

**USG Structural Panel Concrete Roof Deck**

USG Form Number - SCP52 Specification

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## Specification for USG Structural Panel Concrete Roof Deck

### Roof Deck Systems

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Description of Work: Work of this Section includes, but is not limited to, the following:
1. Framing.
  2. Fasteners.
  3. Roof deck construction

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. See Section 05 20 00, Metal Joists  
B. See Section 05 40 00, Cold-Formed Metal Framing  
C. See Section 06 10 00, Rough Carpentry  
D. See Section 06 16 00, Sheathing  
E. See Section 07 01 00, Operation and Maintenance of Thermal and Moisture Protection  
F. See Section 07 41 00, Roof Panels  
G. See Section 13 40 00, Integrated Construction

### 1.03 SYSTEM DESCRIPTION

USG Structural Panel roof deck system consists of steel joists, trusses or wood-framing members and USG Structural Panel Concrete Roof Deck installed with mechanical fasteners. USG Structural Panel Concrete Roof Deck is a high-strength reinforced concrete panels for use in noncombustible construction, as required by the applicable building codes. Adhesives are not recommended, nor required to enhance shear performance. A suitable approved exterior roof system shall be used to complete the envelope.

### 1.04 REFERENCES

- A. ICC-ES AC318 – Acceptance Criteria for Structural Cementitious Floor and Roof Sheathing Panels
- B. ICC-ES AC319 – Acceptance Criteria for Horizontal Diaphragms Consisting of Structural Cementitious Floor Sheathing Panels Attached to Cold-Formed Steel Framing
- C. ASTM A588/A588M – Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50ksi [345MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
- D. ANSI/AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members
- E. ANSI/AISI S210 – North American Specification for Cold-Formed Steel Framing – Floor and Roof System Design
- F. ANSI/AISI S214 – North American Specification for Cold-Formed Steel Framing – Truss Design
- G. ANSI/AISI S230 – Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings
- H. ASTM E84-17 – Standard Test Method for Surface Burning Characteristics of Building Materials
- I. ASTM E119-16 – Standard Test Method for Fire Tests of Building Construction and Materials
- J. ASTM E136-16 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C

### 1.05 SYSTEM REQUIREMENTS

- A. Performance Requirements: Fabricate and install systems as indicated:
  - 1. Roof Framing:
    - a. Deflection: minimum L/360
    - b. Uniform Roof Load: **150 PSF (7.2 kPa)** (Ultimate)
    - c. Framing Spacing: maximum of **48 inches (1220 mm)** on center
  - 2. Fasteners: Follow the selected fastener layout for Screw Patterns, for the design Diaphragm Loads as described in the current **Progressive Engineering, Inc.'s Evaluation Report PER-14076**.
  - 3. Panel Layout: Follow the USG Structural Panel Concrete Roof Deck application described in the current Progressive Engineering, Inc.'s **Evaluation Report PER-14076**.
- B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.

**Note:** Fire-resistance ratings may require lighter gauge framing than required for Shear-

or Uniform-Loading. A structural engineer shall review and select the correct gauge framing allowed by fire-resistance and load rating.

- C. Noncombustible Ratings: Where noncombustible assemblies are required, provide materials and application procedures identical to those tested according to ASTM E136-16, "Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C."

**Note:** Materials with modified ASTM E136-16 evaluations are not acceptable.

## 1.06 DELIVERY, STORAGE AND HANDLING

### A. Delivery:

1. Deliver material to site promptly without undue exposure to weather.
2. Deliver in manufacturer's unopened containers, pallets, or panels fully identified with name, brand, type and grade.

### B. Storage:

1. Store above ground in dry, ventilated space.
2. Protect materials from soiling, and damage.  
**Note:** If USG Structural Panels are frozen while stored outdoors, allow to thaw-out naturally. Do not use salts or fertilizers to defrost the panels.
3. Panels must be stored over stable soil. Soil must be able to carry the load of the pallets. Each 20 piece pallet weights 3500 lbs (1542 kg).
4. Pallets must not be stacked over  $\pm 1/2$  inch (13 mm) off the pallet edge.

