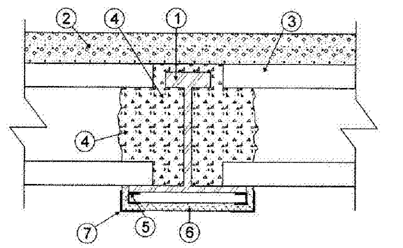
UL Design No. K912

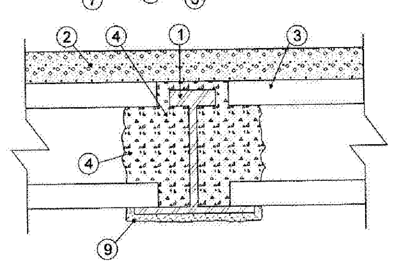
April 05, 2019

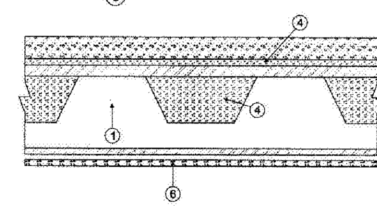
Restrained Assembly Ratings - 2 or 3 Hr (See Item 2)
Unrestrained Assembly Ratings - 2 Hr
Unrestrained Beam Ratings - 2 Hr

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

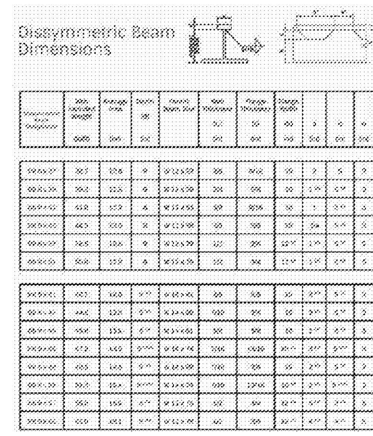
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**







1. **Steel Beam** — Composite dissymmetric steel beam fabricated from structural steel members in accordance with the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, published by the American Institute of Steel Construction. The castellated steel beam, with a partially open web consists of the bottom flange and partial web with a bar welded to the web that serves as the top flange and conforms to the following requirements:



2. **Concrete Topping** — (Optional for unrestrained rating) — 3000 psi compressive strength, 150 (+ or -) 3 pcf unit weight. Normal weight concrete. Min 1-1/8 in. thickness required for 3 hr Restrained Assembly Rating.

Rating Hr	Min. Thkns In.
2	0
3	1-1/8

3. **Precast Concrete Units*** — Carbonate, siliceous or lightweight aggregate. Min 8 in. thick by 4 or 8 ft wide units with cross section similar to that shown for Design No. J952. Openings may be provided through the units for piping, ducts or similar services and should be suitably enclosed with constructions having at least equal resistance, acceptable to authorities having jurisdiction. Units have a min 1-1/2 in. bearing on the bottom flange of Item 1.
4. **Grout** — Sand-cement grout (3500 psi min compressive strength). Min avg thickness 9/16 in. above top bar. Hollow cores in precast concrete units grouted 6 in. min from beam web.
5. **Runner Channel** — Fabricated from 25 MSG galv steel, min 1/2 in. deep with 1 in. legs, fastened to steel beam with XZF powder actuated pins spaced 12 in. OC.
6. **Gypsum Board*** — 1/2 or 5/8 in. thick gypsum board fastened to runner channels with 1 in. long, 0.150 in. diam steel screws spaced 16 in. OC.

   AMERICAN GYPSUM CO — Types AG-C
   CERTAINTEED GYPSUM INC — Type FRPC, SF3, Type C
   CGC INC — Type C
   CONTINENTAL BUILDING PRODUCTS OPERATING CO L L C — Type LGFC-C/A
   GEORGIA-PACIFIC GYPSUM L L C — Type 5
   GEORGIA-PACIFIC GYPSUM L L C — Type TG-C
   NATIONAL GYPSUM CO — Types FSW-C, FSW-G
   PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types C, PG-C
   THAI GYPSUM PRODUCTS PCL — Type C
   UNITED STATES GYPSUM CO — Type C
   USG MEXICO S A DE C V — Type C
7. **Corner Bead** — Fabricated from min 28 MSG galv steel to form an angle with 1-1/4 in. legs. Legs perforated with 1/4 in. diam holes approximately 1 in. OC. Attached to runner channel through gypsum board with 1 in. long, 0.150 in. diam steel screws spaced 16 in. OC.
8. **Joint Compound** — (Not shown) 1/32 in. thick on bottom and sides of wallboard from corner beads and feathered out. Paper tape embedded in joint compound over joints with edges of compound feathered out.
9. **Spray-Applied Fire Resistive Material*** — As an alternate to Items 5 through 8, the bottom flange of the steel beam may be protected with a spray applied fire resistive material. Applied in one coat to a final untamped thickness of 3/8 in. to steel surfaces which are free of dirt, oil or scale. Min avg untamped density of 13 pcf with min ind untamped density of 11 pcf for Types II and D-C/F. Min avg and min ind untamped densities of 22 and 19 pcf, respectively, for Type HP. For Type I, min avg density of 15 pcf with min ind value of 12 pcf.

