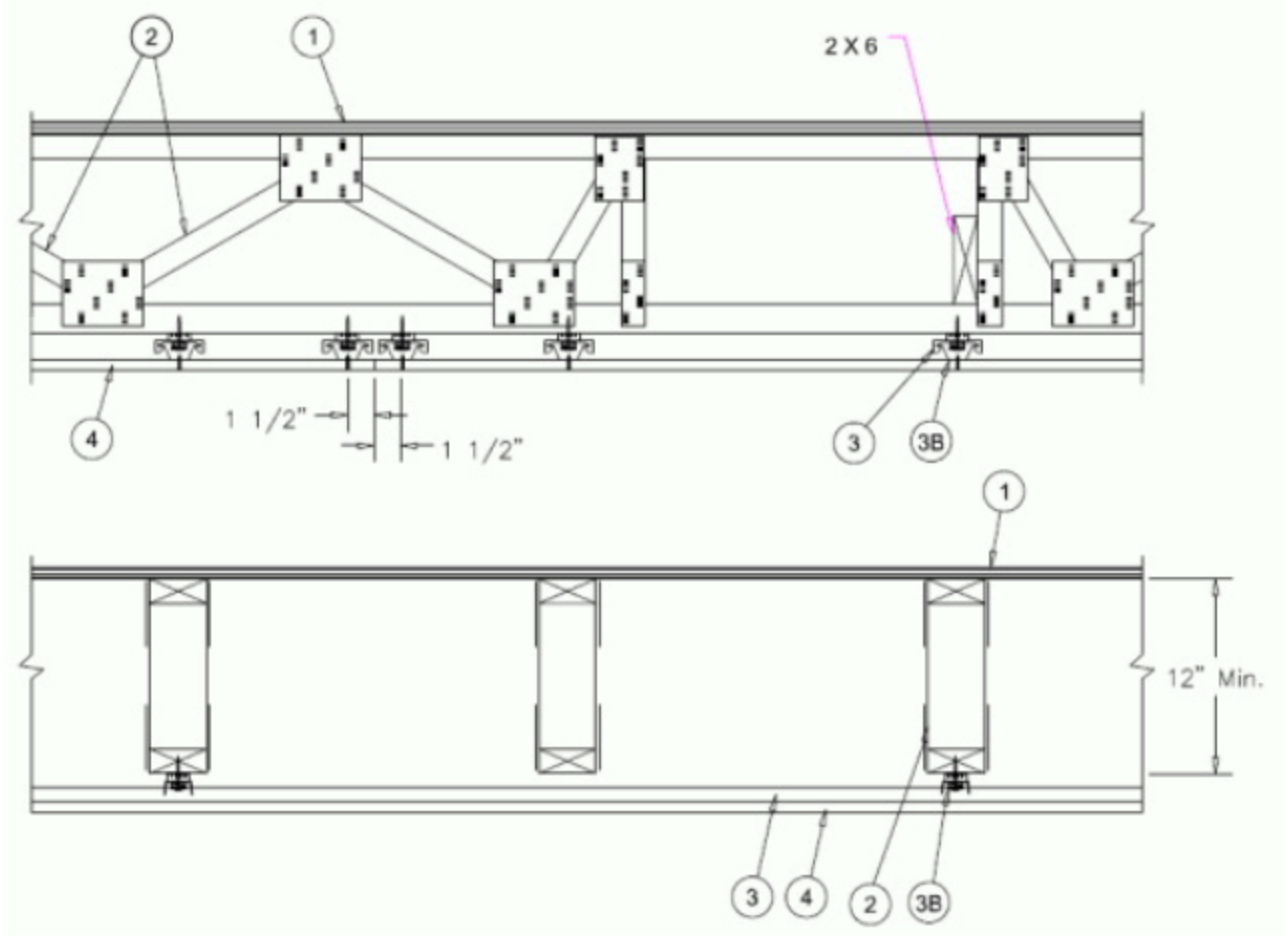
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**


2
1
2 X 6
1 1/2"
1 1/2"
4
3


1
12" Min.
3
4
2


2
1
1 1/2"
1 1/2"
3
4


1
12" Min
3
4
2




1. **Flooring System —** The flooring system shall consist of one of the following:

**System No. 1**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**System No. 2**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring** — Min 3/4 in. thickness of lightweight insulating concrete with **Perlite Aggregate*** or **Vermiculite Aggregate***, or gypsum concrete.

See **Perlite Aggregate** (CFFX) and **Vermiculite Aggregate** (CJZZ) categories for names of manufacturers.

**System No. 3**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Floor Mat Materials*** — (Optional) — Floor mat material nom 1/8 in. (3 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 3/4 in. (19 mm)

**HACKER INDUSTRIES INC** — FIRM-FILL SCM 125

**Alternate Floor Mat Materials** — (Optional) — Floor mat material nom 1/4 in. (6 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 250 and FIRM-FILL SCM 250+

**Alternate Floor Mat Materials** — (Optional) — Floor mat material nom 3/8 in. (10 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/4 in. (32 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 400 and FIRM-FILL SCM 400+

**Alternate Floor Mat Materials** — (Optional) — Floor mat material nom 3/4 in. (19 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in. (38 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 750 and FIRM-FILL SCM 750+

**Alternate Floor Mat Materials** — (Optional)— Floor mat material nom 5/64 in. (2 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1 in. of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat.

**Alternate Floor Mat Materials** — (Optional) — Floor mat material nom 1/4 in. (6 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. (32 mm) of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat II.

**Metal Lath** — (Optional) — For use with 3/8 in. (10 mm) floor mat materials, 3/8 in. expanded steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material. Hacker Floor Primer to be applied prior to the placement of the metal lath. When metal lath is used, floor topping thickness a nom 1-1/4 in. over the floor mat.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

**HACKER INDUSTRIES INC** — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Gyp-Span Radiant

**System No. 4**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.010 in. thick.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**LATICRETE SUPERCAP L L C** — Types LRK, HSLRK

**USG MEXICO S A DE C V** — Types LRK, HSLRK, CSD

**Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding minimum thickness of floor topping over floor mat.

**GRASSWORX L L C** — SC Types

**Alternate Floor Mat Material*** — (Optional) - Floor mat material nominal 3/8 in. thick loose laid over the subfloor. Floor topping shall be a min 3/4 in. thick.

**System No. 5**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring — Floor Topping Mixture*** — Min 1-1/2 in. thickness of floor topping mixture having a min compressive strength of 1000 psi and a cast density of 100 plus or minus 5 pcf. Foam concentrate mixed 40:1 by volume with water and expanded at 100 psi through nozzle. Mixture shall consist of 1.4 cu feet of preformed foam concentrate to 94 lbs Type I Portland cement, 300 lbs of sand with 5-1/2 gal of water.

**ELASTIZELL CORP OF AMERICA** — Type FF

**System No. 6**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring — Floor Topping Mixture*** — Min 1-1/2 in. thickness of floor topping mixture having a min compressive strength of 1000 psi and a cast density of 100 plus or minus 5 pcf. Foam concentrate mixed 40:1 by volume with water and expanded at 100 psi through nozzle. Mixture shall consist of 1.2 cu feet of preformed foam concentrate to 94 lbs Type I Portland cement, 300 lbs of sand with 5-1/2 gal of water.

**AERIX INDUSTRIES** — Floor Topping Mixture

**System No. 7**

Deleted.

**System No. 8**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**MAXXON CORP** — Types Maxxon Standard and Maxxon High Strength

**Floor Mat Materials*** — (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**MAXXON CORP** — Type Encapsulated Sound Mat.

**Floor Mat Reinforcement** — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) - 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** - (Optional, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

**System No. 9**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Mixture shall consist of 5 to 8 gal of water to 80 lbs of floor topping mixture to 2.1 cu ft of sand. Refer to the manufacturer’s instructions accompanying the material and/or contact the manufacturer’s technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**ULTRA QUIET FLOORS** — UQF-A, UQF-Super Blend, UQF-Plus 200

**System No. 10**

**Subflooring —** Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier —** (Optional) Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring — Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**FORMULATED MATERIALS LLC** — Types FR-25, FR-30, SiteMix, and Treadstone Advantage

**Alternate Floor Mat Material* —** (Optional) Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.

**FORMULATED MATERIALS LLC** — Types M1, M2, M3, Elite, Duo, R1, and R2

**System No. 11**

**Subflooring** — Min 1 by 6 in. T & G lumber fastened diagonally to trusses, or min 15/32 in. thick plywood or min 7/16 in. thick oriented strand board (OSB) wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panel to be perpendicular to trusses with joints staggered.

**Finish Floor - Mineral and Fiber Board*** — Min 1/2 in. thick, supplied in sizes ranging from 3 ft by 4 ft to 8 ft by 12 ft. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.

**HOMASOTE CO** — Type 440-32 Mineral and Fiber Board

**System No. 12**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ARCOSA SPECIALTY MATERIALS** — AccuCrete® Types NexGen, Green, Prime and PrePour, AccuRadiant®, AccuLevel® Types G40, G50 and SD30

**Alternate Floor Mat Material*** — (Optional) — Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.

**ARCOSA SPECIALTY MATERIALS** — AccuQuiet® Types D13, D-18, D25, DX38, EM.125, EM.125S, EM.250, EM.250S, EM.375, EM.375S, EM.750, and EM.750S.

**System No. 13**

**Subflooring** — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See **Floor- and Roof-Topping Mixtures** (CCOX) category for names of Classified Companies.

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 14**

**Subflooring** — Min 23/32 in. thick T&G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Gypsum Board*** — One layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1 in. long No. 6 Type W bugle head steel screws spaced 8 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**Floor Mat Materials*** — (As an alternate to the single layer gypsum board) — Floor mat material loose laid over the subfloor.

**MAXXON CORP** — Type Encapsulated Sound Mat.

**Gypsum Board*** — (For use when floor mat is used) Two layers of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists on top of the floor mat material. Gypsum board secured to each other with 1 in. long No. 6 Type G bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches in between layers and from the joints of the subfloor.

**GEORGIA-PACIFIC GYPSUM L L C** — Type DS

**System No. 15**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**DEPENDABLE LLC** — GSL M3.4, GSL K2.6, GSL-CSD, GSL RH and SKIMFLOW

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 16**

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier** — (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See **Floor- and Roof-Topping Mixtures** (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials*** — (Optional) — Nom 3/32 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat RST02

**Floor Mat Materials*** — (Optional) — Nom 3/16 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat FF03NP

**Floor Mat Materials*** — (Optional) — Nom 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**PLITEQ INC** — Type GenieMat FF06

**Floor Mat Materials*** — (Optional) — Nom 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**PLITEQ INC** — Type GenieMat FF10

**Floor Mat Materials*** — (Optional) — Nom 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**PLITEQ INC** — Type GenieMat FF17

**Floor Mat Materials*** — (Optional) — Nom 1 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**PLITEQ INC** — Type GenieMat FF25

**System No. 17**

**Subflooring —** Nom. 1-1/2 in. thick T & G laminated composite plywood sub-floor panels to be perpendicular to the trusses with end joints staggered 4 ft. End joints centered over top chord of trusses. Subfloor panels secured to trusses with construction adhesive and #8 by 3 in. wood screws spaced 12 in. OC in the field and 6 in. OC at the end joints.
**RSP INDUSTRIES INC** — SAP board

**System No. 18**

**Subflooring —** Min 15/32 in. thick wood structural panels, min grade "Underlayment" or "Single-Floor". Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss.

**Wall and Partition Facings and Accessories* - Sound Barrier (Optional) —** Acoustic Sleeper pads stapled to the top of the subfloor, the bottom of the finish floor, or to 5/16 in. thick by 1-1/2 in. wide wood strips and centered over wood trusses. Acoustic Sleeper pads are to be spaced appropriately so that the finish floor panels are fastened through Acoustic Sleeper pads to the trusses.
**STC ARCHITECTURAL PRODUCTS L L C DBA STC SOUND CONTROL** — Acoustic Sleeper

**Finish Floor —** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints

staggered 4 ft. Butt joints of panels have the option of being sealed with any UL Classified caulk or sealant found under - Fill, Void or Cavity Materials* (XHHW).

**System No. 19**

**Structural Cement-Fiber Units* —** For use with **UNITED STATES GYPSUM CO** Types C, IP-X2, IPC-AR and ULIX or AMERICAN GYPSUM CO Type AG-C. gypsum boards only. Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to wood trusses with end joints staggered a min of 2 ft and centered over the trusses. Panels secured to wood trusses with 1-5/8 in. long, No. 8, self-countersinking wood screw spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the end edges of the panel.
**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

**System No. 20**

**Subflooring —** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 4500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**SIKA DEUTSCHLAND GMBH** — Type SCHONOX AP Rapid Plus

**System No. 21**

**Subflooring —** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier —** (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier —** (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**Freudenberg Performance Materials LP** — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750, and 750 Plus.

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 22**

**Subflooring —** Min 23/32 in. thick T & G wood structural panels described and installed as shown in System No. 1.

**Finish Floor - Building Units* —** Min 1/2 in. thick magnesium oxide panels installed parallel, perpendicular, or diagonally to trusses with panel edges offset a min of 4 in. between subfloor and magnesium oxide panels. Panels secured to subfloor with construction adhesive and corrosion resistant fasteners, spaced 12 in. OC around the perimeter and in the field of the panel. Fasteners must be placed no closer than 1/2 in. from all panel edges and no closer than 2 in. from panel corners
**HUBER ENGINEERED WOODS L L C** — Type 1/2 in. Square Edge Exacor™ Board

**System No. 23**

**Subflooring —** Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered. Fastened with 8d ringed shank nails spaced 12 in. OC along each truss.

**Finish Floor - Building Units* —** Min 1/2 in. thick, supplied in 4 by 8 ft panels, fastened to trusses through subfloor with 8d ringed shank nails spaced a max of 12 in. OC. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.
**ECTEK INTERNATIONAL INC** — Type MegaBoard, 1/2 in. thick

**System No. 24**

**Subflooring — Building Units* —** Nom 3/4 in. thick, tongue and grooved boards. Long dimension of boards to be perpendicular to wood trusses with end joints staggered a min of 4 ft. and centered over the trusses. Boards secured to trusses with min 2 in. long screws or 2 in. x 0.113 in. Ring Shank nails spaced a max of 12 in. OC in the field with screws/nails located 1 in. from long edge, and max 8 in. OC along the end joints with screws/nails located 1/2 in. from end joint.

**ECTEK INTERNATIONAL INC —** Type MegaBoard, 3/4 in. thick

**Finish Floor (optional) — Building Units* —** Min 1/2 in. thick, supplied in 4 by 8 ft panels, fastened to trusses through subfloor with 2-3/8 in. long 8d ringed shank nails spaced a max of 12 in. OC. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.

**ECTEK INTERNATIONAL INC —** Type MegaBoard, 1/2 in. thick

**System No. 25**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier — (Optional)** — Nom 0.030 in. thick commercial asphalt saturated felt.

**Floor Mat Materials*** — (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**GRASSWORX L L C** — SC Types

**Finish Flooring*** — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 26**

**Subflooring – Building Units* —** Nom 3/4 in. thick, ship-lap or tongue-in-groove edge detail. Long dimension of boards to be perpendicular to trusses with end joints staggered a min of 4 ft. and centered over the trusses. Boards secured to trusses with #8 x 2 in. long screws or 2 in. long by 0.113 in. ring shank nails spaced a max of 12 in. OC in the field and 8 in. OC along butt ends. Fasteners located 1/2 in. from butt edges and 2 in. from long edges of the board. When Finish Floor (see below) is not used, must be used with Item 7I).

**AMERIFORM L L C** — Type Nocom

**Finish floor –** (Optional) - Min 1/2 in. thick, supplied in 4 ft by 8 ft panels, installed perpendicular or parallel to trusses with panel edges offset a min of 24 in. with adjacent sub-floor joints. Panels secured to subfloor with construction adhesive and corrosion resistant fasteners spaced a max of 12 in. OC. around perimeter and in the field of the panel. Fasteners located 1/2 in. at butt edges and 2 in. from long edge of the boards.

**MULTI-PANELS** – Type M4 Panel

**System No. 27**

**Subflooring** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Floor – Building Units*** - (Optional) - Min 1/2 in. thick, supplied in 4 ft by 8 ft panels, installed perpendicular or parallel to trusses with panel edges offset a min of 24 in. with adjacent sub-floor joints. Panels secured to subfloor with construction adhesive and corrosion resistant fasteners s spaced a max of 12 in. OC. around perimeter and in the field of the panel. Fasteners located 1/2 in. at butt edges and 2 in. from long edges of the board.

**MULTI-PANELS** – Type M4 Panel

**System No. 28**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 900 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**TECNODRY SA DE CV** – Type SURFACE GYP

**System No. 29**

**Subflooring —** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**ALPHAGYP, LLC** — Type AlphaGyp

**Floor Mat Materials*** — (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

**KEENE BUILDING PRODUCTS CO INC** — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials*** — (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

**KEENE BUILDING PRODUCTS CO INC** — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

## System No. 30

**Subflooring —** Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Floor Mat Materials*** — (Optional) — Any Floor Mat Material bearing the UL Classification Marking as to Fire Resistance. See Floor Mat Materials (CCQU) category for names of Classified Companies. Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**Metal Lath —** (Optional) — 3.4 lbs/sq yd expanded galvanized steel diamond lath. Refer to manufacturer's instructions regarding installation recommendations.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**LATICRETE INTERNATIONAL INC** — Type LAT

## System No. 31

**Subflooring** — Min 23/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with joints staggered.

**Vapor Barrier** — (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**BoldStep** — Types BoldStep Regular and BoldStep High Strength

**Floor Mat Materials*** — (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**BoldStep** — Type Sound Mat

**Floor Mat Reinforcement** — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) - 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** - (Optional, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

**System No. 32**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring – Floor Topping Mixture*** — Min 1 in. thickness of floor topping mixture having a min compressive strength of 2000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**YESERA COMERCIAL S.A.** — Type MAX-CRETE Complete

**System No. 33**

**Subflooring** — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. TetraGRIP™ nails measuring 2-3/8 in. long, 0.113 in. diameter, 0.272 in. round head, and helically threaded shank with barbed features on the helix meeting ASTM F1667 and having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**Apex Minerals LLC** — Type Apex Multi Underlayment

**System No. 34**

(For use with items 3V, 4I, 7J; Not applicable with items 6 & 6A)

**Subflooring** – Nom 3/4 inch thick, magnesium oxide structural panel with tongue-and-groove edge detail. Secured perpendicular to trusses with 6d nails. End joints staggered a minimum of 4 ft. Nails spaced a maximum of 12 in. on center in the field and 6 in. on center on the perimeter with edge nails located nominally 1/2 in. from end joints and long joints.

**NEXGEN Building Products Inc** — Type MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panel

2. **Trusses —** Parallel chord trusses, spaced a max 24 in. OC, fabricated from nom 2 by 4 in. lumber with lumber oriented vertically or horizontally. Min truss depth is 12 in. when item 9 is not employed. Min truss depth is 18 in. when item 9 is employed. Truss members secured together with min No. 20 MSG galv steel truss plates. Plates have 5/16 in. long teeth projecting perpendicular to the plane of the plate. The teeth are in pairs facing each other (made by the same punch), forming a split-tooth-type plate. Each tooth

has a chisel point on its outside edge. These points are diagonally opposite each other for each pair. The top half of each tooth has a twist for stiffness. The pairs are repeated on approx 7/8 in. centers with four rows of teeth per in. of plate width.

