

Domed Ceilings and Barrel Vaults



USG Drywall Suspension System

These installation instructions are divided into two parts: **Part 1** applies to domed ceilings, and **Part 2** applies to vaulted ceilings. **Note:** For installation instructions for vaulted ceilings with domed ends, follow Part I for domed ceilings to build the ends first.

To ensure proper installation, read all instructions before you begin. Check the enclosed Bill of Materials to be sure that all parts and equipment are present and undamaged. **Note:** Parts will be permanently damaged if installed incorrectly.

To generate a set of construction specifications on-line, go to www.usg.com > Resources > Online Tools.

Parts	Construction specifications (supplied separately)	Bill of materials (BOM)
	Custom curved tees	
	DGHUB Dome hub (if specified on BOM)	DGSP180 Main tee splice plates (if specified on BOM)
	DGLW Cross tees (if specified on BOM)	DGWC24 Wall attachment clips (if specified on BOM)
Supplies	Hanger wire	Self-drilling screws
	 12-ga. galvanized steel wire in straight lengths	 #2 Phillips round washer head screws #2 Phillips round washer head or similar
Tools	In addition to standard grid installation tools, you should have:	16 to 32 spring clamps
		Locking "C" clamp

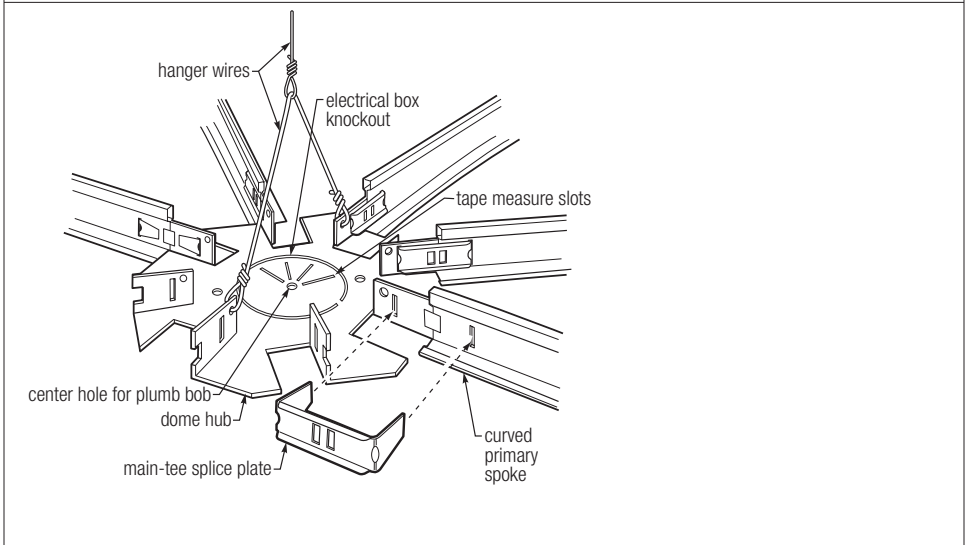
Step 1 **Gather construction specifications** Dome construction specifications are prepared specifically for each dome, and may be provided by the architect, your USG representative, or you can generate a set on-line at www.usg.com > **Resources** > **Online Tools**. These specifications include important tables, diagrams, and dimensions that you will need to install a dome successfully. For additional help, contact your USG representative.

Step 2 **Install the dome hub** To install the dome hub, identify the correct location and elevation for the center or apex of the dome. Hang the dome hub.

Tip: Form a “pail handle” between two opposite hanger holes so that the hub can be hung from a single wire (**Figure 1**).

Tip: Hub detail provides connection points compatible with USG CURVATURA™ splice plates, access point for plumb bob, tape measure slots to aid in arc measurements, and a knockout for a standard electrical box, if needed.

Figure 1- Dome hub



Step 3 **Position and install hanger wires** Curved grid is supplied with sets of punched holes spaced 8” apart (**Figure 2**) along the tee. The two round holes are intended for hangers. Each hanger wire needs to fall in line with a pre-punched hanger hole; because the spokes are curved, the horizontal distance between hanger wires will vary (**Figure 3**). See Table 1.1 of the Construction Specifications for exact hanger locations (dimension B).