   ISOLATEK INTERNATIONAL — Type D-C/F, HP, I or II, Type EBS or Type X Adhesive/Sealer optional

9A. **Spray-Applied Fire Resistive Material*** — As an alternate to Items 5 through 9, the bottom flange of the steel beam and the flange tips may be protected with a spray applied fire resistive material. Applied in one coat to a final untamped thickness of 1/2 in. to steel surfaces which are free of dirt, oil or scale. Min avg and min ind density of 15/14 pcf respectively. For method of density determination, see Design Information Section.

   GCP APPLIED TECHNOLOGIES INC — Types MK6/HY, MK-6ES, MK-6s, MK-10HB, MK-1000HB, RG, Z-106, Z-106G, Z-106HY, Z-146, Z-146 PC, Z -146T, Z-156, Z-156 PC, and Z-156T.

9B. **Spray-Applied Fire Resistive Material*** — As an alternate to items 5 through 9A, the bottom flange of the steel beam and the flange tips may be protected with a spray applied fire resistive material. Applied in one coat to an untamped thickness of 1/2 in. to steel surfaces which are free of dirt, oil or scale. Min. avg and min ind density of 15/14 pcf respectively for types 5GP and 5MD. Min. avg and min ind density of 19/18 pcf respectively for types 7GP and 7HD.

   SOUTHWEST FIREPROOFING PRODUCTS CO — Types 5GP, 5MD, 7GP and 7HD

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

UL Design No. P518

October 18, 2017

Restrained Assembly Rating — 1 Hr.
Unrestrained Assembly Rating — 1 Hr.
Unrestrained Beam Rating — 1 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

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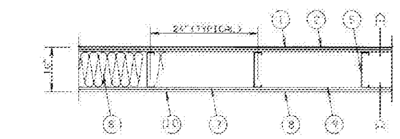
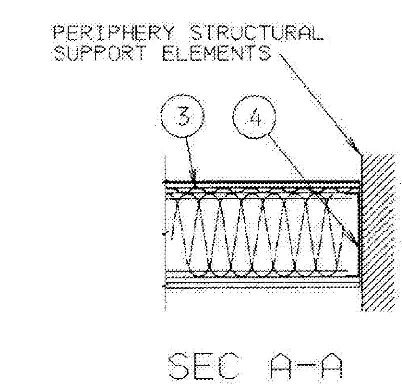




1. **Roof Covering*** — Consisting of hot mopped or cold application materials compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

1A. **Metal Roof Deck Panels** — (Not shown) — In addition to or in lieu of Item 1, the roof covering may consist of a mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory-Metal Roof Deck Panels (CETW).

1B. **In lieu of Item 1, roof covering consisting of single-ply Roofing Membrane*** — that is either ballasted, adhered or mechanically attached as permitted under the respective classified company's Classification. See Fire Resistance Directory-Roofing Membranes (CHCI).

2. **Gypsum Sheathing** — supplied in sheet nom 2 by 4 ft to 4 by 12 ft by long by min 1/2 in. thick gypsum sheathing installed perpendicular to steel roof deck with end joints of adjacent rows staggered 2 ft. Sheathing attached to steel roof deck with Type S, 1-7/8 in. long bugle head steel screws spaced 24 in. OC in both directions.
3. **Steel Roof Deck** — — (Unclassified) — Nom 30 in. wide, corrugated, No. 28 MSG galv steel, min. 9/16 in. deep with 2-1/2 in. corrugation pitch. The deck shall be attached to each steel joist with No. 8-18 by 5/8 in. long self-drilling steel screws located at the side laps of each unit and at the center of each unit, edges at steel channels attached 8 in. OC. Units shall be overlapped at ends a min of 1-1/2 in. or Classified Steel Floor and Form Units* — Noncomposite, min. 9/16 in. deep, min gauge is 28 MSG. Attached to each steel joist with No. 8-18 by 5/8 in. long self-drilling steel screws located at the side laps of each unit and at the center of each unit, edges at steel channels attached 8 in. OC. Units shall be overlapped at ends a min of 1-1/2 in.

   ASC STEEL DECK, DIV OF ASC PROFILES L L C — 36 in. wide, Types BH-36, BHN-36, BHN-35-1/4, DGB-36, B-36, BN-36, BN-35-1/4, C0.9-32 and C1.4-32. All units may be galvanized or Prime Shield™. Non-cellular decks may be vented designated with a "V" suffix to the product name.

   VERCO DECKING INC - A NUCOR CO — Deck types PLB, HSB, Shallow or Deep VERCOR™, Deep VERCOR VENTLOK; FORMLOK deck types PLB, B. Units may be galvanized, phos./ptd. or primed finish. Deck may be vented or non-vented.

   VULCRAFT, DIV OF NUCOR CORP — Types 1.5B, 0.6C, 1.0C, 1.3C; Types BW, B High Strength, BW High Strength, TV-75, -150, TV-75, TF S3, TV S3.