3. **Furring Channels —** Hat channels, 7/8 in. deep by 2-9/16 in. or 2-11/16 in. or 2-23/32 in. wide at the base and 1-7/16 in. wide at the face, formed from No. 25 ga galv steel, spaced 24 in. OC perpendicular to trusses. Channels secured to trusses with double strand of No. 18 SWG galv steel wire spaced 48 in. OC. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Two furring channels used at end joints of gypsum board (Item 4), each extending a min of 6 in. beyond both side edges of the board.

3A. **Resilient Channels —** (Not Shown) — As an alternate to Item 3, resilient channel formed from No. 26 MSG galv steel, spaced 16 in. OC perpendicular to trusses. Channels secured to each truss with 1-1/4 in. long No. 6 Type S bugle head steel screw. Channels overlapped at splices 4 in. Two resilient channels used at end joints of gypsum board (Item 4), each extending a min of 6 in. beyond both side edges of the board.

3B. **Steel Framing Members* —** (Optional)— Used as an alternate method to attach furring channels to trusses (Item 2). Clips spaced 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to the bottom chord of alternating trusses with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to the bottom chord of alternating trusses with No. 8 x 1-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item 3. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two min 7/16 in. long No. 6 self-tapping framing screws, at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 4. When Fiber, Sprayed (Item 6) is used, furring channel spacing reduced to 16 in. OC and two layers of nom 5/8 in. thick, 4 ft wide gypsum board shall be installed as described in Item 4.
**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75)

3C. **Steel Framing Members* —** (Optional, Not Shown) — Used as an alternate method to attach furring channels to trusses. Clips spaced 48 in. OC., and secured to the bottom chord to alternating trusses with two No. 8 x 2-1/2 in. coarse drywall screws, one through the hole at each end of the clip. Furring channels are friction fitted into clips. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 4. Two layers of gypsum board required as described in Item 4. Not evaluated for use with Item 6. When Item 3C is used and Batts and Blankets* are added per Section III Item 18 Blanket Insulation in the General Information of this Directory (BXUV), clips spaced 48 in. OC, furring channels spaced 16 in. OC max, 3-1/2 in. max. Batts and Blankets* secured to plywood subfloor with staples spaced 12 in. OC or to the trusses with 0.090 in. diam galv steel wires spaced 12 in. OC, and two layers of gypsum board required as described in Item 4A. When the Batts and Blankets* are draped over the furring channel/gypsum panel ceiling membrane, the clip spacing shall be reduced to 24 in. OC and secured to consecutive trusses, the furring channel spacing shall be reduced to 12 in. OC, and two layers of gypsum board required as described in Item 4A.
**KINETICS NOISE CONTROL INC** — Type Isomax.

3D. **Steel Framing Members* —** (Optional, Not Shown) — For Use with Item 7- Used as an alternate method to attach furring channels to trusses. Clips spaced 48 in. OC. and secured to the bottom chord to alternating trusses with one No. 8 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 4. Not evaluated for use with Item 6.
**PLITEQ INC** — Type Genie Clip

3E. **Steel Framing Members* —** (Optional, Not Shown) — For use with Item 7B - Used as an alternate method to attach furring channels to trusses. Clips spaced at 48" OC and secured to the bottom of the trusses with one 2 in. Coarse Drywall Screw with 1 in. diam. washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire .Additional clips are required to hold the Gypsum Butt joints as described in item 4. Not evaluated for use with Item 6.
**STUDCO BUILDING SYSTEMS** — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

3F. **Resilient Channels —** For use with Item 4B and 7A - Resilient channels, formed from No. 25 MSG galv steel and shaped as shown, spaced 12 in. OC perpendicular to joist. Channels overlapped 4 in. at splices and secured to each joist with 1-1/4 in. Type S screws. Min end clearance of channels to wall to be 1/2 in. Additional resilient channels positioned so as to coincide with end joints of gypsum board.

3G. **Resilient Channels —** For Use With Item 4C and 7C. Formed from min 25 MSG galv steel installed perpendicular to trusses and spaced 16 in. OC. Channels secured to each truss with 1-5/8 in. long Type S bugle head steel screws. Channels overlapped 4 in. at splices. Two channels, spaced 6 in. OC, oriented opposite each gypsum panel end joint. Additional channels shall extend min 6 in. beyond each side edge of panel. Insulation, Item 7C is applied over the resilient channel/gypsum panel ceiling membrane.

3H. **Steel Framing Members* —** (Optional, Not Shown) — Used as an alternate method to attach furring channels to trusses. Clips spaced at 48" OC and secured to the bottom of the trusses with one 2-1/2 in. Coarse Drywall Screw with 1 in. diam. washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire .Additional clips are required to hold the Gypsum Butt joints as described in item 4. Not evaluated for use with Item 6.
**REGUPOL AMERICA** — Type SonusClip

3I. **Steel Framing Members —** (Not Shown) — For use with Items 4C and 7F, As an alternate to Item 3, main runners, cross tees, cross channels and wall angle as listed below.

a. **Main Runners —** Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv. steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runner/cross tee intersections. Hanger wires wrapped and twist-tied on 16d nails driven in to side of trusses at least 5 in. above the bottom face.

b. **Cross Tees or Channels —** Nom 4 ft long cross tees, with 15/16 in. or 1-1/2 in. wide face, or nom 4 ft long cross channels, with 1-1/2 in. wide face, spaced 16 in. OC, installed perpendicular to the main runners. Additional cross tees or channels used 8 in. from each side of butted gypsum board end joints. The cross tees or channels may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.

c. **Wall Angle or Channel —** Painted or galv. steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.
**USG INTERIORS LLC** — Type DGL or RX

3J. **Steel Framing Members* —** (Optional, Not Shown) — Used to attach resilient channels (Item 3A) to trusses (Item 2). Clips spaced 48 in. OC on adjacent trusses, and secured to trusses with one No. 8 x 2-1/2 in. coarse drywall screw through center grommet hole. Channels secured to clips with one #10 x 1/2 in. pan-head self-drilling screw. Ends of adjoining channels overlapped 6 in. and secured together with two #8 15 x 1/2 in. Philips Modified Truss screws spaced 2-1/2 in. from the center of the overlap. Gypsum board butt joints require additional resilient channels spaced 1-1/2 in. from the butt joint on either side. One edge of the extra channels will extend to an adjacent truss where it is secured with a clip.
**KEENE BUILDING PRODUCTS CO INC** — Type RC+ Assurance Clip

3K. **Resilient Channels —** For use with items 3L, 4F, and 7G — Formed from min 26 MSG galv steel installed perpendicular to trusses. When Item 7G is draped over channels, channels spaced a maximum 12 in. OC. Channels secured to each truss as described in Item 3L. Channel ends butted and centered under the joists and attached to the joists with one screw at each end. Additional resilient channels positioned so as to coincide with end joints of gypsum board as shown in the above illustration. Additional channels shall extend min 3 in. beyond each side edge of board.

3L. **Steel Framing Members* —** (Optional, Not Shown) — Used as an alternate method to attach resilient channels to joists (Item 2). For use with items 3K, 4F and 7G. A resilient sound isolation accessory shall be used at each attachment point of the resilient channels and spaced max 24 in. O.C. Channel ends butted and centered under the joists and attached to the joists with one accessory at each end. Additional accessories used to hold resilient channels that support the gypsum board end joints, as described in Item 3K. The accessory envelops the mounting edge of the resilient channel. The accessory and resilient channel are fastened to the joists with the screws supplied with the accessory and per the accessory manufacturer's installation instructions.
**PAC INTERNATIONAL L L C** — Types RC-1 Boost

3M. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 3.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC, perpendicular to trusses. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring

channels used at end joints of gypsum board (Item 4), each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels —** 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to trusses, friction-fitted into the channel caddy on the Steel Framing Members (Item 3Md) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Blocking —** Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 2 by 4 in. lumber (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 3Md) location with 16d nails or minimum 2-1/2 in. screws.

d. **Steel Framing Members* —** Spaced 48 in. OC. max along truss, and secured to the truss on alternating trusses with two, #10 x 1-1/2 in. screws through mounting holes on the hanger bracket. **PAC INTERNATIONAL L L C** — Type RSIC-SI-CRC EZ Clip

3N. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 3.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to trusses and friction fit into Steel Framing Members (Item 3Nc). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels used at end joints of gypsum board (Item 4). Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Blocking —** Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 2 by 4 in. lumber (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 3Nc) location with 16d nails or minimum 2-1/2 in. screws.

c. **Steel Framing Members* —** Used to attach furring channels (Item 3Na) to trusses. Clips spaced 48 in. OC and secured along truss webs at each furring channel intersection with min. 3/4 in. long self-drilling #10 x 1-1/2 in. screws through each of the provided hole locations. Furring channels are friction fitted into clips.

**PAC INTERNATIONAL L L C** — Type RSIC-S1-1 Ultra

3O. **Resilient Channels —** For Use With Item 4G and 7C. Formed from min 25 MSG galv steel installed perpendicular to trusses and spaced 16 in. OC. Channels secured to each truss with 1-1/4 in. long Type S bugle head steel screws. Channels overlapped 4 in. at splices. Two channels, spaced 6 in. OC, oriented opposite each gypsum panel end joint. Additional channels shall extend min 6 in. beyond each side edge of panel. Insulation, Item 7C is applied over the resilient channel/gypsum panel ceiling membrane.

3P. **Steel Framing Members* —** (Optional, Not Shown, As an alternate to Item 3) — Furring channels and Steel Framing Members as described below:

A. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-23/32 in. wide by 7/8 in., spaced 24 in. OC max perpendicular to trusses. Channels secured to trusses as described in Item 3Pb. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 4.

B. **Steel Framing Members* —** Used to attach furring channels (Item 3Pa) to trusses (Item 2). Clips spaced 48 in. OC max with No. 8 x 2-1/2 in. course drywall screw through the center grommet. Furring channels are friction fitted into clips.

**CLARKDIETRICH BUILDING SYSTEMS** — Type ClarkDietrich Sound Clips

3Q. **Steel Framing Members* —** (Optional, Not Shown) — Used as an alternate method to attach resilient channels (items 3 and 3G) to joists (Item 2). For use with items 3K, 4F and 7G. A resilient sound isolation accessory shall be used at each attachment point of the resilient channels and spaced max 24 in. O.C. Channel ends butted and centered under the joists and attached to the joists with one accessory at each end. Additional accessories used to hold resilient channels that support the gypsum board end joints, as described in Item 3K. The accessory envelops the mounting edge of the resilient channel. The accessory and resilient channel are fastened to the joists with the 2in. screws supplied with the accessory and per the accessory manufacturer's installation instructions.

**PAC INTERNATIONAL L L C** — Types RC-1 Boost

3R. **Steel Framing Members*** — (Optional) — As an alternate to Item 3G — Used as an alternate method to attach furring channels to trusses (Item 2). Clips spaced 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to the bottom chord of alternating trusses with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item 3. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two min 7/16 in. long No. 6 self-tapping framing screws, at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints,

as described in Item 4. When Fiber, Sprayed (Item 6) is used, furring channel spacing reduced to 16 in. OC and two layers of nom 5/8 in. thick, 4 ft wide gypsum board shall be installed as described in Item 4.

**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-1 (2.75), RSIC-SI-X.

3S. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 3G.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC, perpendicular to trusses. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring channels used at end joints of gypsum board (Item 4), each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels** — 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to trusses, friction-fitted into the channel caddy on the Steel Framing Members (Item 3Md) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Blocking** — Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 2 by 4 in. lumber (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 3Md) location with 16d nails or minimum 2-1/2 in. screws.

d. **Steel Framing Members*** — Spaced 48 in. OC. max along truss, and secured to the truss on alternating trusses with two, #10 x 2in. screws through mounting holes on the hanger bracket.

**PAC INTERNATIONAL L L C** — Type RSIC-SI-CRC EZ Clip

3T. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 3G.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to trusses and friction fit into Steel Framing Members (Item 3Nc). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels used at end joints of gypsum board (Item 4). Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Blocking** — Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 2 by 4 in. lumber (blocking), min. 12 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the trusses at the top and bottom of the blocking at each Steel Framing Member (Item 3Nc) location with 16d nails or minimum 2-1/2 in. screws.

c. **Steel Framing Members*** — Used to attach furring channels (Item 3Na) to trusses. Clips spaced 48 in. OC and secured along truss webs at each furring channel intersection with min. 3/4 in. long self-drilling #10 x 2in. screws through each of the provided hole locations. Furring channels are friction fitted into clips.

**PAC INTERNATIONAL L L C** — Type RSIC-S1-1 Ultra

3U. **Steel Framing Members* —** (Optional, Not Shown) — For Optional Use with Item 7G- Used as an alternate method to attach furring channels to trusses. Clips spaced 48 in. OC. and secured to the bottom chord to alternating trusses with one No. 8 x 2-1/2 in. screw and washer through the center hole. Furring channels are friction fitted into clips. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or screw attached with two pan head screws on each leg of overlap. At gypsum board butt joints continuous back to back channels installed with clips installed on every truss.. Not evaluated for use with Item 6, 6A and 7E or Flooring System No. 1.

**ISOTECH INDUSTRIES INC.** — Type ISOSTUD

3V. **Resilient Channels —** For use with Flooring System 34 - Resilient channels, formed from No. 25 MSG galv steel and shaped as shown, spaced 12 in. OC perpendicular to trusses. Continuous channels overlapped 4 in. at splices and secured to each truss with 1-1/4 in. Type S screws. Min end clearance of channels to wall to be 1/2 in. Additional resilient channels positioned so as to coincide with end joints of gypsum board.

4. **Gypsum Board* —** One layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to furring or resilient channels. Gypsum board secured with 1 in. long No. 6 Type S bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. End joints secured to both resilient channels as shown in the end joint detail. When **Steel Framing Members** (Item 3B and 3P) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimension perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long No. 6 Type S bugle head screws spaced 12 in. OC in the field of the board. Gypsum board butt joints shall be staggered 2 ft within the assembly, and shall occur between the main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 6 in. on each end. The two furring channels at each butt joint shall be spaced approximately 3-1/2 in. OC, and be attached to the bottom chord of the truss with one clip at each end of the channel. Screw spacing along the gypsum board butt joint shall be 8 in. OC. When both **Steel Framing Members** (Item 3B) and **Fiber, Sprayed** (Items 6 or 6A) are used, furring channel spacing reduced to 16 in. OC and two layers of nom 5/8 in. thick, 4 ft wide gypsum board are installed with long dimension perpendicular to furring channels. Base layer secured to furring channels with nom 1 in. long No. 6 Type S bugle head screws spaced 12 in. OC in the field of the board. Gypsum board butt joints shall be staggered 2 ft within the assembly, and shall occur between the main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 6 in. on each end. The two furring channels at each butt joint shall be spaced approximately 3-1/2 in. OC, and be attached to the bottom chord of the truss with one RSIC-1 clip at each end of the channel. Screw spacing along the gypsum board butt joint shall be 8 in. OC. Outer layer secured to furring channels using 1-5/8 in. long No. 6 Type S screws spaced 8 in. OC and 1-1/2 in. from the end joint. Butted end joints to be offset a min. of 8 in. from base layer end joints. Butted side joints of outer layer to be offset min. 18 in. from butted side joints of base layer. When **Steel Framing Members** (Item 3C) are used, two layers of nom 5/8 in. thick, 4 ft wide are installed with long dimensions perpendicular to furring channels. Base layer attached to the furring channels using 1 in. long No. 6 Type S bugle-head steel screws spaced 12 in. OC in the field of the board. Butted end joints shall be staggered min 2 ft. within the assembly, and occur midway between the continuous furring channels. Each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 6 in. on each end. The two furring channels shall be spaced approximately 4 in. OC, and be attached to underside of the truss with one Isomax clip at

each end of the channel. Screw spacing along the gypsum board butt joint shall be 8 in. OC. Outer layer attached to the furring channels using 1-5/8 in. long No. 6 Type S bugle-head steel screws spaced 12 in. OC in the field. The end of the outer layer boards at the butt joint shall be attached to the base layer boards with 1-5/8 in. long Type G screws spaced 8 in. OC and 1-1/2 in. from the end joint. Butted end joints to be offset a min of 8 in. from base layer end joints. Butted side joints of outer layer to be offset min 18 in. from butted side joints of base layer. When **Steel Framing Members** (Item 3D) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long No. 6 Type S bugle-head steel screws spaced 12 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 16 in. within the assembly. . At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 6 in. on each end. These additional furring channels shall be attached to underside of the truss with Genie clips as described in Item 3D. Screw spacing along the gypsum board butt joint shall be 6 in. OC. When **Steel Framing Members** (Item 3E) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 3 in. on each end. The two support furring channels shall be spaced approximately 3 in. in from joint. Screw spacing along the gypsum board butt joint and along both additional channels shall be 8 in. OC. Additional screws shall be placed in the adjacent section of gypsum board into the aforementioned 3 in. extension of the extra butt joint channels as well as into the main channel that runs between . Butt joint furring channels shall be attached with one RESILMOUNT Sound Isolation Clip at each end of the channel. When **Fiber, Sprayed** (Items 6 or 6A) is used, two layers of nom 5/8 in. thick, 4 ft wide gypsum board are installed with long dimensions perpendicular to furring channels. Base layer gypsum board secured with 1 in. long No. 6 Type S bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. End joints secured to both resilient channels as shown in the end joint detail. Outer layer gypsum board secured with 1-5/8 in. long No. 6 Type S bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. Outer layer shall be finished as described in Item 5. When **Foamed Plastic** insulation (Item 7E) is applied to the underside of the subflooring, screw spacing shall be reduced to 8 in. OC with minimum 1-1/4 in. long Type S screws to install gypsum to the resilient channels (Item 3A). Resilient channels (Item 3A) to be spaced maximum 12 in. OC. Butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. End joints secured to both resilient channels as shown in end joint detail.

When **Steel Framing Members** (Item 3E) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, an additional single length of furring channel shall be installed and be spaced approximately 3 in. from the butt joint (6 in. from the continuous furring channels) to support the floating end of the gypsum board. Each of these shorter sections of furring channel shall extend one truss beyond the width of the gypsum panel and be attached to the adjacent trusses with one SonusClip at every truss involved with the butt joint.

When **Steel Framing Members*** (Item 3I) are used, one layer of 5/8 in. thick, 48 in. wide gypsum board, installed with long dimension perpendicular to cross channels with side joints centered along main runners. Gypsum board fastened to cross channels with 1 in. long No. 8 Type S bugle head steel screws located 1/2 in. from end joints and 1-3/4 in. from side joints and spaced 8 in. OC along the end joints and in the field. Panels fastened to cross tees with 1 in. long, Type S bugle-head screws spaced in the field and 8 in. OC along end joints. Panels fastened to main runners with 1 in. long. Type S bugle-head screws spaced midway between cross tees. Screws along sides and ends of panels spaced 3/8 to 1/2 in. from panel edge. Gypsum board sheets screw attached to leg of wall angle with 1 in. long No. 8 Type S bugle

head steel screws spaced 12 in. OC. End joints of panels shall be staggered with spacing between joints on adjacent panels not less than 4 ft OC.

When **Steel Framing Members** (Item 3J) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to resilient channels. Gypsum board secured to resilient channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board and located 3/4 in. from side joints and 1-1/2 in. from end joints. Gypsum board joints are to be staggered by a minimum of 24 in.

When **Steel Framing Members** (Item 3M) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 4. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 3N) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 4. Butt joints staggered minimum 24 in. OC.

When **Steel Framing Members** (Item 3U) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed perpendicular to furring channels with butt joints centered between continuous back to back channels and secured to all channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC. Butt joints staggered minimum 48 in. OC.