Figure 2 – Pre-punched grid

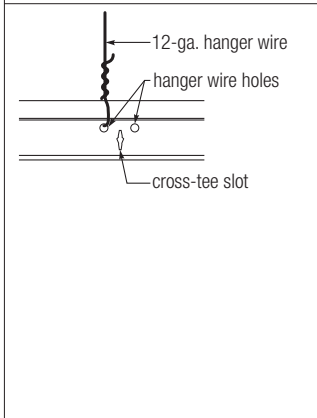
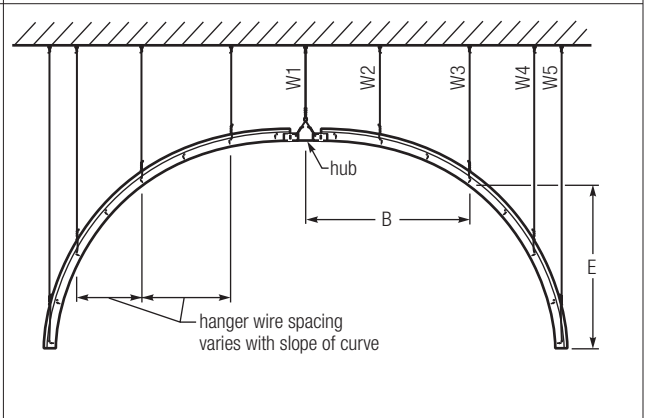