3A. **Plywood Sheathing (As an alternate to Items 2 and 3)** — 1/2 in. thick wood structural panels min grade "Underlayment" or "Single Floor". Face grain of plywood or strength axis of panel to be perpendicular to joists with joints staggered. The plywood shall be attached to each steel joist with 1-1/4 in. long ballistic point nails spaced 8 in. OC at the edges and in the field.

3B. **Mineral and Fiber Board* (As an alternate to Items 2, 3 and 3A)** — One layer of min 1 in. thick by 48 in. wide boards, installed with long dimension perpendicular to joists (Item 5) with joints staggered. Mechanically fastened to each steel joist with pneumatically driven 2-1/2 in. long and 0.1 in. diam steel coil pins spaced at 6 in. OC max.

   HOMASOTE CO — Type FireStall

3C. **Building Units*** — (Optional, for installation over Items 2 and 3, Item 3A or Item 3B) — Expanded foamed plastic insulation boards faced on the top surface with nailbase. Units to be installed with long dimension perpendicular to joists (Item 5).

   HOMASOTE CO — Type NCFR/Thermasote

4. **Roof Joist Track** — Cold formed channels 8-3/16 in. deep with min 1-1/4 in. flanges, fabricated from No. 18 gauge or heavier ptd or galv steel. Used to provide supporting surface between roof joists (Item 5) and the periphery structural support elements. Ends of roof joists secured to roof tracks with 1 in. long, 1/8 in. fillet welds at top and bottom joist flanges.
5. **Roof Joists** — Cee-shaped sections, min 8 in. deep with 1-9/16 in. flanges and 9/16 in. lips, made from No. 18 gauge or heavier ptd or galv steel of 33 KSI min yield strength. Designed in accordance with the American Iron and Steel Institute specifications adopted August 1986. Joists spaced 24 in. OC max.

5A. **Structural Steel Members (Roof Joists)** — (Not Shown)- As an alternate to Item 5, light gauge steel truss system manufactured from cold-formed, galvanized steel chord and web members conforming to ASTM A653 Grade 33 or higher yield strength. Steel thickness of truss chords shall be min of 18 ga. and web sections a min of 20 ga. Truss members welded together. 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, most current edition. Trusses spaced a max of 24 in. OC and having a min depth of 8 in. Where the truss intersects with the interior face of the exterior wall, the min truss depth shall be 12 in. with no min slope.

5B. **Angles**- (Not Shown) — (Optional)- Min 1-1/2 in. by 1-1/2 in. by 18 ga. angles welded to top corner of Item 5A and min 1-1/2 in. by 3 in. by 18 ga. angles welded to bottom conners of Item 5A. All angles, top and bottom corners, welded with 1/16 in. by 1 in. long welds to provide supporting surface between roof joists, Item 5A, and periphery support elements.

6. **Batts and Blankets*** — Nom 24 by 48 by 8 in. thick or 24 in. wide rolls of glass fiber insulation. Each batt placed directly on top of inner layer gypsum wallboard (Item 8) between roof joists. Density of glass fiber insulation is nominal 0.53 pcf. . See Batts and Blankets (BKNV or BZJZ) categories for names of Classified companies.
7. **Bridging** — Min 1-1/2 in. wide, No. 18 MSG galv steel continuous strap. Bridging required at the bottom flange of roof joists at midspan. Bridging secured to the bottom flange of each joist with one No. 8-18 by 5/8 in. long self-drilling steel screw and with two screws at the end of bridging strap.
8. **Gypsum Board*** — 1/2 in. thick, 4 ft wide. Base layer installed with long dimension perpendicular to roof joists with end joints centered on joists and attached with 1-1/4 in. long, Type S-12 bugle head steel screws spaced 8 in. OC at end joints of the board and 12 in. OC in the field. Screws located 1 in. from board side edges and 1/2 in. from butted ends. Face layer installed with long dimension parallel and centered over ceiling joists. Face layer fastened to joists through inner layer with 1-7/8 in. long Type S-12 bugle head steel screws spaced 12 in. OC in the field and 8 in. OC at perimeter. Bottom layer end joints fastened to inner layer with 1-1/2 in. long Type G bugle head steel screws spaced 8 in. OC and located at 1 in. from board edges.

   AMERICAN GYPSUM CO — Type AG-C
   CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C — Type LGFC-C/A.
   GEORGIA-PACIFIC GYPSUM L L C — Types 5, DAPC, TG-C.
   UNITED STATES GYPSUM CO — Type C.
9. **Vapor Barrier** — Latex Primer Sealer, ASTM designation #D1653. Applied to the back surface of the inner layer of wallboard at 39 oz per 100 sq ft.
10. **Finishing System** — Wallboard joints exposed or covered with fiber tape and joint compound. As an option, nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of gypsum board. Alternate Ceiling Membrane Not Shown.
11. **Hanger Wire** — For use with Item 12 - No. 12 SWG galv steel wire secured to steel joists spaced a max 48 in. O.C.
12. **Steel Framing Members** —
    a. **Main runners** — Installed perpendicular to Structural Steel Members, - Nom 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 Structural Steel Members with 12 SWG galv steel wire. Wires located a max of 48 in. OC.
    b. **Main runners** — Nom 4 ft long, 15/16 in. or 1-1/2 in. wide face or cross channels, nom 4 ft long, 1-1/2 in. 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 wallboard 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 - Painted or galvanized steel angles with 1 in. legs or channels with 1 in. legs and 1-9/16 in. deep, 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.
13. **Gypsum Board*** — For use with Steel Framing Members* (Item 12) - Two layers of nominal 1/2 in. thick by 48 in. wide boards. Inner layer installed with long dimension perpendicular to cross tees with side joints centered along main runners and end joints centered along cross tees. Inner layer fastened to cross tees with 1-1/4 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. End joints of adjacent wallboard sheets shall be staggered not less than 4 ft OC. Outer layer attached to the cross tees through inner layer using 1-7/8 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 to be centered along cross tees and be offset a min of 32 in. from end joints of inner layer. Rows of screws on both sides of butted end joints of each layer shall be located 3/8 to 1/2 in. from end joints. Butted side joints of outer layer to be offset a min of 18 in. from butted side joints of inner layer. Joints treated as described in Item 10.

