

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

Design No. J957
September 2, 2024

Restrained Assembly Ratings — 2 and 3 Hr. (See Item 1)

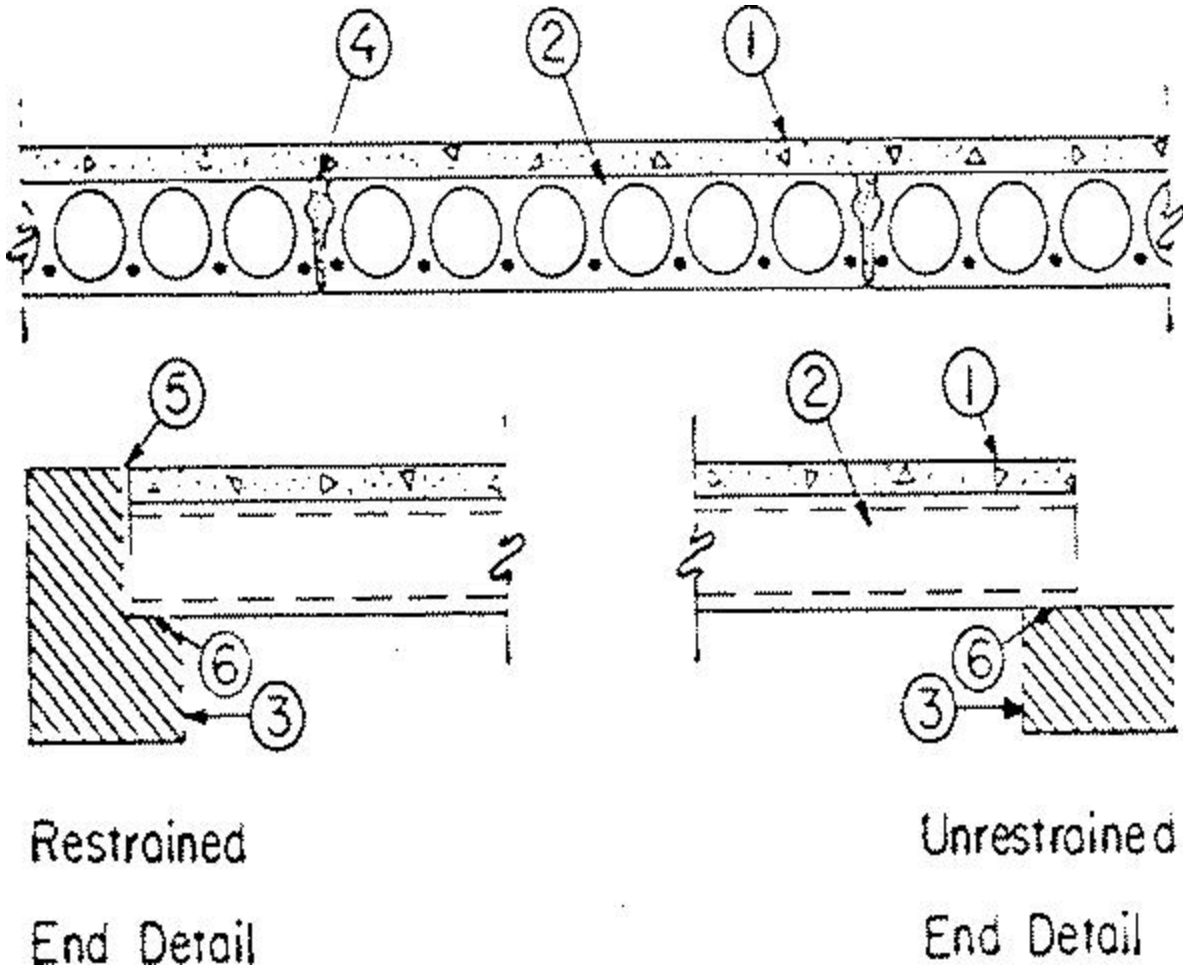
Unrestrained Assembly Rating — 1 and 2 Hr.