**AMERICAN GYPSUM CO** — Type AG-C

**CABOT MANUFACTURING ULC** — 5/8 in. Type C.

**CERTAINTEED GYPSUM INC** — Type C

**CGC INC** — Types C, IP-X2, IPC-AR

**GEORGIA-PACIFIC GYPSUM L L C** — Types 5, DAPC, TG-C

**NATIONAL GYPSUM CO** — Types eXP-C, FSK-C, FSW-C, FSW-G

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Type C

**THAI GYPSUM PRODUCTS PCL** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

4A. **Gypsum Board —** For use when Item 3C is used and **Batts and Blankets*** are secured to the plywood subfloor, to the trusses or draped over the furring channel/gypsum panel ceiling membrane as described

in Item 3C. For method of gypsum board installation, see Item 4.
**CGC INC** — Types C, IP-X2, IPC-AR

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

4B. **Gypsum Board* —** For use when **Batts and Blankets*** (Item 7A) and Resilient Channels (Item 3F) are used. Nom 5/8 in. thick, 4 ft wide gypsum board installed with long dimension perpendicular to resilient channels. Nom 1 in. long No. Type S bugle head screws are driven through channel spaced 8 in. OC. End joints of gypsum board similarly fastened to additional resilient channels positioned at end joint locations.
**AMERICAN GYPSUM CO** — Type AG-C.

**CABOT MANUFACTURING ULC** — 5/8 in. Type C.

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Type C

4C. **Gypsum Board* —** For use with Items 3G and 7C or 3I and 7F, or 3I and 7C. Nom 5/8 in. thick, 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels. Gypsum panels secured with 1 in. long Type S bugle head steel screws spaced 8 in. OC and located a min of 1/2 in. from side joints and 3 in. from the end joints. Finish Rating with this ceiling system is 20 min.
**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — Type ULIX

4D. **Gypsum Board* —** For use when Flooring System (Item 1) consists of both System No. 1 and min 15/32 in. plywood, min grade "Underlayment" or "Sturd-I-Floor" with T & G edges and conforming with PS1-83 specifications, or min 3/4 in. thickness of any Floor Topping Mixture (CCOX) bearing the UL Classification Marking as to Fire Resistance, min Truss depth (Item 2) is 18 in. and Batts and Blankets (Item 7D) and Resilient Channels (Item 3A) are used. One layer of nom 5/8 in. thick, 48 in. wide gypsum board installed with long dimension perpendicular to resilient channels. Gypsum board secured with 1 in. long Type S bugle head steel screws. Screws spaced 1 in. from side joints, and 12 in. OC in the rest of the field. Screws spaced 1-1/2 in. from the end joints. End joints secured to both resilient channels as shown in end joint detail. When batt insulation (Item 7D) is draped over the resilient channel/gypsum board ceiling membrane, the resilient channel (Item 3A) spacing shall be reduced to 12 in. OC., and gypsum board screws spaced 1 in. from side joints, and 8 in. OC in the rest of the field. For use only with Ceiling Damper described in Item 9T.
**PANEL REY S A** — Type PRC2

4F. **Gypsum Board* —** For use with Items 3K, 3L, and 7G— One layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to resilient channels. Gypsum board secured to resilient channels with min nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board and located 3/4 in. from side joints and 1-1/2 in. from end joints. Gypsum board butt joints are to be staggered by a minimum of 24 in.

**CABOT MANUFACTURING ULC** — 5/8 in. Type C.

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Type C

4G. **Gypsum Board* —** For use with Items 3G and 7C. Nom 5/8 in. thick, 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels. Gypsum panels secured with 1 in. long Type S bugle head steel screws spaced 8 in. OC and located a min of 1/2 in. from side joints and 3 in. from the end joints.
**AMERICAN GYPSUM CO** — Type AG-C.

4H. **Gypsum Board* —** For use with Items 3G and 7C Nom 5/8 in. thick, 4 ft. wide gypsum panels installed with long dimension perpendicular to resilient channels. Gypsum panels secured with 1 in. long Type S bugle head steel screws spaced 8 in. OC and located a min of 1/2 in. from side joints and 3 in. from the end joints. Butted end joints stagged min 16 in. Not for use with Dampers, Item 9 or alternates. Not for use with Flooring System No. 1.

**NATIONAL GYPSUM CO** — Type FSLX

4I. **Gypsum Board* —** For use with Flooring System No. 34. Nom 5/8 in. thick, 4 ft. wide gypsum board panels with long dimension perpendicular to resilient channels, with the long edges at the center of the truss space. Gypsum board secured to resilient channels using minimum 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly and occur midway between the continuous furring channels. The resilient channels at the gypsum board ends spaced nominally 6 in. apart, with butted end joints staggered min. 2 ft within the assembly and midway between the continuous furring channels screws placed 3 in. from the board ends into the resilient channels at the butt joints. Finish rating with this ceiling system is 23 minutes.

**AMERICAN GYPSUM CO** — Type AG-C

**CERTAINTEED GYPSUM INC** — Type C

**GEORGIA-PACIFIC GYPSUM L L C** — Type TG-C

**NATIONAL GYPSUM CO** — Type FSW-C

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** — Type C

**UNITED STATES GYPSUM CO** — Type C

5. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an

alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

6. **Fiber, Sprayed* —** (Dry Dense Packed 100% Borate Formulation) — (Not Shown, Optional) — The fiber is applied without water or adhesive at a nominal dry density of 3.5 lb/ft$^3$, in accordance with the application instructions supplied with the product. When Item 6 (Fiber, Sprayed, Dry Dense Packed) is used, Furring Channels (Item 3F) or Resilient Channels (Item 3A) spacing shall be reduced to 12 in. OC. When Item 6 (Fiber, Sprayed, Dry Dense Packed) is used, two layers of gypsum board required as described in Item 4. Not evaluated for use with Item 3C.
**APPLEGATE GREENFIBER ACQUISITION LLC** — Insulmax and SANCTUARY to be used with dry application only.

6A. **Fiber, Sprayed* —** (Loose Fill 100% Borate Formulation) — (Not Shown, Optional) — The finished rating when Fiber, Sprayed is used has not been determined. The fiber is applied without water or adhesive at a minimum dry density of 0.5 lb/ft$^3$ and at a max thickness of 3-1/2 in., in accordance with the application instructions supplied with the product. When Item 6A (Fiber, Sprayed, Loose Fill) is used, Furring Channels (Item 3F) or Resilient Channels (Item 3A) spacing shall be reduced to 12 in. OC. When Item 6A (Fiber Sprayed, Loose Fill) is used, two layers of gypsum board required as described in Item 4. Not evaluated for use with Item 3C.
**APPLEGATE GREENFIBER ACQUISITION LLC** — Insulmax & SANCTUARY to be used with dry application only.

7. **Batts and Blankets* —** (Not Shown) — For use with Item 3D — Nom 3 in. thick mineral wool insulation held suspended in the concealed space with 0.090 in. diam galv steel wires attached to the wood trusses at 18 in. OC.

7A. **Batts and Blankets* —** For Use With Items 3F and 4B — Glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance having a min. density of 0.5 pcf, draped over the resilient channel/gypsum panel ceiling membrane. No limit on overall thickness.

7B. **Batts and Blankets* —** (Not Shown) — For use with Item 3E — Nom 3-1/2 in. thick, min. 2 pcf fiber glass insulation held suspended in the concealed space with nominal 0.090 in. diam galv steel wires attached to the wood trusses at nominally 16 in. OC.

7C. **Batts and Blankets* or Fiber, Sprayed* —** For Use with Item 4C (Not Shown) — Min. 3-1/2 in thick with no limit on maximum thickness fitted in the concealed space, draped over the resilient channel (Item 3G)/gypsum board (Item 4C or 4G) ceiling membrane.

7D. **Batts and Blankets* —** For Use With Item 4D — Insulation may be secured to plywood subfloor with staples spaced 12 in. OC or to the trusses with 0.090 in. diam galv steel wires spaced 12 in. OC. Insulation may alternatively be draped over the resilient channels and gypsum board ceiling membrane, and the resilient channels and gypsum board attachment shall be modified as specified in Item 4D. Any glass fiber insulation bearing the UL Classification Marking for Surface Burning Characteristics and/or Fire Resistance, and having a min density of 0.5 pcf and max thickness of 3-1/2 in. may be used.

7E. **Foamed Plastic* —** (As alternate to Item 6 and 6A, Not Shown) — Spray foam insulation applied directly to the underside of the plywood subflooring. Spray foam insulation installed to a maximum thickness of 10 in. at a nominal 0.5 lb/ft$^3$ or 2.0 lb/ft$^3$ density, depending on the product installed. Spray foam insulation is limited to use with minimum 18 in. deep trusses (Item 2). When spray foam insulation is installed, resilient channels (Item 3A) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board (Item 4) spaced maximum 3 in. away from gypsum butt joints. Gypsum board (Item 4) to be installed using minimum 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a ceiling damper (Item 9) in the concealed space, minimum 1 in. clearance to be maintained between damper housing and spray foam insulation. Not evaluated for use with Items 3, 3B through 3F, 3G, 6, 6A, 7 through 7D. Not evaluated with Flooring System (Item 1) Configuration No. 1.
**BASF CORP** — Enertite® NM, Enertite® G, FE178®, Spraytite® 178, Spraytite® 81206, Walltite® 200, Walltite® US, Walltite® US-N, Walltite® HP+, Walltite® MAX, Walltite® v.5, Walltite® LWP, Walltite® Plus, Enertite® Max, and Walltite® One.

7F. **Batts and Blankets* —** (Not Shown) For Use with Item 3I and 4C — Glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. There is no limit in the overall thickness of insulation, and the insulation can be secured against the subflooring, held suspended in the concealed space or draped over the Steel Framing Members and gypsum panel membrane.

7G. **Batts and Blankets* —** (Not Shown) For Use with Item 3L, 3K, 3U, and 4F — Glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. There is no limit in the overall thickness of insulation, and the insulation can be secured against the subflooring, held suspended in the concealed space or draped over the Steel Framing Members and gypsum panel membrane. When draped over the furring channels the furring channel spacing shall be reduced to 12 in OC.

7H. **Foamed Plastic* —** (As alternate to Items 6 and 7) — Spray foam insulation applied directly to the underside of the plywood subflooring. Spray foam insulation installed to a maximum thickness of 11 in. at a nominal 1.0 lb/ft$^3$ - 2.5 lb/ft$^3$ density, while maintaining a minimum 7 in. clearance between the spray foam insulation and the gypsum board (Item 4). Spray foam insulation is limited for use with minimum 18 in. deep trusses (Item 2). When spray foam insulation is installed, resilient channels (Item 3A) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board spaced maximum 3 in. away from gypsum butt joints. Gypsum board to be installed using minimum 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a ceiling damper (Item 9) in the concealed space, no clearance is necessary between damper housing and spray foam insulation. Only for use with item 3A not evaluated for use with alternates to item 3A.
**CARLISLE SPRAY FOAM INSULATION** — Types SealTite Pro Closed Cell (CC), SealTite Pro Open Cell (OC), SealTite Pro OCX, SealTite Pro No Trim 21, SealTite Pro One Zero, SealTite PRO HFO, Foamsulate Closed Cell, Foamsulate OCX, Foamsulate 70, Foamsulate HFO, and Foamsulate HFO 2.0.

7I. **Batts and Blankets* —** (Not Shown - Required as indicated with Flooring System No. 26) - Glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. Min. 3-1/2 in. thick, 0.92 pcf density, draped over the resilient or furring channels and gypsum

panel membrane. Resilient or furring channels to be spaced 12 in. OC with extra channels installed at butt joints as indicated above.

7J. **Batts and Blankets* —** (Not Shown - Required as indicated with Flooring System No. 34) - Glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. Min. 3-1/2 in. thick, 0.8 pcf density, draped over the resilient and gypsum panel membrane. Resilient or furring channels to be spaced 12 in. OC with extra channels installed at butt joints as indicated above.

8. **Air Duct* —** (Optional) — Any UL Class 0 or Class 1 flexible air duct installed in accordance with the instructions provided by the damper manufacturer.

9. **Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max. nom area shall be 349 sq in. Max. overall length and width shall not exceed 18-11/16 in. by 18-11/16 in. with max. 16 in. by 16 in. register opening. Aggregate damper openings shall not exceed 175 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. An aluminum or steel grille (Item 10) shall be installed in accordance with installation instructions.
**MIAMI TECH INC** — Model Series RxCRD, RxCRDS or RxCRPD

9A. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max damper assembly size nom 18 in. long by 18 in. wide and 4-1/4 in. high, or 8 in. diam. fabricated from galv steel. Aggregate damper openings shall not exceed 162 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.
**RUSKIN COMPANY** — Model CFD7T, CFD7T-END-BT, CFD7T-90-BT, CFD7T-ST-BT, CFD7T-SB, CFD7T-R6-DB, CFD-7T-IB6 or CFDR7T

9B. Deleted.

9C. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 12 in. diameter damper with insulated register box assembly. The maximum size of the register box assembly is nom. 20 in. long by 20 in. wide and 4 in. high fabricated from galv steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**AIRE TECHNOLOGIES INC** — Series 57

9D. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 20 in. long by 16 in. wide by 4 in. high rectangular damper with duct board plenum box assembly. The maximum outer dimensions of the plenum box assembly are 23-1/2 in. long by 19-1/2 in. wide and 17 in. high fabricated from 6pcf, 1-1/2 to 2 in. thick Knauf

Air Duct Board M*. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 160 sq in. per 100 sq ft ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**AIRE TECHNOLOGIES INC** — Series 58

9E. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 14 in. long by 14 in.wide by rectangular damper with 90° boot. The maximum size of damper/boot assembly is 14 in. long by 14 in. wide and 18 in. high fabricated from galv steel. The aggregate area of the register opening(s) through the ceiling membrane shall not exceed 98 sq in. per 100 sq ft ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**AIRE TECHNOLOGIES INC** — Models 50 w/ Boot, 50EA w/ Boot, 51 w/Boot, 50 w/ Box, 50EA w/ Box or 51 w/Box

9F. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). — For use with min 18 in. deep trusses Not for use with flooring system 1 or 17. Max plenum box size nom 19 in. long by 19 in. wide and 11-7/8 in. high fabricated from galv steel. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.
**LLOYD INDUSTRIES INC** — Model CRD 50-BT, CRD 50-EA-BT, CRD 55-BT, CRD 55 EA-BT

**UNITED ENERTECH CORP** — Model C-S/R-WT-L, C-S/R-EA-L, C-S/R-BT, C-S/R-EA-BL

9G. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). For use with min 18 in. deep trusses Not for use with flooring system 1 or 17. Max plenum box size nom 13 in. long by 13 in. wide and 11-7/8 in. high fabricated from galv steel. Aggregate damper openings shall not exceed 50 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.
**LLOYD INDUSTRIES INC** — Model CRD 50-BT-6, CRD 50-EA-BT-6, CRD 55-BT-6, CRD 55 EA-BT-6

9H. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). Ceiling damper & fan assembly for use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 103 sq in. with the length not to exceed 10-1/8 in. and the width not to exceed 10-1/8 in. Aggregate damper openings shall not exceed 52 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille (Item 10) shall be installed in accordance with installation instructions.
**PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA** — Model PC-RD05C5

9I. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). Ceiling damper & fan assembly for use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 113 sq in. with the length not to exceed 10-1/8 in. and the width not to exceed 11-1/8 in. Aggregate damper openings shall not exceed 57 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's

installation instructions provided with the damper. A plastic grille (Item 10) shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDFUWT

9J. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). Ceiling damper & fan assembly for use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 79 sq in. with the length not to exceed 10 in. and the width not to exceed 7-15/16 in. Aggregate damper openings shall not exceed 40 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A metallic grille (Item 10) shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Models RDJ1 and RDH

9K. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8). For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max plenum box size nom 19 in. long by 19 in. wide and 11-7/8 in. high fabricated from galv steel. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper.
**METAL-FAB INC** — Models MSCD-HC and MRCD-HC

9L. **Alternate Ceiling Damper* —** (Optional, To be used with Air Duct Item 8). Ceiling damper & fan assembly for use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 87 sq in. with the length not to exceed 9 in. and the width not to exceed 9-11/16 in. Aggregate damper openings shall not exceed 44 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille (Item 10) shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDMWT

9M. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly for use with min 18 in. deep trusses. Max nom area shall be 87 sq in. with the length not to exceed 9 in. and the width not to exceed 9-11/16 in. Aggregate damper openings shall not exceed 44 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille (Item 10) shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDMWT2

9N. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8) — For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom 21 in. long by 18 in. wide, fabricated from galvanized steel. Plenum box max size nom 21 in. long by 18 in. wide by 14 in. high (inner dimension) fabricated from either galvanized steel or min 1 in. thick Listed Duct Board bearing the UL Listing Marking having a min R-Value of 4.3. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 180 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-1WT

9O. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8) — For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom 12 in. long by 12 in. wide with an 8 in. diameter damper, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 72 sq in. per 100 sq ft of ceiling area.
**GREENHECK FAN CORP** — Model CRD-2WT

9P. **Alternate Ceiling Damper* —** For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 324 sq in. with the length not to exceed 24 in. and the width not to exceed 20 in. Max height of damper shall be 14 in. Aggregate damper openings shall not exceed 162 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 10) shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Model RD-521

**POTTORFF** — Model CFD-521

9Q. **Alternate Ceiling Damper* —** For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 196 sq in. with the length not to exceed 26 in. and the width not to exceed 14 in. Max height of damper shall be 7 in. Aggregate damper openings shall not exceed 98 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 10) not to exceed 144 $in.^2$ shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Model RD-521-BT

**POTTORFF** — Model CFD-521-BT

9R. **Alternate Ceiling Damper* —** For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 256 sq in. with the length not to exceed 24 in. and the width not to exceed 20 in. Max height of damper shall be 17 in. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 10) shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Models RD-521-IP, RD-521-NP

**POTTORFF** — Models CFD-521-IP, CFD-521-NP

9S. **Alternate Ceiling Damper* —** For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Max nom area shall be 144 sq in. with the length not to exceed 14 in. and the width not to exceed 12 in. Max height of damper shall be 17-7/8 in. Aggregate damper openings shall not exceed 74 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 10) shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Models RD-521-90, RD-521-NP90

**POTTORFF** — Models CFD-521-90, CFD-521-90NP

9T. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min 18 in. deep trusses. Not for use with flooring system 1 or 17. Maximum 20 in. long by 18 in. wide by 2-1/8 in. high, fabricated from galvanized steel. Plenum box maximum size nom. 21 in. long by 18 in. wide by 16 in. high fabricated from either galvanized steel or Classified Air Duct Materials bearing the UL Class 0 or Class 1 rigid air duct material. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 180 sq in. per 100 sq ft of ceiling area.
**NAILOR INDUSTRIES INC** — Types 0755, 0755A, 0756, 0756D, 0757, 0757D, 0757FP, 0757DFP, 0763

**SAFE AIR DOWCO** — 0455, 0455A, 0456, 0456D, 0457, 0457D, 0457-DB, 0457-CB, 0463-FB, 0457-EB, 0463-GB, 0463

9U. **Alternate Ceiling Damper* —** (Optional, to be used with Air Duct Item 8) For use with min 18 in. deep trusses. Max nom 11-1/8 in. long by 13-5/8 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 76 sq in. per 100 sq ft of ceiling area.
**GREENHECK FAN CORP** — Model CRD-310WT

9V. **Alternate Ceiling Damper* —** (Optional, to be used with Air Duct Item 8) For use with min 18 in. deep trusses. Max nom 12-3/8 in. long by 14-1/2 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 90 sq in. per 100 sq ft of ceiling area.
**GREENHECK FAN CORP** — Model CRD-320WT

9W. **Alternate Ceiling Damper* —** — (Optional, to be used with Air Duct Item 8) For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 12 in. diameter damper within max 15 in. by 15 in. register box with max 12 in. by 12 in. register opening fabricated from galvanized steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 72 sq. in. per 100 sq. ft. of ceiling area. Damper assembly installed in accordance with the manufacturer's installation instructions.
**RUSKIN COMPANY** — Model CFD7T-SR

9X **Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 12 in. diameter damper and insulated register box assembly. The maximum size of the register box assembly is nom. 20 in. long by 20 in. wide and 4 in. high fabricated from galv steel. The aggregate area of the register opening(s) through the ceiling membrane shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**SOUTHWARK METAL MFG CO** — Model 800 w/Box

9Y **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 20 in. long by 16 in. wide by 4 in. high rectangular damper with plenum box assembly. The maximum outer dimensions of the plenum box assembly are 23-

1/2 in. long by 19-1/2 in. wide and 17 in. high fabricated from 6pcf, 1-1/2 to 2 in. thick Knauf Air Duct Board M*. The aggregate area of the register opening(s) through the ceiling membrane shall not exceed 160 sq in. per 100 sq ft ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**SOUTHWARK METAL MFG CO** — CRD w/DB Box

9Z **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 14 in. long by 14 in. wide and 18 in. high ceiling damper with boot or box assembly, fabricated from galv steel. The aggregate area of the register opening(s) through the ceiling membrane shall not exceed 98 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturers installation instructions.
**SOUTHWARK METAL MFG CO** — Model 500 w/Boot, 510 w/Boot, 500 w/Box or 510 w/Box

9AA. **Alternate Ceiling Damper* —** (Optional, to be used with Air Duct Item 8) For use with min 18 in. deep trusses. Max nom 10-3/8 in. long by 10-3/8 in. wide, fabricated from galvanized steel. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 54 sq in. per 100 sq ft of ceiling area.