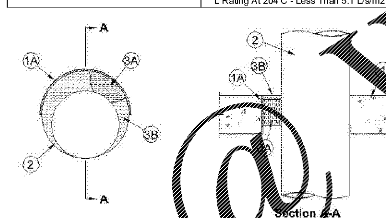
    CGC INC — Type C.
    UNITED STATES GYPSUM CO — Type C.
    USG MEXICO S A DE C V — Type C.

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

UL Design No. C-AJ-7023

July 20, 2017

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 2 and 3 Hr (See Item 3B)	F Ratings - 2 and 3 Hr (See Item 3B)
T Ratings - 0 and 1/4 Hr (See Item 2)	FT Ratings - 0 and 1/4 Hr (See Item 2)
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Ratings - 2 and 3 Hr (See Item 3B)
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Ratings - 0 and 1/4 Hr (See Item 2)
W Rating - Class 1 (See Item 3B)	L Rating At Ambient - Less Than 5.1 L/s/m2
	L Rating At 204 C - Less Than 5.1 L/s/m2



1. **Floor or Wall Assembly** — Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Floor may also be constructed of any min 6 in. (152 mm) thick hollow-core Precast Concrete Units*. Max diam of opening is 26 in. (660 mm). Max diam of opening in floors constructed of hollow-core precast concrete units is 7 in. (178 mm).

   See Concrete Block (CAZT) and Precast Concrete Units (CFTV) category in the Fire Resistance Directory for names of manufacturers.

1A. **Steel Sleeve (Optional)** — Nom 26 in. (660 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe or No. 26 ga (0.022 in. or 0.56 mm thick) sheet steel sleeve with square anchor flange spot welded to the sleeve at approx mid-height. Sleeve cast or grouted in place flush with floor or wall surfaces. Steel pipe sleeve may project a max 2 in. (51 mm) beyond the floor or wall surfaces.

2. **Steel Duct** — Nom 24 in. (610 mm) diam (or smaller) spiral-wound or snap-lock steel duct. Steel gauge of duct shall conform with SMACNA requirements. One steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between the steel duct and the periphery of the opening shall be min 0 in. (point contact) to a max of 2 in. (51 mm). Steel duct to be rigidly supported on both sides of floor or wall assembly. The T Rating is 1/4 Hr for max 12 in. (305 mm) diam steel ducts. Otherwise, the T Rating is 0 Hr.

2A. **Coated Ducts*** — As an alternate to Item 2, nom 24 in. (610 mm) diam (or smaller) steel duct coated with BW11 coating material. Duct sections shall be assembled using bolted flanges or SMACNA approved Transverse Joint Reinforcements. One duct to be installed either concentrically or eccentrically within the firestop system. The annular space between the duct and the periphery of the opening shall be min 0 in. (point contact) to a max of 2 in. (51 mm). Duct to be rigidly supported on both sides of floor or wall assembly. The T Rating is 1/4 Hr for max 12 in. (305 mm) diam ducts. Otherwise, the T Rating is 0 Hr.

   FIRESPRAY INTERNATIONAL LTD — FLAMEBAR BW11 fire rated ductwork

3. **Firestop System** — The firestop system shall consist of the following:
   A. **Packing Material** — Min 3 in. (76 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material* — Sealant** — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall assembly or hollow-core precast concrete floor. Min 3/8 in. (10 mm) diam bead of fill material applied at the point contact location between the steel duct and the concrete floor or wall on the top surface of the floor or both surfaces of the wall or hollow-core precast concrete floor.

   SPECIFIED TECHNOLOGIES INC — SpecSeal Series SSS Sealant, SpecSeal LCI Sealant, Pensil 300 Sealant or SpecSeal Series SIL300 Sealant for floors or walls and Pensil 300S/L Sealant or SpecSeal Series SIL300SL Sealant for floors only.

   W Rating applies only when Pensil 300 Sealant, SpecSeal Series SIL300, Pensil 300 S/L or SpecSeal Series SIL300SL Sealants are used.

   F Rating is 2 Hr when Pensil 300 Silicone Sealant or Pensil 300SL Silicone Sealant is used. F Rating is 3 Hr when all other sealants are used.