Unrestrained Beam Rating — 1, 1-1/2, 2, 3 (See Items 8, 8A)

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. **Concrete Topping** — 3000 psi compressive strength, 110 to 153 pcf unit weight. Normal weight aggregate.

| Rating Hr | Min Thkns In. |
|-----------|---------------|
| 2 | 0 |
| 3 | 1 |

1A. **Floor Topping Mixture*** — Alternate to Item 1 - Min 1/2 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, Gyp-Span Radiant

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

HACKER INDUSTRIES INC — Type FIRM-FILL SCM 250

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

HACKER INDUSTRIES INC — FIRM-FILL SCM 400

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

HACKER INDUSTRIES INC — Type FIRM-FILL SCM 750

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 in. (25 mm) over the floor mat.

1B. Floor Topping Mixture* — Alternate to Items 1 and 1A - 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 High Strength, Gyp-Span Radiant

Floor Mat Materials* — (Optional) — Floor mat material nom 5/64 in. (2 mm) thick adhered to precast concrete unit 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

Alternate Floor Mat Materials — (Optional) — Floor mat material nom 1/4 in. (6 mm) thick adhered to precast concrete unit 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.

1C. 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, Not Shown) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs/sq yd loose laid over the floor mat material.

1D. Alternate Floor Topping Mixture* — Compressive strength to be 1800 psi min. Min. thickness to be 3/4 in. 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.



1E. Alternate Floor Topping Mixture* — Compressive strength to be 1000 psi min. Thickness to be 3/4 in. min. 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.

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

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.

1F. Alternate Floor Topping Mixture* — Compressive strength to be 1000 psi min. Thickness to be 3/4 in. min. Refer to manufacturer's instructions accompanying the material for specific mix design.

FORMULATED MATERIALS LLC — Types FR-25, FR-30, SiteMix, SiteMix SL, 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.

1G. Alternate Floor Topping Mixture* — Compressive strength to be 2100 psi min. Thickness to be 3/4 in. min. 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).

1H. Finish Flooring - Floor Topping Mixture* — (As an alternate to Items 1 - 1G) - Compressive strength to be 1000 psi min. 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.



2. Precast Concrete Units* — Nom 8, 10, 12 or 14 in. thick units. Normal weight aggregate. Cross section similar to the above illustration.

BOCELLA PRECAST L L C

HOLLOWCORE INC

3. End Details — Restrained and unrestrained.

4. Joint — Clearance between slabs at bottom, full length, 1/16 in. min, 5/16 in. max, grouted full length with sand-cement grout (3500 psi min compressive strength) to a max depth of 4-1/2 in. This depth may be maintained by placing a compressible material in the bottom of the joint before applying grout.

Note: A 3/4 in. lateral expansion joint to be provided the full length and depth of the slabs every 14 ft. Expansion should be obtained with noncombustible, compressible material, for example, 24 sheets of 1/16 in. thick ceramic fiber paper (total thickness equals 1-1/2 in.).

5. **End Clearance** — Clearance for expansion at each end of slabs shall be equal to (3/16 plus or minus 1/16 in.) L/17 in., where "L" is equal to length of span in feet.

6. **Min Bearing** — 1-1/2 in.

7. **Beam** — (Optional, Not Shown) — W8x28 min size. The Precast Concrete Units shall be welded to the top flange of the beam by means of weld plates (spaced 48 in. OC max) incorporated in the Units.