**GREENHECK FAN CORP** — Model CRD-300WT

9AB. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 7-11/32 in. long by 7-11/16 in. wide fabricated from galvanized steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 28.5 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturer's installation instructions.

**AIRE TECHNOLOGIES INC** — Models ITG-CRD2.

9AC. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 9-11/16 in long by 9-1/16 in. wide fabricated from galvanized steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 44.5 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturer's installation instructions.

**AIRE TECHNOLOGIES INC** — Models SIG-CRD2

9AD. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 10-13/32 in. long by 10-22/32 in. wide fabricated from galvanized steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 56 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturer's installation instructions.

**AIRE TECHNOLOGIES INC** — Models SMT-CRD2

9AE. **Alternate Ceiling Damper* —** (Optional. To be used with Air Duct Item 8.) — For use with min. 18 in. deep trusses. Not for use with flooring system 1 or 17. Max 8-13/16 in. wide and 8-1/2 in. long fabricated from galvanized steel. Aggregate area of the register opening(s) through the ceiling membrane shall not exceed 37.5 sq in. per 100 sq ft of ceiling area. Damper assembly installed in accordance with the manufacturer's installation instructions.

**AIRE TECHNOLOGIES INC** — Models GBR-CRD2

10. **Grille —** Aluminum or Steel grille, installed in accordance with the installation instructions provided with

the ceiling damper.

11. **Discrete Products Installed in Air-handling Spaces* —** Automatic Balancing Valve/Damper — (Not Shown - Optional) — For use with item 9A, Ruskin Company's Model CFD7T damper (CABS). Ceiling damper to be provided with plenum box per damper manufacturer's instructions with side outlet only. Entire assembly to be installed into any UL Class 0 or Class 1 flexible air duct in accordance with the instructions provided by the automatic balancing valve/damper manufacturer.
**NAILOR INDUSTRIES INC** — Model ABV-4, ABV-5, ABV-6

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-11-13

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

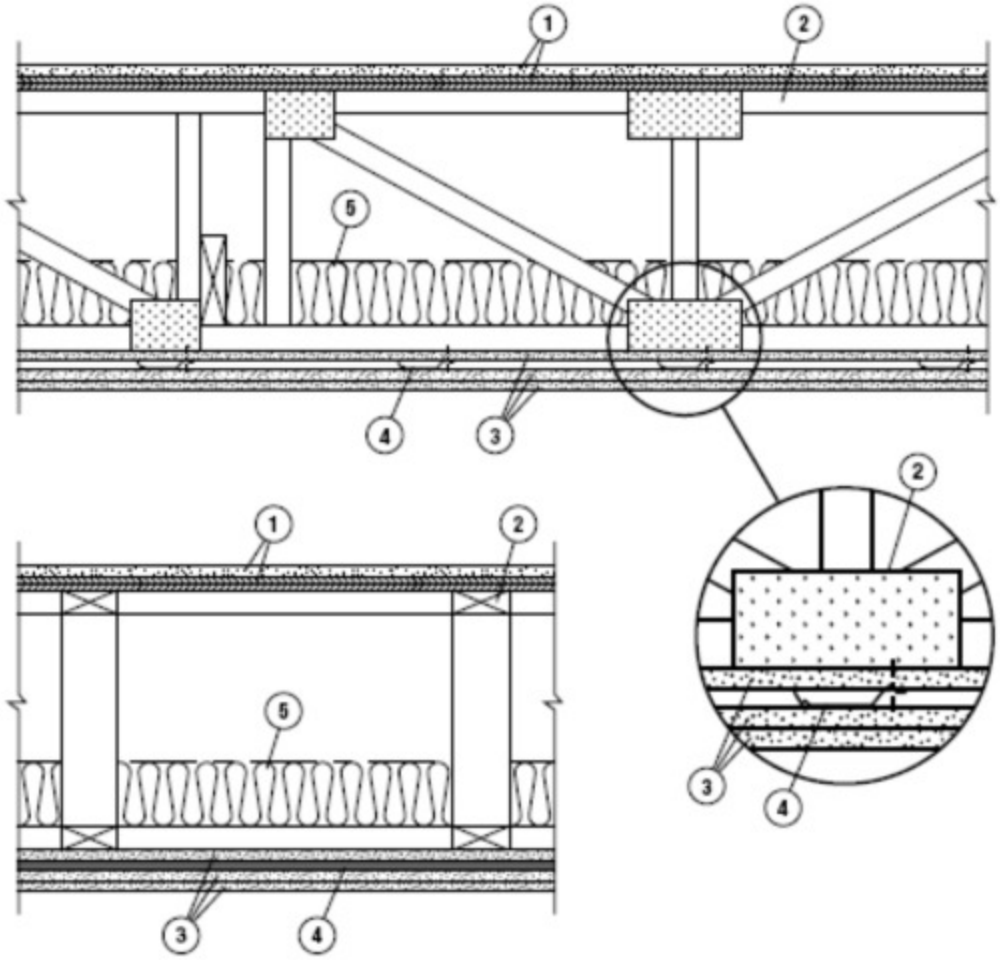
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

## Design No. **M500**

November 13, 2025

**Unrestrained Assembly Rating — 2 Hr.**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




1. **Flooring Systems —** The flooring system shall consist of one of the following:

**System No. 1**

**Subflooring** — Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier** — (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**MAXXON CORP** — Type Maxxon Standard and Maxxon High Strength

**Floor Mat Materials* - (Optional)** — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**MAXXON CORP** — Type Encapsulated Sound Mat.

**Floor Mat Reinforcement** — (Optional) Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath** — (Optional) 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd loose laid over the floor mat material.

**Fiber Glass Reinforcement** — (Optional) 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs./sq. yd loose laid over the floor mat material.

**System No. 2**

**Subflooring** — Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier** — (Optional) Nom 0.010 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**UNITED STATES GYPSUM CO** — Types LRK, HSLRK, CSD

**USG MEXICO S A DE C V** — Types LRK, HSLRK, CSD

**Floor Mat Materials* —** (Optional) Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

**UNITED STATES GYPSUM CO** — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

**System No. 3**

**Subflooring** — Min 19/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panel to be perpendicular to joists with joints staggered.

**Floor Mat Materials* — (Optional)** — Floor mat material nom 1/8 in. (3 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 3/4 in. (19 mm)

**HACKER INDUSTRIES INC** — FIRM-FILL SCM 125

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 1/4 in. (6 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 250 and FIRM-FILL SCM 250+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/8 in. (10 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/4 in. (32 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 400 and FIRM-FILL SCM 400+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 3/4 in. (19 mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in. (38 mm)

**HACKER INDUSTRIES INC** — Types FIRM-FILL SCM 750 and FIRM-FILL SCM 750+

**Alternate Floor Mat Materials — (Optional)** — Floor mat material nom 5/64 in. (2 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of floor-topping mixture. Floor topping thickness a min 1 in. over the floor mat.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat (HSM1.02)

**Alternate Floor Mat Materials — (Optional)** —Floor mat material nom 1/4 in. (6 mm) thick adhered to subfloor with Hacker Floor Primer. Primer to be applied to the surface of the mat prior to the placement of a min 1-1/4 in. (32 mm) of floor-topping mixture.

**HACKER INDUSTRIES INC** — Type Hacker Sound-Mat II (HSM2.06)

**Metal Lath (Optional)** — For use with 3/8 in. (10 mm) or greater floor mat materials, 3/8 in. expanded steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material. Hacker Floor Primer to be applied prior to the placement of the metal lath. When metal lath is used, floor topping thickness a nom 1-1/4 in. over the floor mat.

**Finish Flooring — Floor Topping Mixture*** — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

**HACKER INDUSTRIES INC** — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Gyp-Span Radiant

**System No. 4**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier —** (Optional) — Commercial asphalt saturated felt, 0.030 in. thick.

**Vapor Barrier —** (Optional) — Nom 0.010 in. thick commercial rosin-sized building paper.

**Finish Flooring* —** Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 5**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier —** (Optional) — Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture, having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**DEPENDABLE LLC** — Types GSL M3.4, GSL K2.6 and GSL RH

**Floor Mat Materials* —** (Optional) — Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 55/025 and Quiet Qurl 55/025 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 60/040 and Quiet Qurl 60/040 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 65/075, Quiet Qurl 65/075 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 52/013 and Quiet Qurl 52/013 N

**Alternate Floor Mat Materials* —** (Optional) — Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.
**KEENE BUILDING PRODUCTS CO INC** — Types Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

**System No. 6**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier —** (Optional) Nom 0.010 in. thick commercial asphalt saturated felt.

**Finish Flooring — Floor Topping Mixture* —** Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
**FORMULATED MATERIALS LLC** — Types FR-25, FR-30, SiteMix, and Treadstone Advantage

**Floor Mat Materials* —** (Optional) Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**FORMULATED MATERIALS LLC** — Types M1, M2, M3, Elite, Duo, R1, and R2

**System No. 7**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 4500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**SIKA DEUTSCHLAND GMBH** — Type SCHONOX AP Rapid Plus

**System No. 8**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Vapor Barrier —** (Optional) - Nom 0.030 in. thick commercial asphalt saturated felt.

**Finish Flooring - Floor Topping Mixture* —** Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

**Floor Mat Materials* —** (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
**Freudenberg Performance Materials LP** — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750 and 750 Plus.

**Floor Mat Reinforcement —** (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

**Metal Lath —** (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

**Fiberglass Mesh Reinforcement —** (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

**System No. 9**

**Subflooring — Subflooring** — Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Wood structural panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails.

**Finish Floor - Building Units* —** Min 1/2 in. thick magnesium oxide panels installed parallel, perpendicular, or diagonally to trusses with panel edges offset a min of 4 in. between subfloor and magnesium oxide panels. Panels secured to subfloor with construction adhesive and corrosion resistant fasteners, spaced max 12 in. OC around the perimeter and in the field of the panel. Fasteners must be placed no closer than

1/2 in. from all panel edges and no closer than 2 in. from panel corners. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails.

**HUBER ENGINEERED WOODS L L C** — Type 1/2 in. Square Edge Exacor™ Board

**System No. 10**

**Building Units* —** Nom 3/4 in. thick. Long dimension of panels to be perpendicular to trusses with end joints staggered a min of 4 ft. and joints centered over the joists. Panels secured to wood joists with 2 in. x 0.113 in. Ring Shank nails spaced a max of 12 in. OC in the field and on the perimeter. Fasteners must be placed no closer than 1/2 in. from all panel edges and no closer than 2 in. from panel corners. Screws may be substituted for nails, one for one, when the head diameter, length, and spacing equal or exceed the requirements for the specified nails. When used, **Batts and Blankets***, Item 5B are required.

**HUBER ENGINEERED WOODS L L C** — Type 3/4 in. Tongue and Groove Exacor™ Board

**System No. 11**

**Subflooring —** Nom 23/32 in. thick wood structural panels installed perpendicular to trusses with end joints staggered. Plywood or panels secured to trusses with construction adhesive and No. 6d ringed shank nails, spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

**Finish Flooring - Floor Topping Mixture* —** Min 1 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

**Apex Minerals LLC** — Type Apex Multi Underlayment

2. **Trusses —** Parallel chord trusses, spaced a max of 24 in. OC, fabricated from nom 2 by 4 lumber, with lumber oriented vertically or horizontally. Min truss depth is 12 in. Truss members secured together with min 0.0356 in. thick galv steel plates. Plates have 5/16 in. long teeth projecting perpendicular to the plane of the plate. The teeth are in pairs facing each other (made by the same punch), forming a split tooth type plate. Each tooth has a chisel point on its outside edge. These points are diagonally opposite each other for each pair. The top half of each tooth has a twist for stiffness. The pairs are repeated on approx. 7/8 in. centers with four rows of teeth per inch of plate width.

3. **Gypsum Board* —** Three layers of 5/8 in. thick by 4 ft wide gypsum board. Top layer boards installed with the long dimension perpendicular to trusses with end joints located under bottom of trusses. End joints in adjacent rows shall be staggered on adjacent trusses. Top layer boards secured to bottom chord of trusses with 1-5/8 in. long Type S bugle head screws, spaced max 8 in. OC. Screws located 1-1/2 to 2 in., and 3/4 in. from side and end joints, respectively. Bottom two layers of gypsum board installed perpendicular to furring channels with end joints centered on the furring channels. Middle layer boards secured to each furring channel with 1 or 1-1/4 in. long Type S-12 bugle head steel screws spaced max 8 in. OC. Screws located 1-1/2 to 2 in. and 5/8 to 3/4 in. from side and end joints, respectively. Face layer boards secured to each furring channel through the middle layer with 1-5/8 or 1-7/8 in. long Type S-12 bugle head steel screws, spaced a max of 8 in. OC. Screws located 1-1/2 to 2 in. and 5/8 to 3/4 in. from side and end joints, respectively. End joints and side joints of the face layer boards shall be staggered a

min of 16 in. from the joints in the middle layer. If end joints of the face layer boards are not centered on the furring channels, the end of boards at the end joint shall be attached to the middle layer boards with 1-1/2 in. long Type G steel screws spaced 8 in. OC and located 1-1/2 in. from the end joint. All screws shall be driven no further than flush with the face of the boards in order not to damage the core of the boards.
**AMERICAN GYPSUM CO** — Type AG-C

**CERTAINTEED GYPSUM INC** — Type C

**CGC INC** — Types C, IP-X2, IPC-AR, ULIX

**GEORGIA-PACIFIC GYPSUM L L C** — Types 5, DAPC, TG-C

**NATIONAL GYPSUM CO** — Types FSK-C, FSK-G, FSW-C, FSW-G

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, ULIX

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

3A. **Gypsum Board* —** As an alternate to Item 3 - Three layers of 5/8 in. thick by 4 ft wide gypsum board. Base layer boards installed with long dimension perpendicular to trusses with end joints located under bottom of trusses. End joints in adjacent rows staggered on adjacent trusses. Base layer boards secured to bottom chord of trusses with 1-5/8 in. long Type W screws, spaced max 8 in. OC. Bottom two layers of gypsum board installed perpendicular to furring channels (Item 4) with end joints centered on the furring channels. Midde layer end joints in adjacent rows staggered min. 4 ft. Middle layer boards secured to each furring channel with 1 or 1-1/4 in. long Type S bugle head steel screws spaced max 8 in. OC. Screws. Face layer boards secured to each furring channel through the middle layer with 1-5/8 or 1-7/8 in. long Type S-12 bugle head steel screws, spaced a max of 8 in. OC. End joints and side joints of the face layer boards shall be staggered a min of 24 in. from the joints in the middle layer.

**NATIONAL GYPSUM CO** — Type FSLX

4. **Furring Channels —** Resilient channels, 1/2 in. deep, or inverted hat type furring channels, 7/8 in. deep, formed from 0.019 in. thick galv steel, spaced 12 in. OC perpendicular to trusses. Channels secured to each truss with 1-7/8 in. long Type S steel screws.

5. **Batts and Blankets* —** Any glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. Insulation secured against the subflooring, held suspended in the concealed space or draped over the resilient channels (or furring channels) and gypsum panel membrane. There is no limit in the overall thickness of insulation.

5A. **Loose Fill Material* —** As an alternate to Item 5, any loose fill material bearing the UL Classification Marking for Surface Burning Characteristics. There is no limit in the overall thickness of insulation.

5B. **Batts and Blankets* —** for use with flooring **System 10** - 3-1/2 in. thick, min 0.62 pcf glass fiber batt insulation draped over the resilient channels. Any glass fiber batt insulation bearing the UL Classification Marking for Surface Burning Characteristics or fire Resistance may be used. See **Batts and Blankets* (BKNV or BZJZ)** category in the Fire Resistance Directory for names of manufacturers.

6. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-11-13

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

## Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

# BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

# BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

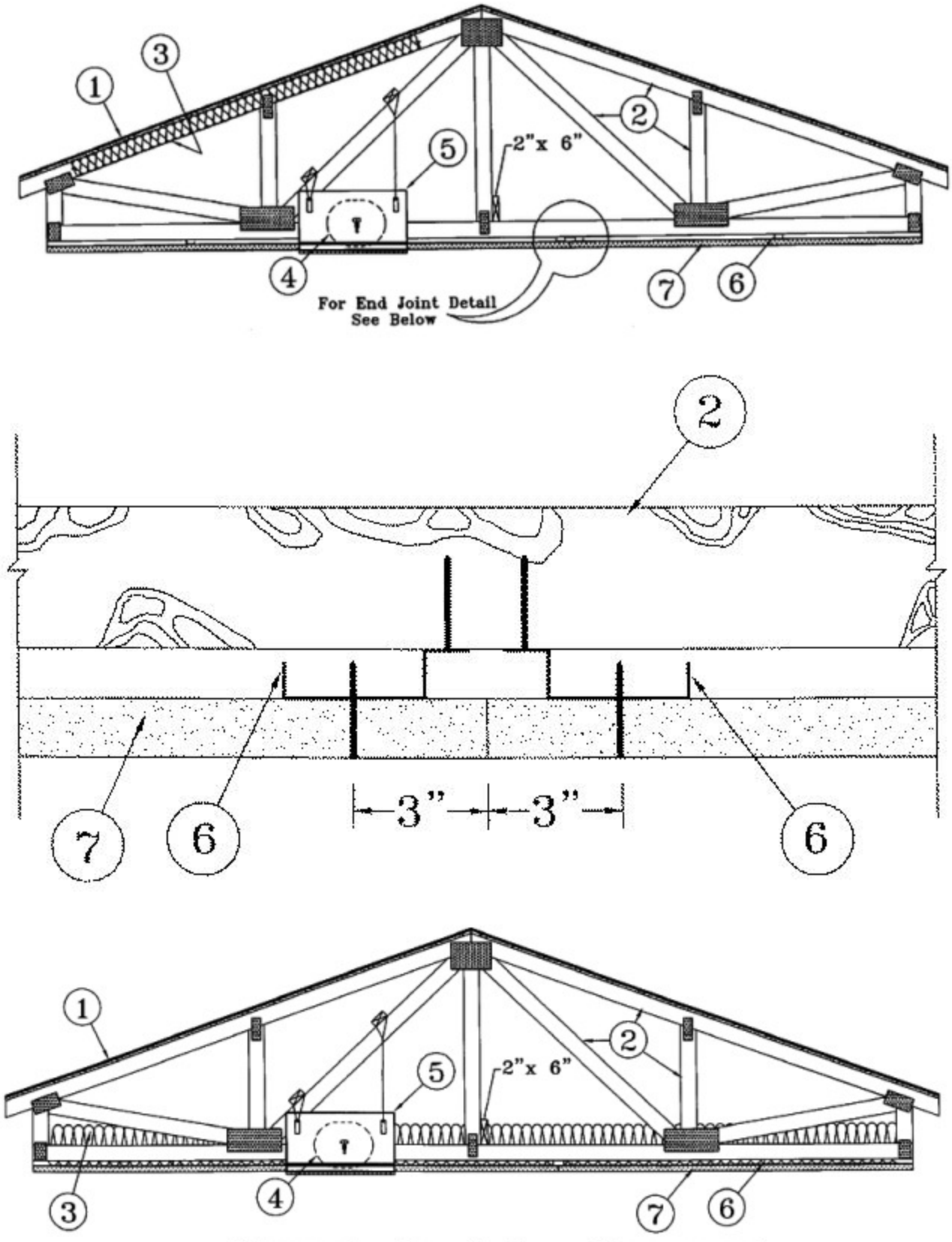
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

**Design No. P522**

August 20, 2025

**Unrestrained Assembly Rating — 1 Hr**
**Finish Rating — 25 Min (See Items 3 or 3A )**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




Alternate Insulation Placement

1. **Roofing System*** — Any UL Class A, B or C Roofing System (TGFU) or Prepared Roof Covering (TFWZ) acceptable for use over nom 15/32 in. thick wood structural panels, min. grade "C-D" or "Sheathing". Nom 15/32 in. thick wood structural panels secured to trusses with No. 6d ringed shank nails spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails. Construction adhesive may be used with either the nails or staples.