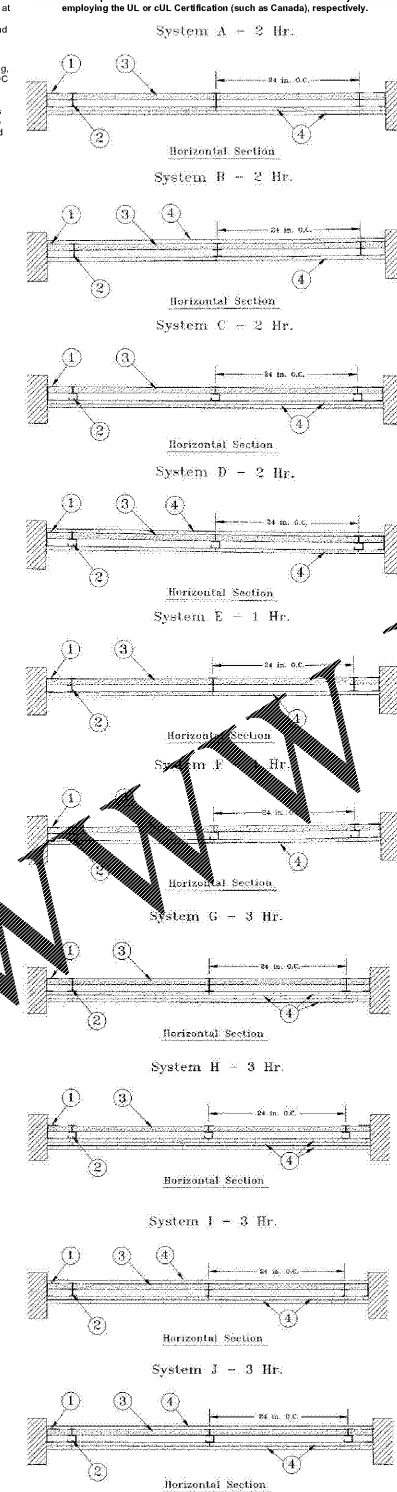
   *** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

UL Design No. U417

April 15, 2019

Nonbearing Wall Ratings — 1, 2 or 3 Hr

*** 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, Side and Ceiling Runners** — "J" -shaped runner, min 2-1/2 in. deep, with unequal legs of 1-1/8 in. and 2-1/8 in., fabricated from min 25 MSG galv steel. Runners positioned with short leg toward finished side of wall. Runners attached to structural supports with steel fasteners located not greater than 2 in. from ends and not greater than 24 in. OC.
2. **Steel Studs** —

   Systems A, B, E, G and I
   "I" -shaped studs fabricated from min 25 MSG galv steel, min 2-1/2 in. deep, 1-1/2 in. wide. Studs contain 3/4 in. wide by 2-1/4 in. high holding tabs spaced 2-3/4 in. OC. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in.

   Systems C, D, F, H and J
   "C-T" -shaped studs, min 2-1/2 in. deep, 1-1/2 in. wide, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. or

   "C-H" - shaped studs, min 2-1/2 in. deep, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. OC.

2A. **Steel Studs** — (Not Shown) — Alternate to Item 2, "E" - shaped studs installed back to back in place of "C-H" - shaped studs (Item 2) "E" - shaped studs secured together with steel screws spaced a maximum 12 in. OC. Fabricated from min 25 MSG (min 20 MSG when Item 5A is used) galv steel, min 2-1/2 in. deep, with one leg 1 in. long and two legs 3/4 in. long. Shorter legs 1 in. apart to engage gypsum liner panels. Cut to lengths 3/8 to 1/2 in. less than floor to ceiling heights.

3. **Gypsum Board*** — Gypsum liner panels, nom 1 in. thick, 24 in. wide. Panels cut max 1 in. less in length than floor to ceiling height. Vertical edges inserted in "T" -shaped section of "C-T" studs, the "H"-shaped section of "C-H" studs or tabs holding tabs of "I" studs. Free edge of end panels attached to long leg of "J" -runners with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced not greater than 12 in. OC.

   CERTAINTEED GYPSUM INC — Types Shaftliner, EGRG Shaftliner, GlasRoc Shaftliner.
   THAI GYPSUM PRODUCTS PCL — Type Shaftliner
4. **Gypsum Board*** —

   Systems A and C

   For use with **Type Shaftliner** liner panels - Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied in one of the following methods. Method 1 — Base layer installed horizontally to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. Face layer installed vertically to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, staggered 12 in. from base layer screws. Method 2 — Base layer installed vertically to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. Face layer installed horizontally to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, staggered 12 in. from base layer screws. Additionally, Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. For the 1/2 in. thick and 5/8 in. thick boards, the Type G screw length shall be 1-1/4 in. and 1-1/2 in. long, respectively. Method 3 — Base layer installed vertically to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. Face layer installed vertically to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, staggered 12 in. from base layer screws. Vertical joints centered over studs and staggered 24 in. on adjacent layers.