8. **Spray-Applied Fire Resistive Materials*** — (Not Shown) — Applied by mixing with water and spraying in one or more coats the final thicknesses as shown in the table below, on the steel beam following the beam contour. Surfaces of the beam shall be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf respectively. Min avg and min ind density of 22/19 pcf respectively for Types Z-106, Z-106/G, Z-106/HY. Min avg and min ind density of 19/18 pcf respectively for Type 7GP and 7HD. For method of density determination, refer to Design Information Section.

| Restrained Assembly Rating Hr | Unrestrained Assembly Rating Hr | Unrestrained Beam Rating Hr | Thkns on Beam In. |
|--|--|--|------------------------------|
| 2 | 1 | 1 | 7/16 |
| 2 | 1-1/2 | 1-1/2 | 3/4 |
| 2 | 2 | 2 | 1 |
| 3 | 1-1/2 | 1-1/2 | 3/4 |
| 3 | 2 | 2 | 1 |
| 3 | 2 | 3 | 1-5/16 |

ARABIAN Vermiculite Industries — Types MK-10 HB, MK-10 HB Extended Set.

GCP Korea Inc — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, Monokote Acoustic 1, Monokote Acoustic 5, Z-106, Z-106/G.

PYROK Inc — Type LD.

Carbolite Global Inc. — Types 4, 5, 5EF, 5GP, 5MD, 7GP, 7HD, 8EF, 8GP, 8MD, 9EF, 9GP, 9MD.

GCP Applied Technologies Inc — Types MK-6/HY, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, Monokote Acoustic 1, Monokote Acoustic 5, RG, Z-106, Z-106/G, Z-106/HY.



8A. **Spray-Applied Fire Resistive Materials*** — (Not Shown) - As an alternate to Item 8 — Applied by spraying with water to the final thickness as shown in the table below, to the steel beam following the beam contour. Surfaces of the beam shall be clean and free of dirt, loose scale and oil. Min avg and min ind density of 13 and 11 pcf, respectively for Type D-C/F, II, or II HS. Min avg and min ind densities of 22 and 19 pcf, respectively, for Type HP. For method of density determination, refer to Design Information Section, Sprayed Material.

| Restrained Assembly Rating Hr | Unrestrained Assembly Rating Hr | Unrestrained Beam Rating Hr | Thkns on Beam In. |
|--|--|--|------------------------------|
| 2 | 1 | 1 | 3/8 |

| | | | |
|---|-------|-------|-------|
| 2 | 1-1/2 | 1-1/2 | 11/16 |
| 2 | 2 | 2 | 1 |
| 3 | 1-1/2 | 1-1/2 | 11/16 |
| 3 | 2 | 2 | 1 |
| 3 | 2 | 3 | 1-5/8 |

ISOLATEK INTERNATIONAL — Type D-C/F, HP, II, or II HS.

8B. **Spray-Applied Fire Resistive Materials*** — (Not Shown) - As an alternate to Item 8 and 8A — Applied by spraying with water to the final thickness as shown in the table below, to the steel beam following the beam contour. Surfaces of the beam shall be clear and free of dirt, loose scale and oil. Minimum average and minimum individual density of 15 and 14 pcf, respectively, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES and SB. For Types 400AC and 400ES min average and min individual density of 22 and 19 pcf, respectively. Min avg density of 44 pcf with min ind value of 40 pcf for Types M-II and TG. Min avg density of 47 pcf, with min individual value of 43 pcf for Type M-II/P. For method of density determination, refer to Design Information Section, Sprayed Material.

| Restrained Assembly Rating, Hr | Unrestrained Assembly Rating, Hr | Unrestrained Beam Rating, Hr | Min Thkns On Beam In. |
|---|---|---|----------------------------------|
| 2 | 1 | 1 | 5/16 |
| 2 | 1-1/2 | 1-1/2 | 1/2 |
| 2 | 2 | 2 | 11/16 |
| 3 | 1-1/2 | 1-1/2 | 1/2 |
| 3 | 2 | 2 | 11/16 |
| 3 | 2 | 3 | 1-1/16 |

BERLIN CO LTD — Types 300, 300ES, 300N , SB, M-II, TG and M-II/P.