2. **Trusses —** Pitched or parallel chord wood trusses, spaced a max of 24 in. OC, fabricated from nom 2 by 4 lumber, with lumber oriented vertically or horizontally. Truss members secured together with min. 0.0356 in. thick galv steel plates. Plates have 5/16 in. long teeth projecting perpendicular to the plane of the plate. The teeth are in pairs facing each other (made by the same punch), forming a split tooth type plate. Each tooth has a chisel point on its outside edge. These points are diagonally opposite each other for each pair. The top half of each tooth has a twist for stiffness. The pairs are repeated on approximately 7/8 in. centers with four rows of teeth per inch of plate width. Minimum parallel chord truss depth shall be 18 in. Where pitched truss intersects with the interior face of the exterior walls, the min truss depth shall be 5-1/4 in. with a min roof slope of 3/12 and a min. average depth of 18 in.. Where the truss intersects with the interior face of the exterior walls, the min truss depth may be reduced to 3 in. if the batts and blankets ( Item 3) are used as shown in the above illustration (Alternate Insulation Placement) and are firmly packed against the intersection of the bottom chords and the plywood sheathing.

3. **Batts and Blankets* —** (Optional) — Required when Item 6B is used — Glass fiber insulation, secured to the wood structural panels with staples spaced 12 in. OC or to the trusses with 0.090 in. diam galv steel wires spaced 12 in. OC. Any glass fiber or loose fill insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance, having a min density of 0.5 pcf. As an option, the insulation may be fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane when resilient channels and gypsum board attachment is modified as specified in Items 6 and 7. When **Steel Framing Members** (Item 6B) are used, max 3-1/2 in. thick insulation shall be draped over the furring channels (Item 6Ba) and gypsum board ceiling membrane, and friction-fitted between trusses and Steel Framing Members (Item 6Bd). The finished rating has only been determined when the insulation is secured to the decking.

3A. **Fiber, Sprayed* —** As an alternate to Item 3 (not evaluated for use with Item 6B) — Any thickness of spray-applied cellulose insulation material, having a min density of 0.5 lb/ft$^3$, applied with water, over the resilient channel/gypsum board ceiling membrane when resilient channels and gypsum board attachment is modified as specified in Items 6 and 7. Fiber, Sprayed is applied with moisture in accordance with the application instructions supplied with the product. The finish rating when Fiber Sprayed is used has not been determined. Alternate application method: The fiber is applied without water or adhesive in accordance with the application instructions supplied with a minimum density of 0.5 lb/ft$^3$ over the resilient channel/gypsum board ceiling membrane when resilient channels and gypsum board attachment is modified as specified in Items 6 and 7. Alternate application method: The fiber is applied without water or adhesive to a nominal density of 3.5 lb/ft$^3$ behind netting (Item 9) stapled to the rafters. The netting is stapled at both lower edges of the rafters creating a cavity to accept the cellulose fiber.
**APPLEGATE GREENFIBER ACQUISITION LLC** — SANCTUARY for use with wet or dry application. Insulmax are to be used for dry application only.

3B. **Foamed Plastic* —** (As an alternate to Item 3 or 3A, Not Shown) — Spray foam insulation applied directly to the underside of the underside of the roofing system (Item 1). Spray foam insulation installed to a maximum thickness of 10 in. at a nominal 0.5 lb/ft$^3$ density, while maintaining a minimum 8-1/2 in. clearance between the spray foam insulation and the gypsum board (Item 7). When spray foam insulation is used, resilient channels (Item 6) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board (Item 7) installed at 6 in. OC to allow for maximum 3 in. spacing off ends of the gypsum board joints. Gypsum board (Item 7) to be installed using 1-1/4 in. long Type S screws, spaced

maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a fire damper (Items 5 through 5K) in the concealed space, minimum 1 in. clearance to be maintained between damper housing and spray foam insulation. Not evaluated for use with Items 6A through 6F.
**Holcim Solutions and Products US, LLC** — Sucraseal

3C. **Cavity Insulation - Batts and Blankets* or Fiber, Sprayed* —** (As described above) in Items 3 and 3A — (For Use with Item 7B, Not Shown) — Min. 3-1/2 in thick with no limit on maximum thickness fitted in the concealed space, draped over the resilient channel (Item 6G)/gypsum board (Item 7B) ceiling membrane.

3D. **Foamed Plastic* —** (As alternate to Item 3, 3A, or 3B, Not Shown) — Spray foam insulation applied directly to the underside of the roofing system (Item 1). Spray foam insulation installed to a maximum thickness of 10 in. at a nominal 0.5 lb/ft$^3$ or 2.0 lb/ft$^3$ density, depending on the product installed. When spray foam insulation is installed, resilient channels (Item 6) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board (Item 7) spaced maximum 3 in. away from gypsum butt joints. Gypsum board (Item 7) to be installed using minimum 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a fire damper (Items 5 through 5H) in the concealed space, minimum 1 in. clearance to be maintained between damper housing and spray foam insulation. Not evaluated for use with Items 6A through 6F.
**BASF CORP** — Enertite® NM, Enertite® G, FE178®, Spraytite® 178, Spraytite® 81206, Walltite® 200, Walltite® US, Walltite® US-N, Walltite® HP+, Walltite® MAX,Walltite® v.5, Walltite® LWP, Walltite® Plus, Walltite® One, and Enertite® Max

3E. **Foamed Plastic* —** (As an alternate to Item 3, 3A, 3B, 3C, or 3D, Not Shown) — Spray foam insulation applied directly to the underside of the underside of the roofing system (Item 1). Spray foam insulation installed to a maximum thickness of 17 in. at a nominal 0.5 lb/ft$^3$ density, while maintaining a minimum 1-1/2 in. clearance between the spray foam insulation and the gypsum board (Item 7). When spray foam insulation is used, resilient channels (Item 6) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board (Item 7) installed at 6 in. OC to allow for maximum 3 in. spacing off ends of the gypsum board joints. Gypsum board (Item 7) to be installed using 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a fire damper (Items 5 through 5K) in the concealed space, no clearance is necessary between damper housing and spray foam insulation. Not evaluated for use with Items 6A through 6F.
**Holcim Solutions and Products US, LLC** — EasySeal.5, EasySeal Ultra and EasySeal EZ-U

3F. **Foamed Plastic* —** (As alternate to Item 3) — Spray foam insulation applied directly to the underside of the roofing system (Item 1). Spray foam insulation installed to a maximum thickness of 11 in. at a nominal 0.5 lb/ft$^3$ - 2.5 lb/ft$^3$ density, while maintaining a minimum 7 in. clearance between the spray foam insulation and the gypsum board (Item 7). When spray foam insulation is installed, resilient

channels (Item 6) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board spaced maximum 3 in. away from gypsum butt joints. Gypsum board to be installed using minimum 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a fire damper (Items 5 through 5K) in the concealed space, no clearance is necessary between damper housing and spray foam insulation. Only for use with item 6 not evaluated for use with alternates to item 6.
**CARLISLE SPRAY FOAM INSULATION** — Types SealTite Pro Closed Cell (CC), SealTite Pro Open Cell (OC), SealTite Pro OCX, SealTite Pro No Trim 21, SealTite Pro One Zero, SealTite PRO HFO, Foamsulate Closed Cell, Foamsulate OCX, Foamsulate 70, Foamsulate HFO, and Foamsulate HFO 2.0.

3G. **Foamed Plastic* —** (As an alternate to Item 3, 3A, 3B, 3C, or 3D, Not Shown) — Spray foam insulation applied directly to the underside of the underside of the roofing system (Item 1). Spray foam insulation installed to a maximum thickness of 17 in. at a nominal 0.5 lb/ft$^3$ density, while maintaining a minimum 1-1/2 in. clearance between the spray foam insulation and the gypsum board (Item 7). When spray foam insulation is used, resilient channels (Item 6) shall be installed maximum 12 in. OC, with channels adjacent to butt joints of gypsum board (Item 7) installed at 6 in. OC to allow for maximum 3 in. spacing off ends of the gypsum board joints. Gypsum board (Item 7) to be installed using 1-1/4 in. long Type S screws, spaced maximum 8 in. OC, and butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. If used with a fire damper (Items 5 through 5K) in the concealed space, no clearance is necessary between damper housing and spray foam insulation. Not evaluated for use with Items 6A through 6F.

**EVEREST SYSTEMS LLC** — Opticell 0.5

4. **Air Duct* —** For use with **Ceiling Dampers*** - Any UL Class 0 or Class 1 flexible air duct installed in accordance with the instructions provided by the damper manufacturer.

5. **Ceiling Damper* —** Max nom area, 324 sq in. Max square size, 18 in. by 18 in. rectangular sizes not to exceed 324 sq in. with a max width of 18 in. Max damper height is 14 in. Installed in accordance with manufacturers installation instructions provided with the damper. Max damper openings not to exceed 162 sq in. per 100 sq ft of ceiling area.
**C&S AIR PRODUCTS** — Model RD-521

**POTTORFF** — Model CFD-521

5A. **Alternate Ceiling Damper* —** Max nom area, 196 sq in. Max square size, 14 in. by 14 in. Rectangular sizes not to exceed 196 sq in. with a max width of 26 in. Max overall damper height is 7 in. Installed in accordance with the manufacturers installation instructions provided with the damper. Max damper openings not to exceed 98 sq in. per 100 sq ft of ceiling area.
**C&S AIR PRODUCTS** — Model RD-521-BT

**POTTORFF** — Model CFD-521-BT.

5B. **Alternate Ceiling Damper* —** Max nom area shall be 256 sq in. with the length not to exceed 24 in. and the width not to exceed 20 in. Max height of damper shall be 17 in. Aggregate damper openings shall not exceed 128 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Model RD-521-IP, RD-521-NP

**POTTORFF** — Models CFD-521-IP, CFD-521-NP

5C. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 75 sq in. with the length not to exceed 8-9/16 in. and the width not to exceed 8-3/4 in. Max height of damper shall be 9-7/8 in. Aggregate damper openings shall not exceed 38 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturers installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**DELTA ELECTRONICS INC** — Models CRD2, GBR-CRD, ITG-CRD

5D. **Alternate Ceiling Damper* —** Ceiling damper & fan. Max nom area shall be 75 sq in. with the length not to exceed 9-1/4 in. and the width not to exceed 9-3/4 in. Max height of damper shall be 9-7/8 in. Aggregate damper openings shall not exceed 45 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**DELTA ELECTRONICS INC** — Model SIG-CRD

5E. **Alternate Ceiling Damper* —** Max nom area shall be 144 sq in. with the length not to exceed 14 in. and the width not to exceed 12 in. Max height of damper shall be 17-7/8 in. Aggregate damper openings shall not exceed 74 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille shall be installed in accordance with installation instructions.
**C&S AIR PRODUCTS** — Model RD-521-90, RD-521-NP90

**POTTORFF** — Models CFD-521-90, CFD-521-90NP

5F. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 131 sq in. with the length not to exceed 11-1/16 in. and the width not to exceed 11-7/8 in. Aggregate damper openings shall not exceed 66 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**DELTA ELECTRONICS INC** — Model SMT-CRD

5G. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 103 sq in. with the length not to exceed 10-1/8 in. and the width not to exceed 10-1/8 in. Aggregate damper openings shall not exceed 52 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**PANASONIC CORPORATION, PANASONIC CORPORATION OF NORTH AMERICA** — Model PC-RD05C5

5H. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 113 sq in. with the length not to exceed 10-1/8 in. and the width not to exceed 11-1/8 in. Aggregate damper openings shall not exceed 57 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDFUWT

5I. **Alternate Ceiling Damper* —** Ceiling damper & fan. Max nom area shall be 79 sq in. with the length not to exceed 10 in. and the width not to exceed 7-15/16 in. Aggregate damper openings shall not exceed 40 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A metallic grille shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Models RDJ1 and RDH

5J. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 87 sq in. with the length not to exceed 9 in. and the width not to exceed 9-11/16 in. Aggregate damper openings shall not exceed 44 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDMWT

5K. **Alternate Ceiling Damper* —** Ceiling damper & fan assembly. Max nom area shall be 87 sq in. with the length not to exceed 9 in. and the width not to exceed 9-11/16 in. Aggregate damper openings shall not exceed 44 sq in. per 100 sq ft of ceiling area. Damper shall be installed in combination with one of the fan models described in, and in accordance with, the manufacturer's installation instructions provided with the damper. A plastic grille shall be installed in accordance with installation instructions.
**BROAN-NUTONE L L C** — Model RDMWT2

6. **Furring Channels —** Resilient channels formed of 25 MSG thick galv steel. Installed perpendicular to the trusses (Item 2), spaced a max of 16 in. OC when no insulation (Item 3 or 3A) is fitted in the concealed spaced, or a max of 12 in. OC when insulation (Item 3 or 3A) is fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane, or when insulation (Item 3B, 3D or 3E) is applied to the underside of the roofing system (Item 1). Two courses of resilient channel positioned 6 in. OC at wallboard butt-joints (3 in. from each end of wallboard). Channels oriented opposite at wallboard butt-joints. Channel splices overlapped 4 in. beneath wood trusses. Channels secured to each truss with 1-1/4 in. long Type S screws.

6A. **Steel Framing Members* —** (Not Shown) — As an alternate to Item 6, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 16 in. OC perpendicular to trusses when no insulation (Items 3 or 3A) is fitted in the concealed space or 12 in. OC when insulation (Items 3 or 3A) is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane or 24 in. OC when insulation (Items 3 or 3A) is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane and a second layer of gypsum board is attached as described in Item 7 for steel framing members. Channels secured to trusses as described in Item 6Ab. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members —** Used to attach furring channels (Item a) to trusses (Item 2). Clips spaced 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating trusses with No. 8 by 2-1/2 in. coarse drywall screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to alternating trusses with No. 8 by 1-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item 6Aa. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.
**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75).

6B. **Steel Framing Members* —** (Not Shown) — As an alternate to Items 6 and 6A.

a. **Furring Channels —** Hat-shaped furring channels, 7/8 in. deep by 2-5/8 in. wide at the base and 1-1/4 in. wide at the face, formed from No. 25 ga. galv steel, spaced max 16 in. OC perpendicular to trusses and Cold Rolled Channels (Item 6Bb). Furring channels secured to Cold Rolled Channels at every intersection with a 1/2 in. pan head self-drilling screw through each furring channel leg. Ends of adjoining channels overlapped 4 in. and tied together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap. Supplemental furring channels at base layer and outer layer gypsum board butt joints are not required. Batts and Blankets draped over furring channels as described in Item 3. Two layers of gypsum board attached to furring channels as described in Item 7.

b. **Cold Rolled Channels —** 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to trusses, friction-fitted into the channel caddy on the Steel Framing Members (Item 6Bd). Adjoining lengths of cold rolled channels lapped min. 6 in. and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Blocking —** Where truss design does not permit direct, full contact of the hanger bracket, a piece of nominal 2 by 4 in. lumber (blocking), min. 6 in. long to permit full contact of the hanger bracket, to be secured vertically to the side of the truss (Item 2) at the top and bottom of the blocking at each Steel Framing Member (Item 6Bd) location.

d. **Steel Framing Members* —** Hangers spaced 48 in. OC. max along truss, and secured to the Blocking (Item 6Bc) on alternating trusses with a single 5/16 in. by 2 in. hex head lag bolt or four #6 1-1/4 in. drywall screws through mounting hole(s) on the hanger bracket. The two 1/4 in. long steel teeth on the hanger are embedded in the side of the blocking. Hanger positioned on blocking and leveling bolt height adjusted such that furring channels are flush with bottom of trusses before gypsum board installation. Spring gauge of hanger chosen per manufacturer's instructions. **KINETICS NOISE CONTROL INC** — Type ICW.

6C. **Steel Framing Members* —** (Not Shown) — As an alternate to Items 6, 6A and 6B.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep installed perpendicular to wood structural members. Channels spaced a max of 16 in. OC when no insulation (Item 3 or 3A) is fitted in the concealed space or a max of 12 in. OC when insulation (Item 3 or 3A) is fitted in the concealed space. Channels secured to trusses as described in Item 6Cb. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 AWG galvanized steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item 6Ca) to trusses (Item 2). Clips secured to the bottom chord of each truss (48 in. OC) with one No. 8 by 2-1/2 in. long coarse drywall screw through center grommet. Furring channels are friction fitted into clips. Adjoining channels are overlapped as described in Item 6Ca. As an alternate, ends of adjoining channels may be

overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the gypsum board butt joints, as described in Item 7.
**PLITEQ INC** — Type Genie Clip

6D. **Steel Framing Members* —** (Not Shown) — As an alternate to Items 6, 6A, 6B and 6C.

a. **Main runners —** Installed perpendicular to trusses — Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft OC. Main runners hung a min of 2 in. from bottom chord of trusses with 12 SWG galv steel wire. Wires located a max of 48 in. OC.

b. **Cross tees or channels —** Nom 4 ft long, 15/16 in. or 1-1/2 in. wide face or cross channels, nom 4 ft long, 1-1/2 wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or channels used at 8 in. from each side of butted gypsum board end joints. The cross tees or channels may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.

c. **Wall angles or channels —** Used to support steel framing member ends and for screw-attachment of the gypsum wallboard — Min 0.016 in. thick painted or galvanized steel angle with 1 in. legs or min. 0.016 in. thick painted or galvanized steel channel with a 1 by 1-1/2 by 1 in. profile, attached to walls at perimeter of ceiling with fasteners 16 in. OC.
**CGC INC** — Type DGL or RX

**USG INTERIORS LLC** — Type DGL or RX

6E. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to items 6, 6A, 6B, and 6C, furring channels and Steel Framing Members as described below.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-5/8 in. wide by 7/8 in deep, spaced 16 in OC, perpendicular to trusses. When insulation, Items 3 or 3A is used, the furring channel spacing shall be reduced to 12 in. OC. Channels secured to joists as described in Item b.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the wood trusses (Item 2). Clips spaced at 48" OC and secured to the bottom of the trusses with one 2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 7.
**STUDCO BUILDING SYSTEMS** — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

6F. **Steel Framing Members* —** (Not Shown) — As an alternate to Items 6 through 6E- Not for use with Items 3 or 3A. Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
**USG INTERIORS LLC** — Type DGL or RX

6G. **Resilient Channels —** For Use With Item 7B - Formed from min 25 MSG galv steel installed perpendicular to trusses and spaced 16 in. OC. Channels secured to each truss with 1-5/8 in. long Type S bugle head steel screws. Channels overlapped 4 in. at splices. Two channels, spaced 6 in. OC, oriented opposite each gypsum panel end joint. Additional channels shall extend min 6 in. beyond each side edge of panel. Insulation, Item 3C is applied over the resilient channel/gypsum panel ceiling membrane.