   For use with **Type EGRG or GlasRoc Shaftliner liner panels** - Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied in one of the following methods. Method 1 — Base layer installed horizontally to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. with the 1st screws installed 12 in. from the board edge. Face layer installed vertically to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 12 in. OC. with the 1st and 2nd screws spaced 3/4 in. and 6-3/4 in. from the board edge, staggered 12 in. from base layer screws. Method 2 — Base layer installed vertically to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. with the 1st screws installed 12 in. from the board edge. Face layer installed horizontally to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC., with the 1st and 2nd screws installed 3/4 in. and 6-3/4 in. from the board edge, staggered 12 in. from base layer screws. Additionally, Type G screws to be installed at the center of each stud cavity, spaced 12 in. OC., 1-1/2 in. from both sides of the horizontal joint. For the 1/2 in. thick and 5/8 in. thick boards, the Type G screw length shall be 1-1/4 in. and 1-1/2 in. long, respectively. Method 3 — Base layer installed vertically to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. with the 1st screws installed 12 in. from the board edge. Face layer installed vertically to steel studs with 1-5/8 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, with the 1st and 2nd screws spaced 3/4 in. and 6-3/4 in. from the board edge, staggered 12 in. from base layer screws. Vertical joints centered over studs and staggered 24 in. on adjacent layers.

   CERTAINTEED GYPSUM INC — 1/2 in. thick Type C, 5/8 in. thick Type C or 5/8 in. thick Type X, Type X-1, SilentFX, EGRG, GlasRoc, GlasRoc-2

   SAINT-GOBAIN GYPROC MIDDLE EAST FZE — Type Gyproc FireStop, Gyproc FireStop MR, Gyproc FireStop M2TECH, Gyproc FireStop ACTIV'Air, Gyproc FireStop MR ACTIV'Air, Gyproc FireStop M2TECH ACTIV'Air, Gyproc DuraLine, Gyproc DuraLine MR, Gyproc DuraLine M2TECH, Gyproc DuraLine ACTIV'Air, Gyproc DuraLine MR ACTIV'Air, Gyproc DuraLine M2TECH ACTIV'Air

   THAI GYPSUM PRODUCTS PCL — Type C, Type X

   Systems B and D
   Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied vertically to steel studs with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 12 in. OC. Vertical joints on opposite sides of wall staggered a min of 24 in.

   CERTAINTEED GYPSUM INC — 1/2 in. thick Type C, 5/8 in. thick Type C or 5/8 in. thick Type X, Type X-1, SilentFX, EGRG, GlasRoc, GlasRoc-2

   SAINT-GOBAIN GYPROC MIDDLE EAST FZE — Type Gyproc FireStop, Gyproc FireStop MR, Gyproc FireStop M2TECH, Gyproc FireStop ACTIV'Air, Gyproc FireStop MR ACTIV'Air, Gyproc FireStop M2TECH ACTIV'Air, Gyproc DuraLine, Gyproc DuraLine MR, Gyproc DuraLine M2TECH, Gyproc DuraLine ACTIV'Air, Gyproc DuraLine MR ACTIV'Air, Gyproc DuraLine M2TECH ACTIV'Air

   THAI GYPSUM PRODUCTS PCL — Type C, Type X

   Systems E and F
   Gypsum panels, nom 5/8 in. thick, 48 in. wide, applied vertically with edges centered over studs, with 1 in. long Type S or S-12 self-drilling, self-tapping bugle head steel screws spaced 12 in. OC.

   CERTAINTEED GYPSUM INC — Type X, Type X-1, Easi-Lite Type X-2, SilentFX, EGRG, GlasRoc, GlasRoc-2, or Type C

   SAINT-GOBAIN GYPROC MIDDLE EAST FZE — Type Gyproc FireStop, Gyproc FireStop MR, Gyproc FireStop M2TECH, Gyproc FireStop ACTIV'Air, Gyproc FireStop MR ACTIV'Air, Gyproc FireStop M2TECH ACTIV'Air, Gyproc DuraLine, Gyproc DuraLine MR, Gyproc DuraLine M2TECH, Gyproc DuraLine ACTIV'Air, Gyproc DuraLine MR ACTIV'Air, Gyproc DuraLine M2TECH ACTIV'Air

   THAI GYPSUM PRODUCTS PCL — Type X, Type C

   Systems G and H
   Gypsum panels, nom 5/8 in. thick, 48 in. wide applied in three layers to one side of the assembly. Base layer applied vertically, remaining layers applied vertically or horizontally. Base layer attached to studs with 1 in. long Type S or S-12 steel screws spaced 24 in. OC. Middle layer attached to studs with 1-5/8 in. long Type S or S-12 steel screws spaced 24 in. OC when installed vertically or 16 in. OC when installed horizontally. Face layer attached to studs with 2-1/4 in. long Type S or S-12 steel screws spaced 16 in. OC when installed vertically or 12 in. OC when installed horizontally. Screws offset 6 in. from layer below. Horizontal joints on adjacent layers staggered a min of 12 in. When applied horizontally, 1-1/2 in. long Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. Vertical joints centered over studs and staggered 24 in. on adjacent layers.