Figure 3 – Hanger wire spacing



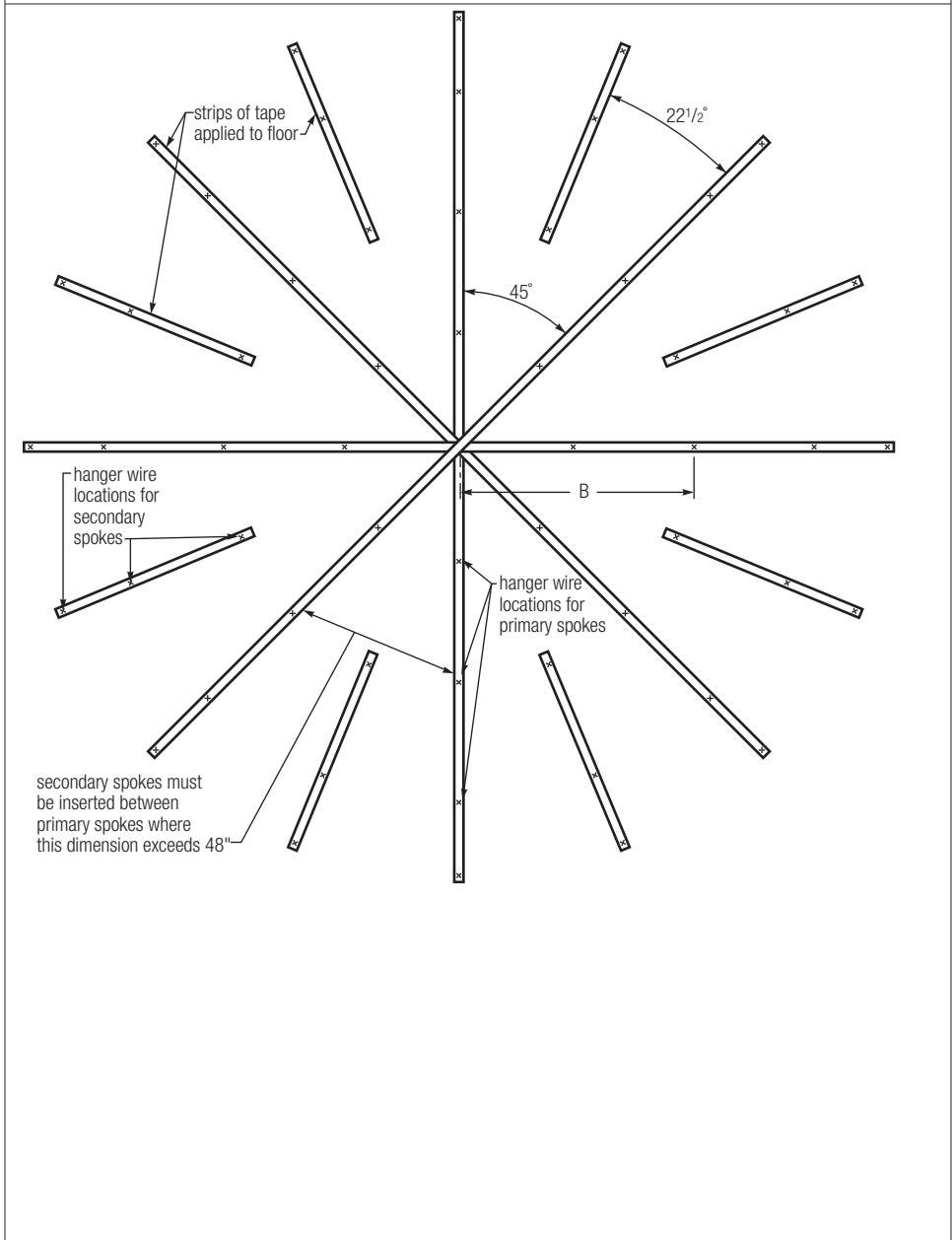
Domes

Tip: It may be easier to mark hanger locations on a tape measure or a long stick and use this as a template against the ceiling. If there are many obstructions, it may be easier to mark the locations on strips of tape along the floor (**Figure 4**), then use a laser to project the points to the ceiling.

Tip: Extra hanger holes are provided to help work around obstructions; however, the space between any two hanger wires must not exceed 32" (every fourth hole).

Eight rows of hanger wires radiate from the center of the dome. As these rows diverge by more than 4', additional rows of hanger wires need to be inserted between them (**Figure 4**).

Figure 4 – Hanger wire locations from floor



Step 4 Assemble and hang primary spokes

The first row in Table 1.2 of the Construction Specifications indicates the arc length required for each of the primary spokes (dimension D). Prepare each spoke by measuring along the arc of the tee and trimming the end to the required length. Depending on the size of the dome, several tees may need to be connected to form the length required.

Tip: The vertical slots between the hanger holes are not used in dome applications but will be useful later to gauge the correct position of headers and cross tees. The slots are exactly 8" apart along the arc of the tee.

Hang the primary spokes from the hanger wires by connecting curved tees to the hub and to each other (**Figure 5**) using splice plates provided. Grid face elevations (measured from perimeter) are shown in Table 1.1 of the Construction Specifications to aid in the leveling of spokes (**Figure 3**) (dimension E).

Figure 5 – Connect curved tees to hub and other tees

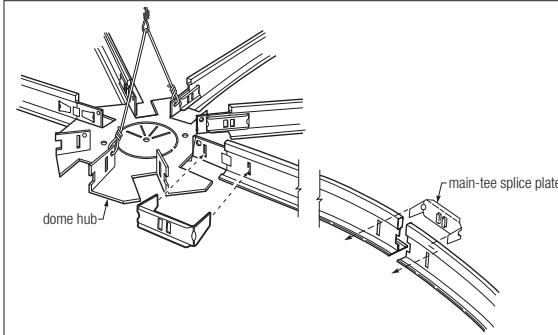
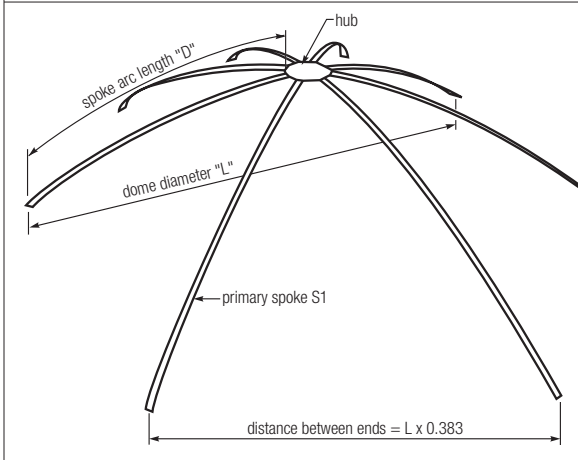


Figure 6 – Connect curved tees to hub and other tees



Important! The integrity and accuracy of the primary spokes will ultimately determine the quality of the completed installation. Check the integrity of the completed spokes. Extra care at this point will prevent troublesome alignment problems later.

1. Check the elevation difference between the hub and the end of each primary spoke to make sure it agrees with the construction specifications. If elevations need to be adjusted, adjust them now.
2. It is important that the main spokes are hung in the proper position relative to each other. Check for proper position by measuring the distance between the ends of the spokes. These distances should all be the same. The correct distance between the ends can be calculated by multiplying the dome diameter (ceiling opening size "L") by 0.383 (**Figure 6**). If hanger wires need to be relocated, move them now.
3. Examine each completed spoke from one end. Hanger wires should be in line. They should hang straight and plumb within 1:6 (about 10 degrees). The spokes should be straight with no waves. If hangers need to be relocated, move them now.