6H. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to items 6 through 6G, furring channels and Steel Framing Members as described below.

a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-1/2 in. wide by 7/8 in deep, spaced 16 in OC, perpendicular to trusses. When insulation, Items 3 or 3A is used, the furring channel spacing shall be reduced to 12 in. OC. Channels secured to joists as described in Item b.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the wood trusses (Item 2). Clips spaced at 48" OC and secured to the bottom of the trusses with one 2-1/2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG galvanized steel wire. Additional clips are required to hold the Gypsum Butt joints as described in Item 7.
**REGUPOL AMERICA** — Type SonusClip

7. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide boards, installed with long dimension parallel to trusses. Attached to the resilient channels using 1 in. long Type S bugle-head screws. Screws spaced a max of 12 in. OC along butted end-joints and in the field when no insulation (Item 3 or 3A) is fitted in the concealed spaced, or a max of 8 in. OC along butted end-joints and in the field when insulation (Item 3 or 3A ) is fitted in the concealed space, draped over the resilient channel/gypsum board ceiling membrane. When insulation (Item 3B, 3D or 3E) is installed in the concealed space, spray-applied to the underside of the roofing system (Item 1), screws are spaced a max of 8 in. OC along resilient channels, fasteners are increased in length to 1-1/4 in, and gypsum board butt joints shall be staggered min. 2 ft within the assembly, and occur between the main furring channels.

When **Steel Framing Members*** (Item 6A or 6C) are used, sheets installed with long dimension perpendicular to furring channels and side joints of sheet located beneath trusses. Gypsum board screws are driven through channel spaced 12 in. OC in the field when no insulation (Item 3 or 3A) is fitted in the concealed space, or 8 in. OC in the field when insulation (Item 3 or 3A) is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane. Gypsum board butt joints shall be staggered min. 2 ft within the assembly, and occur between the main furring channels. At the gypsum board butt joints, each end of the gypsum board shall be supported by a single length of furring channel equal to the width of the wallboard plus 6 in. on each end. The furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to the trusses with one clip at each end of the channel. Screw spacing along the butt joint to attach the gypsum board to the furring channels shall be 8 in. OC. Second (outer) layer of gypsum board required when furring channels (Item 6A, a) are spaced 24 in. OC and insulation is fitted in the concealed space, draped over the furring channel/gypsum board ceiling membrane. Outer layer of gypsum board attached to the furring channels using 1-5/8 in. long Type S bugle-head screws spaced 8 in. OC at butted joints and 12 in. OC in the field. Butted end joints of outer layer to be offset a minimum of 8 in. from base layer end joints. Butted side joints of outer layer to be offset minimum 18 in. from butted side joints of base layer.

When **Steel Framing Members** (Item 6B) are used, two layers of nom 5/8 in. thick, 4 ft wide gypsum board are installed with long dimensions perpendicular to furring channels (Item 6Ba). Base layer attached to the furring channels using 1 in. long Type S bugle head steel screws spaced 8 in. OC along butted end joints and 12 in. OC in the field of the board. Butted end joints centered on the continuous furring channels. Butted base layer end joints to be offset a min of 16 in. in adjacent courses. Outer layer attached to the furring channels using 1-5/8 in. long Type S bugle head steel screws spaced 8 in. OC at butted end joints and 12 in. OC in the field. Butted end joints centered on the continuous furring channels and offset a min of 16 in. from butted end joints of base layer. Butted side joints of outer layer to be offset min 16 in. from butted side joints of base layer.

When **Steel Framing Members** (Item 6C) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 72 in. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 3 in. on each end, spaced approximately 2 in. in from joint. Screw spacing along the gypsum board butt joint shall be 8 in. OC. Butt joint furring channels shall be attached with a RESILMOUNT Sound Isolation Clip secured to underside of every truss that is located over the butt joint. Over all Gypsum Board side joints, approximately 20 in. lengths of furring channel shall be installed parallel to trusses (Item 2) between main furring channels. Side joint furring channels shall be attached to underside of the joist with RESILMOUNT Sound Isolation Clips - located approximately 2 in. from each end of the approximate 20 in. length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 8 in. OC, approximately 1/2 in. from joint edge.

When **Steel Framing Members** (Item 6E) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 3 in. on each end. The two support furring channels shall be spaced approximately 3 in. in from end joint. Screw spacing along the gypsum board butt joint and along both additional channels shall be 8 in. OC. Additional screws shall be placed in the adjacent section of gypsum board into the aforementioned 3 in. extension of the extra butt joint channels as well as into the main channel that runs between. Butt joint furring channels shall be attached with one RESILMOUNT Sound Isolation Clip at each end of the channel.

When alternate **Steel Framing Members*** (Item 6F) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip with hold down clips to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with 1 in. drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

When **Steel Framing Members** (Item 6H) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, an additional single length of furring channel shall be installed and be spaced approximately 3 in. from the butt joint (6 in. from the continuous furring channels) to support the floating end of the gypsum board. Each of these shorter sections of furring channel shall extend one truss beyond the width of the gypsum panel and be attached to the adjacent trusses with one SonusClip at every truss involved with the butt joint.

**CGC INC** — Types C, IP-X2, IPC-AR

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Types C, IP-X2, IPC-AR

7A. **Gypsum Board* —** For use with Steel Framing Members (Item 6D) when Batts and Blankets* (Item 3) are not used - One layer of nom 5/8 in. thick by 48 in. wide boards, installed with long dimension parallel to the main runners. Gypsum board fastened to each cross tee or channel with five wallboard screws, with one screw located at the midspan of the cross tee or channel, one screw located 12 in. from and on each side of the cross tee or channel mid span and one screw located 1-1/2 in. from each gypsum board side joint. Except at wallboard end joints, wallboard screws shall be located on alternating sides of cross tee flange. At gypsum board end joints, gypsum board screws shall be located 1/2 in. from the joint. Gypsum board fastened to main runners with wallboard screws 1/2 in. from side joints, midway between intersections with cross tees or channels (16 in. OC). End joints of adjacent gypsum board sheets shall be staggered not less than 32 in. Gypsum board sheets screw attached to leg of wall angle with wallboard screws spaced 12 in. OC. Joints treated as described in Item 7. For use with **Steel Framing Members*** (Item 6D) when **Batts and Blankets*** (Item 3) are used - Ratings limited to 1 Hour - 5/8 in. thick, 4 ft wide; installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Fastened to cross tees with 1 in. long steel gypsum board screws spaced 8 in. OC in the field and 8 in. OC along end joints. Fastened to main runners with 1 in. long gypsum board screws spaced midway between cross tees. Screws along sides and ends of boards spaced 3/8 to 1/2 in. from board edge. End joints of the sheets shall be staggered with spacing between joints on adjacent boards not less than 4 ft OC.

**CGC INC** — Type C or IP-X2

**UNITED STATES GYPSUM CO** — Type C or IP-X2

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG MEXICO S A DE C V** — Type C or IP-X2

7B. **Gypsum Board* —** For use with Items 3C and 6G. Nom 5/8 in. thick, 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels. Gypsum panels secured with 1 in. long Type S bugle head steel screws spaced 8 in. OC and located a min of 1/2 in. from side joints and 3 in. from the end joints. Finish Rating with this ceiling system is 20 min.
**CGC INC** — Type ULIX

**UNITED STATES GYPSUM CO** — Type ULIX

8. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads; paper tape, 2 in. wide, embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.
**Alternate Ceiling Membrane** — Not Shown.

9. **Netting —** Fibrous, woven netting material fastened to underside of each joist with staples, with side joints overlapped.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-08-20

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

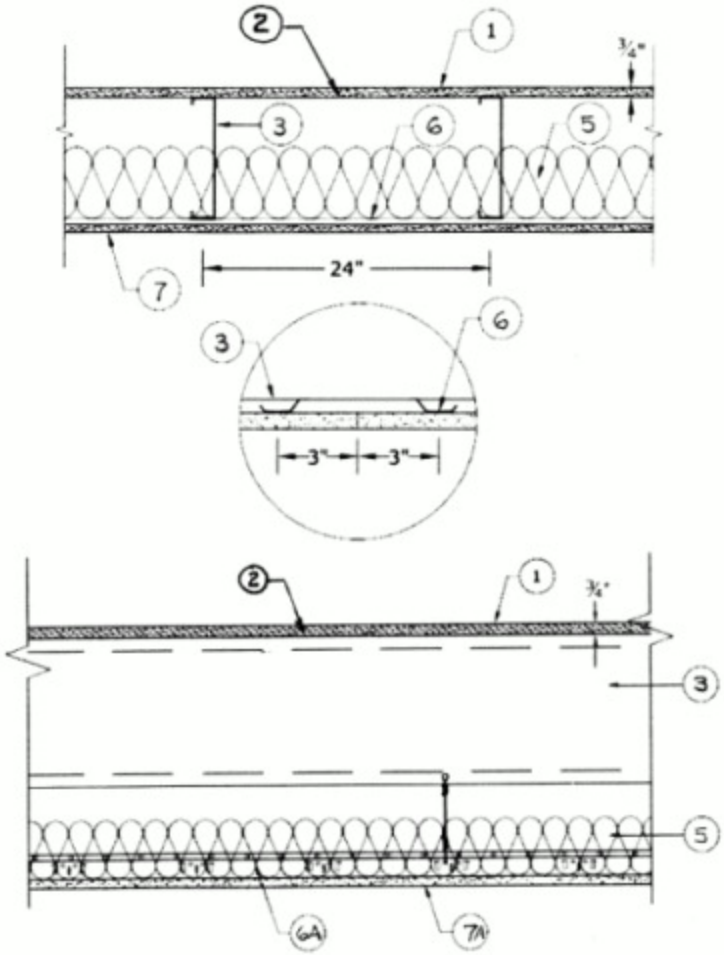
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

## Design No. P561

June 20, 2023

**Unrestrained Assembly Rating — 1, 1-1/2 and 2 Hr.**
**This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7**

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**




1. **Roof Covering* —** Consisting of hot-mopped or cold-application materials which provide Class A, B or C coverings, directly applied to Structural Cement-Fiber Units(Item 2). See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

1A **Roofing Membrane* —** (Not Shown) — In lieu of Item 1, single-ply membrane that is either ballasted, adhered or mechanically attached to Structural Cement-Fiber Units(Item 2). See Fire Resistance Directory-Roofing Membranes (CHCI) Category

**Roofing System — 1 or 1-1/2 Hr Rating**

2. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled A36 steel sections for joist specified in Item 3J:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

**Unrestrained Assembly Rating is 1 hour when Item 3A or 3B is used. Unrestrained Assembly Rating is 1-1/2 hour when Item 3, 3C, 3F, 3G, or 3H is used.**

**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

**2 Hr Rating**

2. **Structural Cement-Fiber Units* —** Nom 3/4 in. thick, with long edges tongue and grooved. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.
As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled A36 steel sections for joist specified in Item 3J:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

**UNITED STATES GYPSUM CO** — Types STRUCTO-CRETE, USGSP

2A. **Gypsum Board* (Not Shown) —** Min 1/2 in. thick gypsum board, Classified as to Surface Burning Characteristics. Boards loosely laid, adhered or mechanically attached to Structural Cement-Fiber Units. Joints between Structural Cement Fiber Units and of Gypsum Board staggered a min of 6 in. See Gypsum Board (BWFR) Category in the Building Materials Directory or Roofing Systems (TGFU) in the Roofing Material Directory or Gypsum Board (CKNX) Category in the Fire Resistance Directory.
**UNITED STATES GYPSUM CO** — Type FRX-G

3. **Structural Steel Members —** Channel-shaped, min 10 in. deep with min 1-5/8 in. wide flanges and 1/2 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 50,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3A. **Structural Steel Members —** (Not Shown) -As an alternate to Item 3 - For maximum clear spans not exceeded 8 ft. Channel-shaped, min 6 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 18 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3B. **Structural Steel Members —** (Not Shown) -As an alternate to Item 3 - Channel-shaped, min 8 in. deep with min 1-9/16 in. wide flanges and 3/8 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 33,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3C. **Structural Steel Members* —** (Not Shown) -As an alternate to item 3 only - The joists are channel-shaped, 10 in. min depth. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to rim joist with a minimum of three #10 3/4 in. long self-drilling screws at the rim track clip to the outside of the web joist, and a #10 1/2 in. long screw through the top and bottom flange of the joists to the top and bottom flange of the rim track. At rim joist splices bearing on supports, rim joists

are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with a minimum of six 3/4 in. long self-drilling #10 screws to each rim piece. For use with item 3C.
**CEMCO, LLC** — Type SSCJ floor joists, SSRT rim joists or Type SSTT rim joists. When Type SSTT rim joists are used, secured to preformed clip tabs in accordance with manufacturers installation instructions.

3D. **Clip Angles —** (Not Shown) - No. 16 MSG, 9-3/4 in. long steel angles with 2 in. legs. Secured to track and joist with eight No.10, 3/4 in. long, self-drilling, hex head screws, located 1 in. from each end of clip angle, with the other two screws on each leg evenly spaced. Only one clip angle per joist end.

3E. **Clip Angles —** (Not Shown) - As an alternate to Item 3D, for use with 6 or 8 in. deep joists (Item 3A or 3B). No. 16 MSG, 5-1/2 in. long steel angles with 1-1/2 in. legs for 6 in. deep joists and No. 18 MSG, 7-1/4 in. long steel angles with 1-1/2 in. legs for 8 in. deep joists. Secured to track and joist with six No.10, 3/4 in. long, self-drilling, hex head screws, located 1 in. from each end of the clip angle and at the centerline. Only one clip angle per joist end.

3F. **Structural Steel Members* —** (Not Shown) -As an alternate to Item 3 only. The proprietary joists are channel-shaped, min 9-1/4 in. deep. Joists are fabricated from min No. 16 MSG galv steel. Joists spaced max 24 in. OC. Joists attached to joist rim with three min 3/4 in. long No. 10 x 16 self-drilling steel TEK screws through tab to the outside of the web. At joist rim splices bearing on supports, joists rims are connected using an overlapping section of a 12 in. long splice plate (a joist piece), with four min 3/4 in. long No. 10 x 16 self-drilling steel TEK screws to each rim piece.
**CLARKDIETRICH BUILDING SYSTEMS** — Types TDJ24, TDW24, TDJ48, TDW48 Floor Joists, TD Rim Joist

3G. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 3, 3A, 3B, 3C and 3F - Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel chord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness spaced a maximum of 24 in. OC.
**AEGIS METAL FRAMING, DIV OF MITEK** — Ultra-Span, Pre-fabricated Light Gauge Steel Truss System

**TRUSSTEEL, DIV OF ITW BUILDING COMPONENTS INC** — TrusSteel

3H. **Structural Steel Members* —** (Not Shown) - As an alternate to Item 3, 3A, 3B, 3C, 3F and 3G, - Pre-fabricated steel truss system consisting of cold-formed, galvanized steel chord and web sections. Truss top and bottom chords min. 4 in. high by 1-11/16 in. wide by 18 ga. Truss webs min. 1-1/2 in. by 1-1/2 in. by 20 ga. square tube bent and triangulated as shown. Chords and web connected by fillet welds. Overall truss depth min. 12 in. Trusses spaced a max of 24 in. OC. Truss ends placed over and secured to Bearing Seats (Item 3H1) with two min. #10 by 3/4 in. long screws on each side of Bearing Seats. Allowable loading must be calculated so as to stress the steel trusses to a maximum of 98% of the stress calculated in accordance with the allowable stress design approach outlined in the manufacturer's load tables.
**EISEN PANEL SYSTEMS L L C** — Type Gateway Panel pre-fabricated steel truss system.

3H1. **Bearing Seats* —** ((Not Shown) — Galvanized steel tube, min. 1 in. by 2-1/2 in. by 13 ga., oriented vertically and welded to min. 4 in. by 4 in. by 10 ga., galvanized steel plate. Bearing seats spaced 24 in. OC

and attached to bearing supports by welding or screw attaching the steel plate to the bearing supports.
**EISEN PANEL SYSTEMS L L C** — Type Gateway Panel bearing seat.

3H2. **Bracing —** (Not Shown) - For use with Item 3H — Galvanized channel-shaped steel sections, min. 1-1/2 in. wide with 1/4 in. flanges, min. 16 ga. Bracing attached to underside of trusses with min. #10 by 3/4 in. long screws through truss bottom chord. Bracing installed in truss cavities by scoring, bending and flattening the ends to form a tab for attachment to truss top and bottom chords. Two pieces of bracing crossed and tabs secured to truss chords with min. #10 by 3/4 in. long screws. Location and spacing of underside and crossed bracing to be specified on truss engineering.

3I. **Steel Trusses —** As an alternate to Items 3, 3A, 3B, 3C, 3F, 3G and 3H - Cold-formed galvanized steel truss chord and web sections manufactured from steel conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chord and web sections as required by design to meet governing code requirements. Truss members connected together with No. 10-16 (min size) self-drilling screws or equivalent. Truss chord and web members to be designed in accordance with the American Iron and Steel Institute's Specification for the Design of Cold-Formed Steel Structural Members, 1996 Edition. Trusses spaced a max of 24 in. OC. Where the truss intersects with the interior face of the exterior walls, the min truss depth shall be 12 in.

3J. **Steel Joists —** As an alternate to Items 3, 3A, 3B, 3C, 3F, 3G, 3H and 3I, minimum 12K1, spaced a max 24 in. OC.

3K. **Structural Steel Members* —** As an alternate to Item 3 - Limited to the 1 Hour Ratings. Pre-fabricated light gauge steel truss system consisting of cold-formed, galv steel cord and web sections. Trusses fabricated in various sizes, depths and from various steel thickness. Trusses spaced a max of 24 in. OC. Location of lateral bracing for truss chord and web sections to be specified on truss engineering.
**TRUSS LINK INC** — Truss Link

4. **Joist Bridging —** (Not Shown) - For use with Item 3 and 3B - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of joist sections cut to length and placed between outer supports, adjacent to openings and at mid span with 8 ft OC max spacing. Bridging channels are screw-attached at each end to joist web using angle clips. V-bracing of 1-1/2 in. by 20-ga galvanized steel is screw-attached to bottom joist flange between bridging channels.

4A. **Joist Bridging —** (Not Shown) - For use with Item 3A - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of rim track sections cut to length, with two 4 in. long folded back flanges, and placed between outer supports, adjacent to openings and at mid span with 10 ft OC max spacing. Bridging channels are screw-attached to each of the four top and bottom joist flanges with two No. 8 by 1/2 in. long wafer head steel screws.

4B. **Joist Bridging —** (Not Shown) - For use with Item 3A and 3B - 1-1/2 in. wide strips formed from 20 MSG - The structural bridging is installed perpendicular to and on the bottom surface of the joists at mid-span with one #10 x 3/4 in. long hex head steel screw at each interface.