   CERTAINTEED GYPSUM INC — Type C

   SAINT-GOBAIN GYPROC MIDDLE EAST FZE — Type Gyproc FireStop, Gyproc FireStop MR, Gyproc FireStop M2TECH, Gyproc FireStop ACTIV'Air, Gyproc FireStop MR ACTIV'Air, Gyproc FireStop M2TECH ACTIV'Air, Gyproc DuraLine, Gyproc DuraLine MR, Gyproc DuraLine M2TECH, Gyproc DuraLine ACTIV'Air, Gyproc DuraLine MR ACTIV'Air, Gyproc DuraLine M2TECH ACTIV'Air

   THAI GYPSUM PRODUCTS PCL — Type C

   Systems I and J
   Gypsum panels, nom 5/8 in. thick, 48 in. wide applied in two layers to one side of the assembly and one layer to the other side. On the two layer side, base layer applied vertically, face layer applied vertically or horizontally. Base layer attached to studs with 1 in. long Type S or S-12 steel screws space 24 in. OC. Face layer attached to studs with 1-5/8 in. long Type S or S-12 steel screws spaced 24 in. OC when installed vertically or 16 in. OC when installed horizontally. Screws offset 6 in. from layer below. When applied horizontally, 1-1/2 in. long Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. Vertical joints centered over studs and staggered 24 in. on adjacent layers. On the one layer side, panels applied vertically and attached to studs with 1 in. long Type S or S-12 steel screws spaced 12 in. OC. Vertical joints on opposite sides of wall staggered min 24 in. OC.

   CERTAINTEED GYPSUM INC — Type C

   SAINT-GOBAIN GYPROC MIDDLE EAST FZE — Type Gyproc FireStop, Gyproc FireStop MR, Gyproc FireStop M2TECH, Gyproc FireStop ACTIV'Air, Gyproc FireStop MR ACTIV'Air, Gyproc FireStop M2TECH ACTIV'Air, Gyproc DuraLine, Gyproc DuraLine MR, Gyproc DuraLine M2TECH, Gyproc DuraLine ACTIV'Air, Gyproc DuraLine MR ACTIV'Air, Gyproc DuraLine M2TECH ACTIV'Air

   THAI GYPSUM PRODUCTS PCL — Type C
5. **Furring Channels** — (Optional, Not Shown) — For use with single or double layer systems. Resilient furring channels fabricated from min 25MSG corrosion protected steel, installed horizontally, and spaced vertically a max 24 in. OC. Flange portion of channel attached to each intersecting "I", "C-T", "C-H" or "E" stud on side of stud opposite the 1 in. liner panels with 1/2 in. long Type S or S-12 pan-head steel screws. When furring channels are used, wallboard to be installed vertically only.

5A. **Steel Framing Members*** — (Optional, Not Shown) — For use with single or double layer systems. 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 installed vertically only.
   b. **Steel Framing Members*** — Used to attach furring channels (Item 5Aa) to studs (Item 2 or 2A). Clips spaced max. 24 in. OC., and 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. 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.

   PAC INTERNATIONAL L L C — Types RSIC-1, RSIC-1 (2.75).

5B. **Steel Framing Members*** — (Optional, Not Shown) — For use with 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 (Item 2 or 2A) 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 4.
   b. **Steel Framing Members*** — Used to attach furring channels (Item a) to studs. Clips spaced 24 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 A237R

5C. **Steel Framing Members*** — (Optional, Not Shown) — For use with 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 (Item 2 or 2A) as described in Item 5Cb. 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 4.
   b. **Steel Framing Members*** — Used to attach furring channels (Item 5Ca) to studs. Clips spaced 24 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

5D. **Steel Framing Members*** — (Optional, Not Shown) — For use with 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 4.
   b. **Steel Framing Members*** — Used to attach resilient channels (Item 5Da) 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.

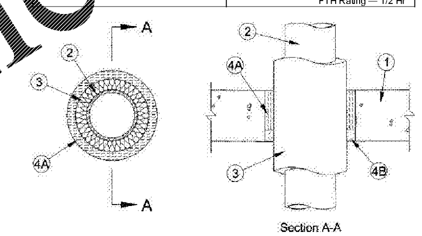
   KEENE BUILDING PRODUCTS CO INC — Type RC Assurance Clip
6. **Joint Tape and Compound** — (Not shown) — Joints covered with joint compound and paper or mesh tape. Screw heads covered with joint compound.

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

UL Design No. F-A-5012

August 18, 2011

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 2 Hr	F Rating — 2 Hr
T Rating — 1/2 Hr	FT Rating — 1/2 Hr
	FH Rating — 2 Hr
	FTH Rating — 1/2 Hr



1. **Floor Assembly** — Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Floor may also be constructed of any UL Classified hollow-core Precast Concrete Units*. Max diam of opening is 7 in.

   See **Precast Concrete Units** (CFTV) category in the Fire Resistance Directory for names of manufacturers.
2. **Through Penetrants** — One metallic pipe or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes and tubing may be used:
   A. **Steel Pipe** — Nom 4 in. diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe** — Nom 4 in. diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing** — Nom 4 in. diam (or smaller) Type M (or heavier) copper tubing.
   D. **Copper Pipe** — Nom 4 in. diam (or smaller) Regular (or heavier) copper pipe.
3. **Pipe Covering*** — One of the following types of pipe coverings shall be used:
   A. **Pipe and Equipment Covering Materials*** — Nom 1 in. thick hollow cylindrical heavy density (min 3.5 pcf) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. A nom annular space of 15/16 in. is required within the firestop system.