## 1.09 PROJECT CONDITIONS

### A. Environmental Requirements:

1. When mechanically fastened, do not install USG Structural Panel Concrete Roof Deck when ambient or conditioned temperature is below 0 °F (-18 °C).
2. Do not apply finished roofing over USG Structural Panel Concrete Roof Deck when wet, frozen or containing frost.

**Note:** If installed panels have snow or ice, do not use salts or defrosting agents, sand is recommended over slippery surfaces.

## PART 2 – PRODUCTS

### 2.01 PRODUCTS AND MANUFACTURERS

- A. Structural Concrete Panel: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.

### 2.02 MATERIALS

#### A. Structural Concrete Panel:

1. USG Structural Panel Concrete Roof Deck, A noncombustible concrete roof deck manufactured in accordance with Acceptance Criteria AC318.
  - a. Panel Dimensions:
    - i. Thickness: 3/4 inch (19 mm)
    - ii. Width: 48 inches (1220mm) for Square edge or [47-3/4 inches (1213 mm) for Tongue & Groove edge].
    - iii. Lengths: [96 inches (2440 mm)] or [72 inches (1829 mm)] or [80 inches (2032 mm)]
    - iv. Edges: [Square] or [Tongue & Groove]

- b. Panel Properties:
  - i. Density: 75 lb/ft<sup>3</sup> (1201 kg/m<sup>3</sup>) tested in accordance with ASTM C1185
  - ii. Weight: 5.3 lbs/ft<sup>2</sup> (25.9 kg/m<sup>2</sup>) tested in accordance with ASTM D1037 at a thickness of 3/4 inch (19mm)
  - iii. pH Value: 10.5 when tested in accordance with ASTM D1293
  - iv. Noncombustibility: Pass tested in accordance to ASTM E136-16
  - v. Surface Burning Characteristics: when tested in accordance with ASTM E84 0 Flame Spread / 0 Smoke Developed
  - vi. Mold Resistance: 10 tested in accordance with ASTM D3273  
1 tested in accordance with G21
  - vii. Termite resistance: 9.8 when tested in accordance with AWPA E1.
  - viii. VOC Emissions: Low VOC compliant; tested in accordance with California Department of Public Health (CDPH/EHLB) Standard Method Version 1.1, 2010 (Emission Testing for CA Specification 01350)
- B. USG Structural Panel Concrete Roof Deck Fasteners: To select the appropriate fastener to specific type of framing, reference **Table 2** of Progressive Engineering, Inc.'s Evaluation Report **PER-14076**
- C. Roof Coverings and Roofing Membranes: Follow roof covering manufacturers' installation procedures.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, adjoining construction, and the conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.
  - 1. Steel framing to receive the USG Structural Panel Concrete Roof Deck shall be structurally sound, free from bows, twists or other malformations and in general compliance with local building code requirements. Damaged framing shall be replaced before installation of USG Structural Panel Concrete Roof Deck.

### 3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Framing Installation:
  - 1. The roof joists and other roof framing components must be designed to meet the strength and deflection criteria specified in the contract documents.
  - 2. Cold-formed steel shall comply with AISI-General, with a minimum 54 mils or 0.0538 inch (1.37 mm) base metal thickness (No.16 gauge) and a minimum G60 galvanized coating.  
**Note:** A structural engineer must review and approve the use of lighter gauge joists.
  - 3. The attachment flange or bearing edge must be a minimum 1-5/8 inch (41 mm) wide.
  - 4. The panel must bear on the supporting flange or edge at least 3/4 inch (19 mm)
  - 5. Provide a uniform and level joist bearing at wall-to-roof connections.
  - 6. Locate joists directly over bearing studs or a header installed at the top of the load bearing wall to distribute load.
  - 7. On steel framing, a web stiffener shall be provided at reaction points and/or concentrated loads as specified in the contract documents. End blocking shall be provided where joists ends are not otherwise restrained from rotation.