GREENTECH ASIA PACIFIC SDN BDH — Types 300, 300ES, 300HS; Types M-II or M-II/P

GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C — Types 300, 300AC, 400AC, M-II, TG and M-II/P.

ISOLATEK INTERNATIONAL — Types 300, 300AC, 300ES, 300HS, 300N, SB, 400AC, 400ES, 3000, 3000ES, M-II, TG and M-II/P.

NEWKEM PRODUCTS CORP — Types 300, 300ES, 300N, SB, M-II, TG and M-II/P.



8C. **Spray-Applied Fire Resistive Materials*** — (Not Shown) As an alternate to Item 8, 8A, and 8B — Applied by spraying with water to the final thickness as shown in the table below, to the steel beam following the beam contour. Surfaces of the beam shall be clear and free of dirt, loose scale and oil. Minimum average and minimum individual density of 17.5 and 16 pcf, respectively for Type 300TW. Minimum average and minimum individual density of 22 and 19 pcf, respectively for Type 400. For method of density determination, refer to Design Information Section, Sprayed Material.

| Restrained Assembly Rating, Hr | Unrestrained Assembly Rating, Hr | Unrestrained Beam Rating, Hr | Min Thkns On Beam In. |
|---|---|---|----------------------------------|
| 2 | 1 | 1 | 5/16 |

| | | | |
|---|-------|-------|--------|
| 2 | 1-1/2 | 1-1/2 | 1/2 |
| 2 | 2 | 2 | 11/16 |
| 3 | 1-1/2 | 1-1/2 | 1/2 |
| 3 | 2 | 2 | 11/16 |
| 3 | 2 | 3 | 1-1/16 |

GREENTECH ASIA PACIFIC SDN BDH — Type 400

GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C — Type 400.

ISOLATEK INTERNATIONAL — Type 300TW or Type 400.

NEWKEM PRODUCTS CORP — Type 400.

The thickness of Spray-Applied Fire Resistive Materials shown in the table below are applicable when the beams are supporting solid subfloors or floor assemblies containing only fluted floor or form units.

Min Thkns In.

| Rating Hr | Restrained Beam Rating Hr | Unrestrained Beam Rating Hr |
|-----------|---------------------------|-----------------------------|
| 1 | 7/16 | 7/16 |
| 1-1/2 | 1/2 | 3/4 |
| 2 | 13/16 | 1 |
| 3 | 1-5/16 | 1-5/16 |
| 4 | 1-5/8 | 1-5/8 |

CARBOLINE CO — Types 15, 15HY, 22.

8D. **Spray-Applied Fire Resistive Materials*** — (Not Shown) As an alternate to Item 8, 8A, 8B and 8C — Applied by mixing with water and spraying in one or more coats the final thicknesses as shown in the table below, on the steel beam following the beam contour. Surfaces of the beam shall be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf respectively. Min avg and min ind density of 22/19 pcf respectively for Types Z-106, Z-106/G, Z-106/HY. For method of density determination, refer to Design Information Section.

| Restrained Assembly Rating Hr | Unrestrained Assembly Rating Hr | Unrestrained Beam Rating Hr | Thkns on Beam In. |
|-------------------------------|---------------------------------|-----------------------------|-------------------|
| 2 | 1 | 1 | 3/8 |
| 2 | 1-1/2 | 1-1/2 | 5/8 |
| 2 | 2 | 2 | 7/8 |
| 3 | 1-1/2 | 1-1/2 | 5/8 |
| 3 | 2 | 2 | 7/8 |



| | | | |
|---|---|---|--------|
| 3 | 2 | 3 | 1-7/16 |
|---|---|---|--------|

GCP KOREA INC — Types MK-6CBF, MK-6ED, MK-6HY, MK-6HY Extended Set, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G.

GCP APPLIED TECHNOLOGIES INC — MK-6HY, MK-6HY Extended Set, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, RG, Z-106, Z-106/G, Z106/HY.

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