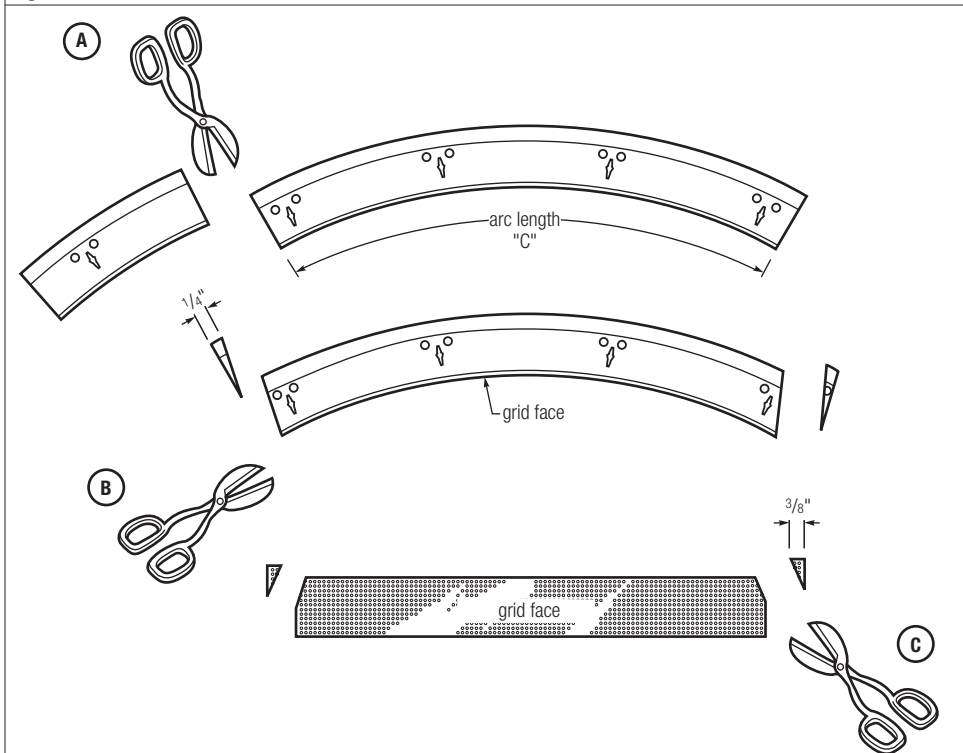
Step 5 **Add headers to
expand spokes**

Steps 5-7 are not needed for domes smaller than 10-1/2' in diameter (dimension L). If your dome is smaller than this, headers are not required. Go to Step 8.

For domes 10-1/2' in diameter or larger (dimensions L – see page 4), where spokes get too far apart to support the dome (48" or more), short pieces of tees, called "headers", are required to span between the spokes. Table 1.3 of the Construction Specifications indicates the length (dimension C) of the headers required. Depending on the size of the dome, several rows of headers may be required.

1. Prepare eight (8) headers. When cutting headers, they must be trimmed at both ends to avoid interference. Cut the headers to the length specified in the Construction Specifications (**Figure 7A**) (dimension C). Snip the bulb back about 1/4" (**Figure 7B**) and the face back about 3/8" (**Figure 7C**). It is important that the headers are all cut to the same length.