4C. **Joist Bridging —** (Not shown) — For use with item 3C. Installed immediately after joists are erected and before construction loads are applied. The structural bridging, Type CEMCO Sure Bridging, consisting of No. 18 MSG galv steel, 2-1/2 in. wide by 25-1/2 in. long with 1-5/16 in. long legs structural bridging staggered between the steel joists and attached to the bottom joist flange with two #10 1/2 in. long self-drilling screws at each end tab of bridging. Solid bridging consisting of cut to length joist sections placed between outer joists and at center joist with 8 ft OC max spacing. Solid bridging is seated in the structural bridging and is screw-attached at joist web using Type CEMCO Sure-Support Clips (1-1/2 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg on one side and the other side with Type CEMCO Sure-Support Clips (4 in. by 1-1/2 in. by 7 in. long, 16 MSG, min 50 ksi support clip) with three #10 3/4 in. long self-drilling screws per leg.

4D. **Joist Bridging —** (Not Shown) —For use with Item 3F. Installed at the center of the joist span immediately after joists are erected and before construction loads are applied. The bridging (2-1/2 TDSB18) consists of No. 18 MSG galv steel channels, 2-1/2 in. wide by 1-1/4 in. deep by 21-3/4 in. long with 2-1/8 in. long web extensions at each end for screw-attachment to the bottom flange of the steel joists with a min 3/4 in. long No. 10 x 16 self-drilling steel TEK screw. Solid bridging consisting of cut-to-length joist sections placed between the outermost joists and between the centermost joists with a max spacing of 8 ft OC. Solid blocking is screw-attached at joist web using a No. 16 MSG, min 50 ksi steel support clip (EasyClip S-Series) with three min 3/4 in. long No. 10 x 16 self-drilling steel TEK screws per leg on the outside of the joist web, and with a No. 16 MSG, min 50 ksi steel support clip (EasyClip E-Series) with three min 3/4 in. long No. 10 x 16 self-drilling steel TEK screws per leg on the inside of the joist web. Alternatively, blocking may consist of min 925JB24 prefabricated joist blocking attached with two No. 10-16 TEK screws at each connection angle.

4E. **Bridging —** (Not Shown)—For use with Item 3G - Location of lateral bracing for truss chord and web sections to be specified on truss engineering.

5. **Batts and Blankets* —** Glass fiber insulation, min 3-1/2 in. thick, bearing the UL Classification Marking for Surface Burning Characteristics. Min density of 0.5 pcf. The insulation shall be fitted in the concealed space, draped over the resilient channel (Item 6) or steel frame members (Item 6A) and gypsum board (Item 8) ceiling membrane. See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers.

6. **Resilient Channels —** Formed of No. 25 MSG galv steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 1/2 in. long Type S-12 low profile steel screw. Two channels, spaced 6 in. OC, oriented opposite each gypsum board end joint as shown on the illustration above. Additional channels shall extend min 6 in. beyond each side edge of board.

6A. **Steel Framing Members* —** (Optional) — When it is desired to drop the ceiling below the bottom plane of the structural steel members (Item 3), a suspension system may be used in lieu of the resilient channels. Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft long , 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 24 in. OC a min of 4 in. below bottom flange of joists, twist tied to #10 - 3/4 in. long screws installed in the web, 1/2 in. from the bottom

flange of the steel joists. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 16 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted gypsum panel end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft or 12 ft long, installed perpendicular to main runners, spaced 16 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum panel.
**CGC INC** — Type DGL or RX

**USG INTERIORS LLC** — Type DGL or RX.

6B. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 6 — Furring channels and Steel Framing Members as described below:

a. **Furring channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 3). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.
**PLITEQ INC** — Type Genie Clip

6C. **Alternate Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Items 6 to 6B, furring channels and Steel Framing Members as described below.

a. **Furring channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to the steel joists (Item 3). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 7.
**PAC INTERNATIONAL L L C** — Types RSIC-1 or RSIC-1 (2.75)

7. **Gypsum Board* —** One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient/furring channels. Gypsum panels secured to resilient/furring channels with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel mid-span, and 1-1/2 in. from side edges of the board. End joints secured to both resilient/furring channels as shown in end joint detail. When **Steel Framing Members** (Item 6B or 6C) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.
**CGC INC** — Types C, IP-X2, IPC-AR

**CGC INC** — Type ULIX

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, ULIX

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG INTERIORS LLC** — Types C, IP-X2, IPC-AR

7A. **Gypsum Board* —** For use when Steel Framing Members* (Item 6A) are used - One layer of 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side edges centered over main runners and joints centered over cross tees or channels. Fastened to cross tees or channels with 1 in. long Type S screws bugle-head screws spaced 8 in. OC with the screws located 4 in. from the mid-span of the cross tee or channel, and 1-1/2 in. from side edges of gypsum panel. Fastened to main runners with 1 in. long Type S bugle-head screws spaced midway between cross tees or channels. End joints of gypsum panels shall be staggered not less than 4 ft OC with adjacent gypsum panels end joints.
**CGC INC** — Types C, IP-X2, IPC-AR

**CGC INC** — Type ULIX

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type C

**UNITED STATES GYPSUM CO** — Types C, IP-X2, IPC-AR, ULIX

**USG BORAL DRYWALL SFZ LLC** — Type C

**USG INTERIORS LLC** — Types C, IP-X2, IPC-AR

8. **Finishing System —** (Not Shown) — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2023-06-20

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."

# Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

## BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
## BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

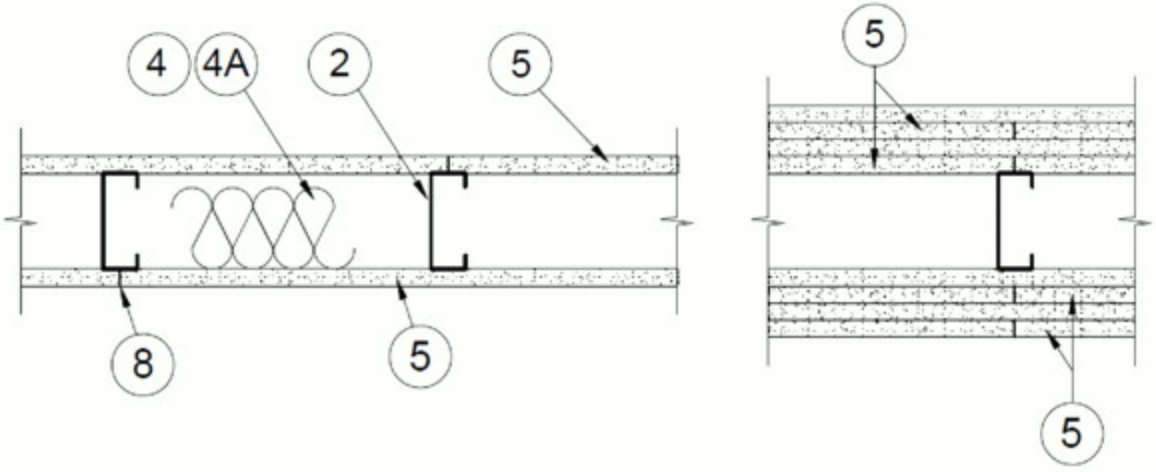
See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

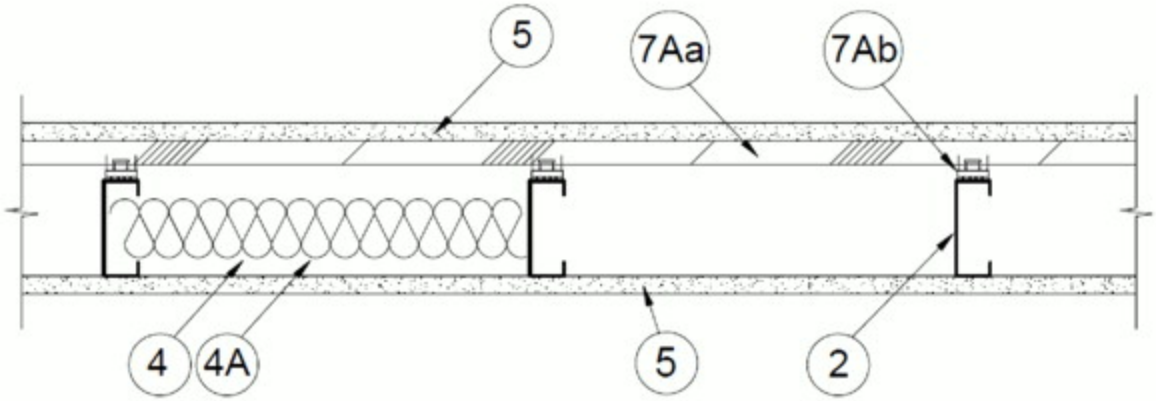
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

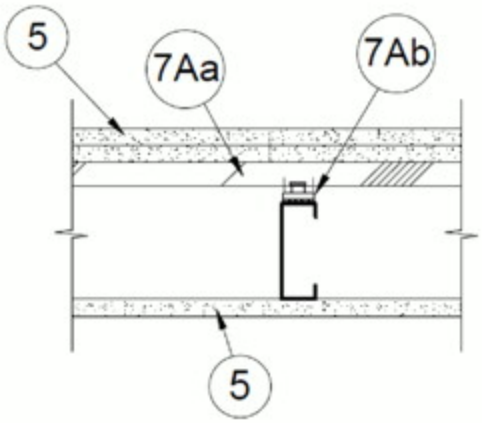
## Design No. **U419**

December 15, 2025

**Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr (See Items 4 & 5 through 5J)**
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**






1. **Floor and Ceiling Runners —** (Not Shown) — For use with Item 2 — Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth to accommodate stud size, with min 1-1/4 in. long legs, attached to floor and ceiling with fasteners 24 in. OC max.

1A. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2B, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.
**CEMCO, LLC** — Viper25™ Track

**CRACO MFG INC** — SmartTrack25™

**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — Viper25™ Track

**IMPERIAL MANUFACTURING GROUP INC** — Viper25™ Track

1B. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2C, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.018 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
**CEMCO, LLC** — Viper20™ Track

**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — Viper20™ Track

**IMPERIAL MANUFACTURING GROUP INC** — Viper20™ Track

1C. **Framing Members* — Floor and Ceiling Runners —** (Not Shown) — In lieu of Item 1 — Channel shaped, attached to floor and ceiling with fasteners 24 in. OC. max.
**ALLSTEEL & GYPSUM PRODUCTS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV** — Type SUPREME D24/30EQD and Type SUPREME D20

**QUAIL RUN BUILDING MATERIALS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**SCAFCO STEEL STUD MANUFACTURING CO** — Type SUPREME D24/30EQD and Type SUPREME D20

**STEEL CONSTRUCTION SYSTEMS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**TELLING INDUSTRIES L L C** — Type SUPREME D24/30EQD and Type SUPREME D20

**UNITED METAL PRODUCTS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

1D. **Floor and Ceiling Runners —** (Not Shown) — For use with Item 2A — Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, min depth to accommodate stud size, with min 1 in. long legs, attached to floor and ceiling with fasteners spaced max 24 in. OC.

1E. **Framing Members* — Floor and Ceiling Runners —** (Not Shown, As an alternate to Item 1) — For use with Items 2E, 5F or 5G or 5I only, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.
**CLARKDIETRICH BUILDING SYSTEMS** — CD ProTRAK

**DMFCWBS L L C** — ProTRAK

**MBA METAL FRAMING** — ProTRAK

**RAM SALES L L C** — Ram ProTRAK

**STEEL STRUCTURAL PRODUCTS L L C** — Tri-S ProTRAK

**THE MILL STEEL COMPANY** — ProTRAK

1F. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2F, proprietary channel shaped runners, minimum width to accommodate stud size, with 1- 1/8 in. long legs fabricated from min 0.015 in. (min bare metal thickness) galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
**SUPER STUD BUILDING PRODUCTS** — The Edge

1G. **Framing Members* — Floor and Ceiling Runner —** For use with Item 2G, proprietary channel shaped runners, minimum width to accommodate stud size attached to floor and ceiling with fasteners 24 in. OC

max.
**STUDCO BUILDING SYSTEMS** — CROCSTUD Track

1H. **Floor and Ceiling Runners —** (Not Shown) — Channel shaped, fabricated from min 0.02 in. galv steel, min width to accommodate stud size, with min 1 in. long legs, for use with studs specified below and fabricated from min 0.018 in. galv steel or thicker, attached to floor and ceiling with fasteners spaced max 24 in. OC.
**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — Viper20™ Track VT100

**IMPERIAL MANUFACTURING GROUP INC** — Viper20™ Track VT100

1I. **Framing Members* — Floor and Ceiling Runners —** (Not Shown, As an alternate to Item 1) — For use with Items 2H, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.
**TELLING INDUSTRIES L L C** — TRUE-TRACK™

1J. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2I, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

1K. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2J, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.018 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

1L. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2N, proprietary channel shaped runners, 1-1/4 in. wide by min. 3-1/2 in. deep fabricated from min 0.018 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
**RESCUE METAL FRAMING, L L C** — AlphaTRAK

1M. **Framing Members* — Floor and Ceiling Runners —** Not Shown — As an alternate to Item 1 — For use with Item 2O, proprietary channel shaped runners, min width to accommodate stud size, galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
**RONDO BUILDING SERVICES PTY LTD** — Rondo Wall Track

1N. **Framing Members* — Floor and Ceiling Runners —** Not Shown — As an alternate to Item 1 — For use with Item 2P, proprietary channel shaped runners, min width to accommodate stud size, galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.
**OEG BUILDING MATERIALS** — OEG Track

1O. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2Q, proprietary channel shaped runners, min width to accommodate stud size, fabricated from min. 25 MSG (0.018 in. min. bare metal thickness), attached to floor and ceiling with fasteners spaced 24 in. OC max.
**CEMCO, LLC** — Viper X Track

1P. **Framing Members* — Floor and Ceiling Runner —** (Not Shown — Alternate to Item 1) — For use with Item 2R, channel shaped runners pre-equipped with proprietary attachment clips. Min. 3-5/8 in. wide. Legs of top runners minimum 3-1/4 in. wide. Legs of bottom runners minimum 1-1/2 in. wide. Runners attached to floor and ceiling with fasteners 24 in. OC max.

**HYPERFRAME INC** - Hypertrack

1Q. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2S , proprietary channel shaped runners, min width to accommodate stud size, fabricated from min. 20 EQ/22 mils. (min. 0.0221 in. thick) galvanized steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

**JJC INTERNATIONAL DISTRIBUTORS** — Non-structural Tracks 3-5/8" and 6".

1R. **Framing Members* — Floor and Ceiling Runner —** Not Shown — In lieu of Item 1 — For use with Item 2T, proprietary channel shaped runners ,min width to accommodate stud size, fabricated from min. 25 MSG (0.018 in. min. bare metal thickness), attached to floor and ceiling with fasteners spaced 24 in. OC max

**IRONLINE METALS LLC** — Bantam Track.

2. **Steel Studs —** Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

2A. **Steel Studs —** (As an alternate to Item 2, For use with Items 5B, 5E, 5H, 5J or Type ULIX) — Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min depth, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.

2B. **Framing Members* - Steel Studs —** (As an alternate to Item 2, For use with Items 5C, 5I or Type ULIX) — Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a 1/2 in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.
**CEMCO, LLC** — Viper25™

**CRACO MFG INC** — SmartStud25™

**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — Viper25™

**IMPERIAL MANUFACTURING GROUP INC** — Viper25™

2C. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.018 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.
**CEMCO, LLC** — Viper20™

**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — Viper20™

**IMPERIAL MANUFACTURING GROUP INC** — Viper20™

2D. **Framing Members* — Steel Studs —** In lieu of Item 2 — Channel shaped studs, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.
**ALLSTEEL & GYPSUM PRODUCTS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV** — Type SUPREME D24/30EQD and Type SUPREME D20

**QUAIL RUN BUILDING MATERIALS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**SCAFCO STEEL STUD MANUFACTURING CO** — Type SUPREME D24/30EQD and Type SUPREME D20

**STEEL CONSTRUCTION SYSTEMS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

**TELLING INDUSTRIES L L C** — Type SUPREME D24/30EQD and Type SUPREME D20

**UNITED METAL PRODUCTS INC** — Type SUPREME D24/30EQD and Type SUPREME D20

2E. **Framing Members* — Steel Studs —** (Not Shown, As an alternate to Item 2) — For use with Items 5F or 5G or 5I or Type ULIX only, channel shaped studs, min depth as indicated under Item 5F, 5G or 5I, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.
**CLARKDIETRICH BUILDING SYSTEMS** — CD ProSTUD

**DMFCWBS L L C** — ProSTUD

**MBA METAL FRAMING** — ProSTUD

**RAM SALES L L C** — Ram ProSTUD

**STEEL STRUCTURAL PRODUCTS L L C** — Tri-S ProSTUD

**THE MILL STEEL COMPANY** — ProSTUD

2F. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — proprietary channel shaped steel studs, minimum width indicated under Item 5, 1-1/4 in. deep fabricated from min 0.015 in. (min bare metal thickness) galvanized steel. Studs 3/8 in. to 3/4 in. less in lengths than assembly heights.
**SUPER STUD BUILDING PRODUCTS** — The Edge

2G. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — proprietary channel shaped studs, minimum width indicated under Item 5, Studs to be cut 3/8 to 3/4 in less than the assembly height.
**STUDCO BUILDING SYSTEMS** — CROCSTUD

2H. **Framing Members* — Steel Studs —** (Not Shown, As an alternate to Item 2) — Fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.
**TELLING INDUSTRIES L L C** — TRUE-STUD™

2I. **Framing Members* — Steel Studs —**

2J. **Framing Members* — Metal Studs —** Not Shown — In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.018 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights

2K. **Framing Members* — Steel Studs —** As an alternate to Item 2 — For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.
**EB METAL INC** — NITROSTUD

2L. **Framing Members* — Steel Studs —** As an alternate to Item 2 — For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.
**OLMAR SUPPLY INC** — PRIMESTUD

2M. **Framing Members* — Steel Studs —** As an alternate to Item 2 — For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.
**MARINO/WARE, DIV OF WARE INDUSTRIES INC** — StudRite™

2N. **Framing Members*— Steel Studs —** As an alternate to Item 2 — proprietary channel shaped steel studs, min depth 3-1/2 in. and as indicated under Item 5, spaced a max of 24 in. OC, fabricated from min 0.018 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in length than assembly height.
**RESCUE METAL FRAMING, L L C** — AlphaSTUD

2O. **Framing Members* — Steel Studs —** As an alternate to Item 2 — proprietary channel shaped steel studs, min width as indicated under Item 5, galv steel. Studs to be cut 3/8 to 3/4 in. less in lengths than assembly height. Spaced 24 in. OC max.
**RONDO BUILDING SERVICES PTY LTD** — Rondo Lipped Wall Stud

2P. **Framing Members* — Steel Studs —** As an alternate to Item 2 — proprietary channel shaped steel studs, min width as indicated under Item 5, min 25 MSG galv steel. Studs to be cut 3/8 to 3/4 in. less in lengths than assembly height. Spaced 24 in. OC max.
**OEG BUILDING MATERIALS** — OEG Stud

2Q. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — For use with Item 1O, proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max of 24 in. OC, fabricated from min 25 MSG (0.018 in. min. bare metal thickness). Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.
**CEMCO, LLC** — Viper X

2R. **Framing Members* — Steel Studs —** (Not Shown — Alternate to Item 2, For use with Item 1P) — Channel shaped steel studs with attachment clips at top and bottom, min 3-5/8 in. depth, spaced a max of 24 in. OC. Studs clipped into floor and ceiling runners (Item 1P). Max 2-3/8 in. extension reveal from top of stud to inside of ceiling runner.