8. Provide additional joists under parallel partitions and around all roof openings that interrupt one or more spanning members. Framing must be properly fastened to the supporting walls or structure.
  9. All blocking or bridging must be installed prior to the installation of USG Structural Panel Concrete Roof Deck.
  10. When 48 inch (1220 mm) on center framing spacing is installed and a sheathing single-span condition exists, additional track blocking is required perpendicular to the framing located mid-way between the edges of the panel.
  11. Framing must be of good quality, free of bows, twists or other malformations.
- B. USG Structural Panel Concrete Roof Deck Application:
1. The panels shall be cut to size with a circular saw equipped with carbide-tipped cutting blade and a dry dust collection device or a water-dispensing device that limits the amount of airborne dust.
    - a. Wear safety glasses and a NIOSH-approved dust mask when cutting the panel.
    - b. Dispose of collected dust in a safe manner and in compliance with local, state and federal ordinances.
  2. USG Structural Panel Concrete Roof Deck shall be installed in a horizontal manner (long edges perpendicular to the framing) in a running bond pattern.
 

**Note:** The fire and structural ratings for USG Structural Panels are based on mechanical attachment only.
  3. Begin panel installation by snapping a line across the joists parallel to the rim joist at a distance equal to the width of the first panel being placed.
    - a. Given that panel width is 48 inch (1220 mm), plan the layout so the first and last panel row width is a minimum of 24 inch (610 mm) wide.
    - b. In the case where the row width is less than 24 inch (610 mm) wide, panels shall be blocked on all edges by framing (flat stock metal strapping is not sufficient to carry uniform loads).
  4. Ensure that all supporting members are free of debris before placing panels. Place the cut edge or tongue along the rim joist.
    - a. Place each panel across three or more supports (minimum two-span condition). Cut panels to length as needed to ensure that the butt end of the panel is centered on the framing member.
    - b. Install panels in a direction that ensures that the butt end falls over the open side of the joist. This will help keep adjacent ends in the same place.
  5. Fasten panels following the fastening schedule listed in the contract documents. Begin fastening at one end and fan out across the panel. **Do not fasten all the corners first.**

**Note:** Fastener edge distance will vary depending on the type of framing selected, to select the appropriate fastener to specific type of framing, reference **Table 2** of *Progressive Engineering, Inc.'s Evaluation Report PER-14076*

    - a. After the installation of one complete row, begin the next row. Slide panels together so that the tongue of the panel being installed fits into the groove of the installed panel.
    - b. If there is construction debris lodged inside the groove, do not force the tongue into the clogged groove. Clean the plugged groove with a stiff bristle brush to dislodge the trapped debris.
    - c. **Do not gap the panels.**
    - d. Install the second panel and all subsequent panels in a similar manner to complete the row.
    - e. Install all rows in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows.

- f. Fasten outside corner of first installed panel, progressively fan out fastener installation to adjacent panel edges in a progressive manner
  6. Make cutouts in panels before installing the panel whenever possible.
    - a. If a cutout is required after the panel is installed, set the depth of the saw blade to ensure that the framing is not scored.
    - b. Support the ends and edges of cutouts with framing if they are larger than **6 inches (153 mm)** in diameter (refer to: *SCP43 Page 7 - Field Installation Guide – Panel Penetrations*).
  7. Ensure panel is flush with supporting member, drive fasteners so the heads are flush with the surface of the board.
  8. During Construction Traffic Protection – prior to roof finishing, place “sheathing materials” on the roof in high traffic areas with newly installed USG Structural Panel Concrete Roof Deck (i.e. additional USG Structural Panels or plywood).
- C. Clean Up:
1. Leftover material shall be removed from the job site.
  2. Remove all foreign material from the floor surface and vacuum all dust from the surface.

**END OF SECTION**