   See **Pipe and Equipment Covering** — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. **Pipe and Equipment Covering Materials*** — Nom 1 in. thick unfaced mineral fiber pipe insulation having a nom density of 3.5 pcf (or heavier) and sized to the outside diam of the pipe or tube. Pipe insulation secured with min 8 AWG steel wire spaced max 12 in. OC. A nom annular space of 15/16 in. is required within the firestop system.

   INDUSTRIAL INSULATION GROUP L L C — High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT or High Temperature Pipe Insulation Thermaloc.
   C. **Sheathing Material*** — Used in conjunction with Item 3B, foil-scrim-kraft or all-service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3B) with the kraft side exposed. Longitudinal and transverse joints sealed with metal fasteners or butt tape.

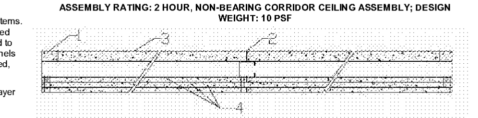
   See **Sheathing Materials** (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread value of 25 or less and a Smoke Developed value of 50 or less may be used.
4. **Firestop System** — The firestop system shall consist of the following:
   A. **Packing Material** — Min 3 in. thickness of min 4 pcf density mineral wool batt insulation firmly packed into opening as a permanent form. When floor is constructed of hollow-core precast concrete units, packing material depth to be increased to extend above top of hollow-core penetrated by insulated through-penetrant. Packaging material to be recessed from bottom surface of floor as required to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Material*— Sealant** — Min 1 in. thickness of fill material applied within annulus, flush with bottom surface of floor assembly.

   SPECIFIED TECHNOLOGIES INC — SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

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

Design No. GP/CC 120-01

ASSEMBLY RATING: 2 HOUR, NON-BEARING CORRIDOR CEILING ASSEMBLY; DESIGN WEIGHT: 10 PSF



1. **Perimeter Framing:** 'J' shaped runner with unequal legs, 2-1/4" minimum deep, fabricated from minimum 0.018 (25 gauge) galvanized steel. Secured around the perimeter with suitable fasteners, 24" oc maximum.
2. **Steel Stud:** 'C-T' shaped slotted webs stubs, 1-1/2" wide by 2-1/2" minimum deep, fabricated from minimum 0.018" (25 gauge) thick galvanized steel. Friction fitted 24" oc maximum with 'J' runner flangers. Cut studs 1/2" less than the span between J runner webs at the ends and fit between panels of Shaftliner.
3. **Gypsum Shaftliner*:** 1" thick DensGlass® Ultra Shaftliner (DGUSL) Type X panels or 1" ToughRock® Fireguard® (TRSL) Type X panels, supplied in nominal 24" widths. The panels are inserted against the long leg of the 'J' runners and into the 1" deep recess of the C-T studs. Edges or ends of panels are retained by binding 'J' runner tabs (12" oc) at a 90° angle or by driving 1-5/8" long drywall screws 12 " oc through the shaftliner at the 2-1/4" long leg of the "J" runner around the perimeter of the assembly.
4. **Gypsum Board:** 1/2" thick ToughRock Fireguard C gypsum board or 1/2" thick DensArmor® Fireguard C gypsum panels are applied in three layers. The base layer is attached parallel to the studs opposite the shaftliner side with 1" drywall screws 24" oc. The second ply is attached over the base layer parallel to the studs and with joints offset to different studs with 1-5/8" drywall screws 12" oc. The third ply is applied at right angles to the studs over the second ply and attached with 2" long drywall screws 12" oc. Butt joints in the face ply are centered between studs. 1-1/2" #10 Type "G" screws are driven 8" oc at 3" from each side of the butt joint.

   Face layer joints are taped and finished.

* Components bearing the Warnock Hersey Certification Mark.

Testing Standard(s): ASTM-E119, CAN/ULC-S101, UBC-7-1 except for reduced scale assembly (span 72" x 96").

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Ragona Architecture & Design, PLLC — Registered Architectural Company — CERT NO. 52928 — North Carolina — Charlotte, N.C.

Matthew Todd Ragona — Registered Architect — 9810 — North Carolina — Charlotte, N.C. DATE 6/7/19

Warren Norman Company

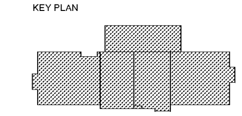
Strand Hospitality Services — Hotel Management, Consulting & Advisory Services

HOME 2 SUITES BY HILTON

HOME 2 SUITES BELMONT

HAWLEY AVE
BELMONT, NC 28012

KEY PLAN



Revisions		
#	Date	Description

Project Number:	18021
Issued for:	CONSTRUCTION
Issue Date:	2019-06-07

DRAWING TITLE
UL DESIGN ASSEMBLIES

SHEET NUMBER
G.302

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