**HYPERFRAME INC**— Hyperstud

2S. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — For use with Item 1Q, proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max of 24 in. OC, fabricated from min. 20 EQ/22 mils. (min. 0.0221 in. thick) galvanized steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.

**JJC INTERNATIONAL DISTRIBUTORS** — Non-structural Studs 3-5/8" and 6".

2T. **Framing Members* — Steel Studs —** Not Shown — In lieu of Item 2 — For use with Item 1R, proprietary channel shaped steelstuds, min depth as indicated under Item 5, spaced a max of 24 in. OC, fabricated from min 25 MSG (0.018 in. min. bare metal thickness). Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.

**IRONLINE METALS LLC** — Bantam Stud.

3. **Wood Structural Panel Sheathing —** (Optional, For use with Item 5 Only) — (Not Shown) — 4 ft wide, 7/16 in. thick oriented strand board (OSB) or 15/32 in. thick structural 1 sheathing (plywood) complying with DOC PS1 or PS2, or APA Standard PRP-108, manufactured with exterior glue, applied horizontally or vertically to the steel studs. Vertical joints centered on studs, and staggered one stud space from wallboard joints. Attached to studs with flat-head self-drilling tapping screws with a min. head diam. of 0.292 in. at maximum 6 in. OC. in the perimeter and 12 in. OC. in the field. When used, gypsum panels attached over OSB or plywood panels and fastener lengths for gypsum panels increased by min. 1/2 in.

4. **Batts and Blankets* —** (Required as indicated under Item 5) — Mineral wool batts, friction fitted between studs and runners. Min nom thickness as indicated under Item 5.

See **Batts and Blankets** (BKNV or BZJZ) Categories for names of Classified companies.

4A. **Batts and Blankets* —** (Optional – as an alternate to item 4) — Placed in stud cavities, any glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance.

See **Batts and Blankets** (BKNV or BZJZ) Categories for names of Classified companies.

4B. **Fiber, Sprayed* —** (Optional – as an alternate for items 4 or 4A, for use with Type ULIX) Where insulation is required - Spray applied granulated mineral fiber material. The fiber is applied with adhesive at a minimum density of 4.0 pcf to completely fill the wall cavity in accordance with the application instructions supplied with the product. See **Fiber, Sprayed** (CCAZ).
**AMERICAN ROCKWOOL MANUFACTURING, LLC** — Type Rockwool Premium Plus

4C. **Foamed Plastic* —** (As an alternate for items 4, 4A or 4B, for use with Item 5K) — Spray applied, foamed plastic insulation, at any thickness from partial fill to completely filling stud cavity, for 2 hour rated assemblies only. When foamed plastic is used, minimum stud depth shall be 3-1/2 in. with minimum 20 MSG steel thickness.

**CARLISLE SPRAY FOAM INSULATION —** Types SealTite ONE, SealTite Pro Closed Cell (CC), SealTite Pro Open Cell (OC), SealTite Pro OCX, SealTite Pro No Trim 21, SealTite Pro One Zero, Foamsulate Closed Cell, Foamsulate OCX, Foamsulate 70, and Foamsulate HFO.

4D. **Foamed Plastic* —** (As an alternate for items 4, 4A or 4B, for use with Item 5K) — Spray applied, foamed plastic insulation, at any thickness from partial fill to completely filling stud cavity, for up to 2 hour

rated assemblies only. When foamed plastic is used, minimum stud depth shall be 3-1/2 in. with minimum 20 MSG steel thickness.

**BASF CORP -** Enertite® NM, Enertite® G, FE178®, Spraytite® 178, Spraytite® 81206, Walltite® 200, Walltite® US, Walltite® US-N, Walltite HP+, FE137®, FE158®, Spraytite® 158, Spraytite® SP, Spraytite® 81205, Walltite® MAX, Walltite® LWP, Walltite® Plus, Walltite® One, and Enertite® Max

4E. **Foamed Plastic* —** (As an alternate to Item 4 for use with Item 5L) — Spray applied, foamed plastic insulation, at any thickness from partial fill to completely filling stud cavity, for up to 2 hour rated assemblies only. When foamed plastic is used, minimum stud depth shall be 3-1/2 in. with minimum 20 MSG steel thickness.

**BASF CORP -** Walltite® v.5

5. **Gypsum Board* —** Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) with Type ULIX need not be staggered. The thickness and number of layers for the 1 hr, 2 hr, 3 hr and 4 hr ratings are as follows:

**Gypsum Board Protection on Each Side of Wall**

| Rating, Hr | Min Stud Depth, in. Items 2, 2C, 2D, 2F, 2G, 2O | No. of Layers & Thkns of Panel | Min Thkns of Insulation (Item 4) |
|---|---|---|---|
| 1 | 3-1/2 | 1 layer, 5/8 in. thick | Optional |
| 1 | 2-1/2 | 1 layer, 1/2 in. thick | 1-1/2 in. |
| 1 | 1-5/8 | 1 layer, 3/4 in. thick | Optional |
| 2 | 1-5/8 | 2 layers, 1/2 in. thick | Optional |
| 2 | 1-5/8 | 2 layers, 5/8 in. thick | Optional |
| 2 | 3-1/2 | 1 layer, 3/4 in. thick | 3 in. |
| 3 | 1-5/8 | 3 layers, 1/2 in. thick | Optional |
| 3 | 1-5/8 | 2 layers, 3/4 in. thick | Optional |
| 3 | 1-5/8 | 3 layers, 5/8 in. thick | Optional |
| 4 | 1-5/8 | 4 layers, 5/8 in. thick | Optional |
| 4 | 1-5/8 | 4 layers, 1/2 in. thick | Optional |
| 4 | 2-1/2 | 2 layers, 3/4 in. thick | 2 in. |

**CGC INC** — 1/2 in. thick Type C, IP-X2 or IPC-AR; WRC, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULIX, WRX or WRC; 3/4 in. thick Types IP-X3 or ULTRACODE

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — 1/2 in. thick Type C and 5/8 in. thick Type SCX

**UNITED STATES GYPSUM CO** — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type SCX, SGX, SHX, ULIX, WRX, IP-X1, AR, C, WRC, FRX-G, IP-AR, IP-X2, IPC-AR; 3/4 in. thick Types IP-X3 or ULTRACODE

**USG BORAL DRYWALL SFZ LLC** — 1/2 in. Type C; 5/8 in. Types C, SCX, SGX, ULTRACODE

**USG MEXICO S A DE C V** — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX, WRC or; 3/4 in. thick Types IP-X3 or ULTRACODE

When Item 7B, **Steel Framing Members***, is used, Nonbearing Wall Rating is limited to 1 Hr. Min. stud depth is 3-1/2 in., min. thickness of insulation (Item 4) is 3 in., and two layers of gypsum board panels (1/2 in. or 5/8 in. thick) shall be attached to furring channels as described in Item 6. One layer of gypsum board panels (1/2 in. or 5/8 in. thick) attached to opposite side of stud without furring channels as described in Item 6.

5A. **Gypsum Board* —** (As an alternate to Item 5) — 5/8 in. thick, 24 to 54 in. wide, applied horizontally as the outer layer to one side of the assembly. Secured as described in Item 6.
**CGC INC** — Type SHX.

**UNITED STATES GYPSUM CO** — Type FRX-G, SHX.

**USG MEXICO S A DE C V** — Type SHX.

5B. **Gypsum Board* —** (Not Shown) — As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 in or 3/4 in. thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) — Nom 5/8 in. or 3/4 in. may be used as alternate to all 5/8 in. or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 in. or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Gypsum board secured to 20 MSG steel studs Item 2A with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. To be used with Lead Batten Strips (see Item 11) or Lead Discs or Tabs (see Item 12).
**RAY-BAR ENGINEERING CORP** — Type RB-LBG

5C. **Gypsum Board* —** (For Use With Item 2B) — Rating Limited to 1 Hour. 5/8 in. thick, 48 in. wide, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. (Vertical Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. Vertical joints are to be centered over studs and staggered one stud cavity on opposite sides of studs. (Horizontal Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. All horizontal joints are to be backed as outlined under section VI of Volume 1 in the Fire Resistive Directory.

**CGC INC** — Type SCX, ULIX.

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type SCX

**UNITED STATES GYPSUM CO** — Type SCX, SGX, ULIX.

**USG BORAL DRYWALL SFZ LLC** — Type SCX

**USG MEXICO S A DE C V** — Type SCX

5D. **Gypsum Board* —** (As an alternate to Item 5) — 5/8 in. thick, 48 in. wide, applied vertically or horizontally. Secured as described in Item 6. For use with Items 1 and 2 only.
**CGC INC** — Type USGX

**UNITED STATES GYPSUM CO** — Type USGX

**USG BORAL DRYWALL SFZ LLC** — Type USGX

**USG MEXICO S A DE C V** — Type USGX

5E. **Gypsum Board* —** (Not Shown) — (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or No. 6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.
**NEW ENGLAND LEAD BURNING CO INC, DBA NELCO** — Nelco

5F. **Gypsum Board* —** (As an alternate to Item 5) — For use with Items 1E and 2E and limited to 1 Hour Rating only, Gypsum panels with beveled, square or tapered edges, applied vertically, and fastened to the steel studs with 1 in. long Type S screws spaced 8 in. OC along vertical and bottom edges and 12 in. OC in the field. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Steel stud depth shall be a minimum 3-5/8 in.
**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — Type SCX

**UNITED STATES GYPSUM CO** — 5/8 in. thick Type SCX, SGX, ULIX

**USG BORAL DRYWALL SFZ LLC** — 5/8 in. thick Type SCX, SGX

5G. **Gypsum Board* —** (As an alternate to Item 5) — For use with Items 1E and 2E only, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally, as specified in the table below and fastened to the steel studs as described in Item 6. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and

horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 2 hr, 3 hr and 4 hr ratings are as follows:

**Gypsum Board Protection on Each Side of Wall**

| Rating, Hr | Min Stud Depth, in. Item 2E | No. of Layers & Thickness of Panel | Min Thkns of Insulation (Item 4) |
|---|---|---|---|
| 2 | 1-5/8 | 2 layers, 1/2 in. thick | Optional |
| 2 | 1-5/8 | 2 layers, 5/8 in. thick | Optional |
| 3 | 1-5/8 | 3 layers, 1/2 in. thick | Optional |
| 3 | 1-5/8 | 3 layers, 5/8 in. thick | Optional |
| 4 | 1-5/8 | 4 layers, 5/8 in. thick | Optional |
| 4 | 1-5/8 | 4 layers, 1/2 in. thick | Optional |

**CGC INC** — 1/2 in. thick Type C, IP-X2 or IPC-AR;, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULIX or 3/4 in. thick Types IP-X3 or ULTRACODE

**THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO** — 1/2 in. thick Types C and 5/8 in. thick SCX

**UNITED STATES GYPSUM CO** — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type SCX, SGX, SHX, IP-X1, AR, C, , FRX-G, IP-AR, IP-X2, IPC-AR, ULIX; 3/4 in. thick Types IP-X3 or ULTRACODE

**USG BORAL DRYWALL SFZ LLC** — 1/2 in. Type C; 5/8 in. Types C, SCX, SGX, ULTRACODE

**USG MEXICO S A DE C V** — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

5H. **Gypsum Board* —** (Not Shown) — (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 or 3/4 in thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 or 3/4 in. may be used as alternate to all 5/8 or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Gypsum board secured to 20 MSG steel studs Item 2B with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 11A) or Lead Discs (see Item 12A).
**MAYCO INDUSTRIES INC** — Type X-Ray Shielded Gypsum

5I. **Gypsum Board* —** (As an alternate to Item 5) — Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 5. Steel stud minimum depth shall be as indicated in Item 5.
**CGC INC** — Type ULIX, ULX

**UNITED STATES GYPSUM CO** — Type ULIX, ULX

**USG MEXICO S A DE C V** — Type ULX

5J. **Gypsum Board* —** (Not Shown) — (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".
**RADIATION PROTECTION PRODUCTS INC** — Type RPP - Lead Lined Drywall

5K. **Gypsum Board* —** (As an alternate to Item 5 when Foam Plastic insulation (Items 4C or 4D) is used) - **—** Any 5/8 in. thick, 4 ft. wide, Gypsum Board listed in Item 5 above. Applied vertically with vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Gypsum panels secured to studs with 1-1/4 in. long Type S steel screws spaced 8 in. OC at perimeter and in the field. For 2 layer assemblies outer layer will be attached to studs over inner layer with the 1-7/8 in. long steel screws spaced 8 in. OC.

5L. **Gypsum Board* —** (As an alternate to Item 5 when Foam Plastic insulation (Items 4E) is used) **—** Any 5/8 in. thick, 4 ft. wide, Gypsum Board listed in Item 5 above. Additional layer of Gypsum Board is required to what is shown in Item 5 above. Applied vertically with vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. For 2 layer assemblies inner layer attached to studs with 1-1/4 in. long Type S steel screws spaced 8 in. OC, outer layer will be attached to studs over inner layer with the 1-7/8 in. long steel screws spaced 8 in. OC. For 3 layer assemblies inner layers installed as described in the 2 layer system above, third layer attached to studs over inner layers with 2-5/8 in. long steel screws spaced 8 in. OC.

6. **Fasteners —** (Not Shown) — For use with Items 2 and 2F - Type S or S-12 steel screws used to attach panels to studs (Item 2) or furring channels (Item 7). **Single layer systems:** 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 8 in. OC when panels are applied horizontally, or 8 in. OC along vertical and bottom edges and 12 in. OC in the field when panels are applied vertically. **Single layer system with Type ULIX:** 1 in. long, spaced 12 in. OC in the field and perimeter, when panels are applied horizontally or vertically. **Two layer systems:** First layer- 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels or 2-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC with screws offset 8 in. from first layer. **Three-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in., 5/8 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below. **Four-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second

layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 24 in. OC. Fourth layer- 2-5/8 in. long for 1/2 in. thick panels or 3 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below.

7. **Furring Channels —** (Optional, Not Shown, for single or double layer systems) — Resilient furring channels fabricated from min 25 MSG corrosion-protected steel, spaced vertically a max of 24 in. OC. Flange portion attached to each intersecting stud with 1/2 in. long Type S-12 steel screws. Not for use with Items 5B, 5E, 5H, or 5J.

7A. **Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to studs with No. 8 x 9/16 in. minimum self-drilling, S-12 steel screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels.
**PAC INTERNATIONAL L L C** — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75).

7B. **Framing Members* —** (Optional, Not Shown) — As an alternate to Item 7, for single or double layer systems, furring channels and Steel Framing Members on only one side of studs as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Batts and Blankets placed in stud cavity as described in Item 5. Two layers of gypsum board attached to furring channels as described in Item 5. Not for use with Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Ba) to one side of studs (Item 2) only. Clips spaced 48 in. OC., and secured to studs with two No. 8 x 2-1/2 in. coarse drywall screws, one through the hole at each end of the clip. Furring channels are friction fitted into clips.
**KINETICS NOISE CONTROL INC** — Type Isomax

7C. **Framing Members* —** (Not Shown) — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-3/8 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Ca) to studs (Item 2). Clips spaced max. 48 in. OC. GENIECLIPS secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips.
**PLITEQ INC** — Type GENIECLIP

7D. **Steel Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — Furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 AWG galvanized steel wire.. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Da) to studs. Clips spaced 48 in. OC., and secured to studs with 2 in. coarse drywall screw with 1 in. diam washer through the center hole. Furring channels are friction fitted into clips
**STUDCO BUILDING SYSTEMS** — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

7E. **Steel Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — Furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item 7Eb. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 AWG galvanized steel wire.. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Ea) to studs. Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips.
**REGUPOL AMERICA** — Type SonusClip

7F. **Steel Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — Resilient channels and Steel Framing Members as described below:

a. **Resilient Channels —** Formed of No. 25 MSG galv steel, spaced 24 in. OC, and perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and secured in place with two No. 8 15 x 1/2 in. Philips Modified Truss screws spaced 2-1/2 in. from the center of the overlap. Gypsum board attached to resilient channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach resilient channels (Item 7Fa) to studs. Clips spaced 48 in. OC., and secured to studs with No. 8 x 2-1/2 in. coarse drywall screw through the center hole. Resilient channels are secured to clips with one No. 10 x 1/2 in. pan-head self-drilling screw.
**KEENE BUILDING PRODUCTS CO INC** — Type RC+ Assurance Clip

7G. **Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Ga) to studs (Item 2). Clips spaced max. 48 in. OC. Clips secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center hole. Furring channels are friction fitted into clips.
**CLARKDIETRICH BUILDING SYSTEMS** — Type ClarkDietrich Sound Clip

7H. **Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-23/32 in. wide by 7/8 in. deep, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels are overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping #6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Gypsum board attached to furring channels as described in Item 6. Not for use with Items 5B, 5E, 5H, or 5J.

b. **Steel Framing Members* —**Used to attach furring channels (Item 7Ha) to studs. Clips spaced 48 in. OC. staggered on adjacent furring channels and secured to studs with one No. 8 x 2-1/2 in. screw and washer through the center hole. Furring channels are friction fitted into clips.

**ISOTECH INDUSTRIES INC.** — Type ISOSTUD

8. **Joint Tape and Compound —** Vinyl or casein, dry or premixed joint compound applied in two coats to joints and screw heads of outer layers. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Paper tape and joint compound may be omitted when gypsum panels are supplied with a square edge.

9. **Siding, Brick or Stucco —** (Optional, Not Shown) — Aluminum, vinyl or steel siding, brick veneer or stucco, meeting the requirements of local code agencies, installed over gypsum panels. Brick veneer attached to studs with corrugated metal wall ties attached to each stud with steel screws, not more than each sixth course of brick.

10. **Caulking and Sealants* —** (Optional, Not Shown) — A bead of acoustical sealant applied around the partition perimeter for sound control.
**UNITED STATES GYPSUM CO** — Type AS

11. **Lead Batten Strips —** (Not Shown, For Use With Item 5B) — Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5B) and optional at remaining stud locations. Required behind vertical joints.

11A. **Lead Batten Strips —** (Not Shown, For Use With Item 5H) — Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations.

12. **Lead Discs or Tabs —** (Not Shown, For Use With Item 5B) — Used in lieu of or in addition to the lead batten strips (Item 11) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 5B) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

12A. **Lead Discs —** (Not Shown, for use with Item 5H) — Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

13. **Lead Batten Strips —** (Not Shown, For Use With Item 5E) — Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5E) and optional at remaining stud locations.

14. **Lead Tabs —** (Not Shown, For Use With Item 5E) — 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 5E) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

15. **Barrier Mesh —** (Optional, Not Shown) - Attached to steel studs on one or both sides of the wall using Barrier Mesh Clips spaced at maximum 12 inches on center vertically, using a flat head type screw penetrating through the steel at least 3/8 of an inch. For Steel Studs less than 0.033 inches in thickness, use self-piercing screws. For Steel Studs equal to or greater than 0.033 inches in thickness, use steel drill screws (self-tapping). Gypsum Board (Item 5) to be installed directly over the Barrier Mesh using prescribed screw patterns with lengths increased by a minimum 1/8 in. Barrier Mesh may be installed with the long dimension of the diamond pattern positioned vertically or horizontally. Barrier Mesh joints may occur as butt joints at the framing members and secured using the Barrier Mesh Clips or occur in between framing members as overlapping joints secured using 18 SWG wire ties spaced a maximum 12 in. on center.
**CLARKDIETRICH BUILDING SYSTEMS** — Barrier Mesh, Barrier Mesh Clips

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-12-15

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL Solutions' Follow - Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL Solutions' Follow - Up Service. Always look for the Mark on the product.

UL Solutions permits the reproduction of the material contained in Product iQ subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from Product iQ with permission from UL Solutions" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "©2026 UL LLC."