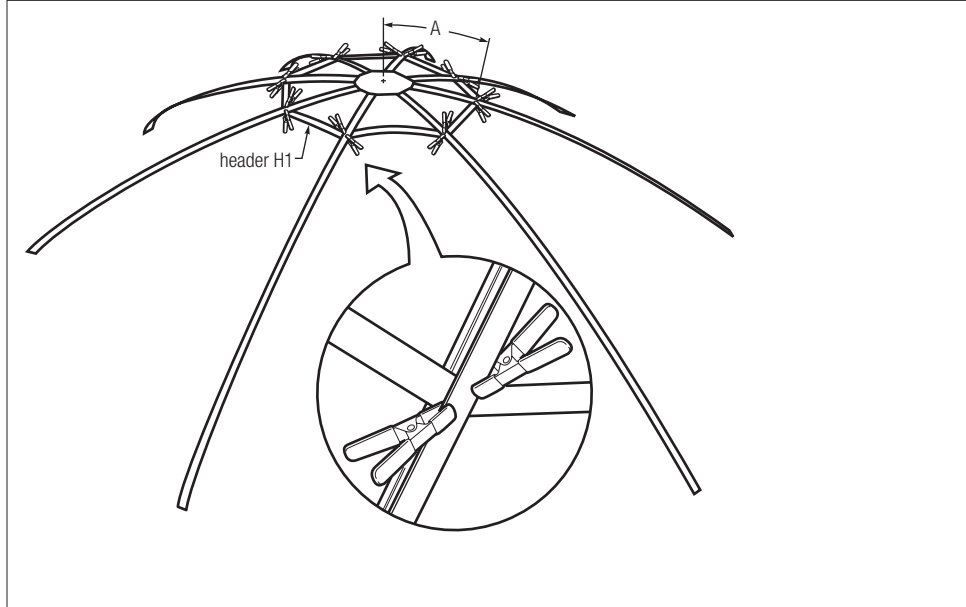
Figure 7 – Trim headers at both ends



Step 5
(continued)

2. Table 1.3 of the Construction Specifications indicates the correct position of each header (dimension A). Position and attach all headers and temporarily hold them in place with spring clamps (**Figure 8**). Use the cross-tee holes on the primary spoke as a guide for positioning. The web of the header should fall in line with a cross-tee hole on the spoke ($\pm 1/16"$). The spring clamps will allow you to adjust the positions.

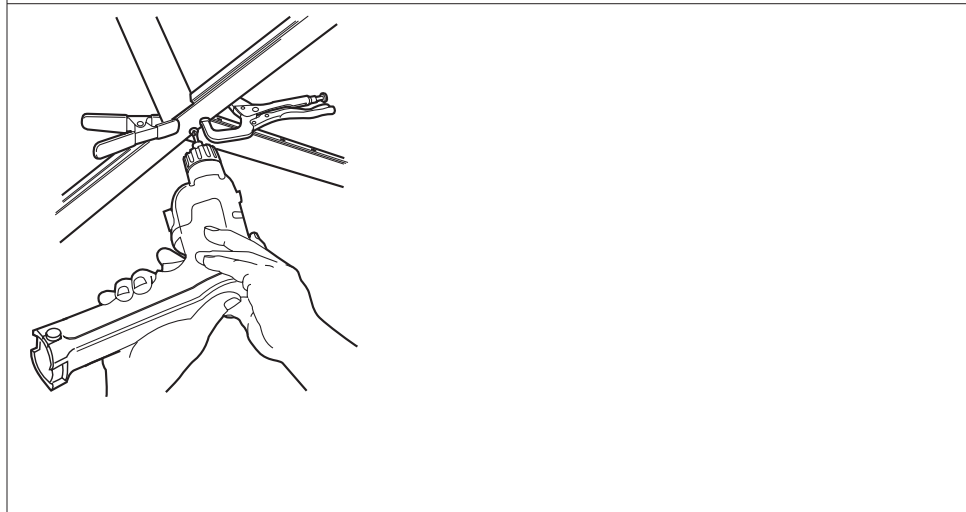
Figure 8 – Hold headers in place with spring clamps



Tip: If the headers seem tight and you're having difficulty lining up the slots on the spokes, double-check the lengths of the headers to make sure they're trimmed properly. All eight (8) headers must be cut to the same length.

3. Once all headers are in position, clamp the intersection and permanently attach the headers to the spokes using self-drilling screws (**Figure 9**). For best results, use #8 x 1/2" washer-head self-drilling screws.
4. Examine each of the spokes from one end to make sure they are not twisted or pushed out of line at the header intersections. If header adjustments are needed, make them now.

Figure 9 – Screw-attach headers



Step 6 **Install secondary
spokes**

Use the primary spokes as a model for hanger locations on the eight (8) secondary spokes. Table 1.2 of the Construction Specifications indicates the length of the secondary spokes (dimension D). It is important to have the slots and hanger holes on the primary spokes line up with the ones on the secondary spokes. The only way to do this is to build the secondary spokes working inward from the perimeter of the dome. Examine the end of the primary spoke. Measure the distance from the end of the spoke to the first hole (**Figure 10**) (dimension X). Cut the new spoke using the same offset distance and build the new spoke working inward from the perimeter toward the header (**Figure 10**). Attach the secondary spoke and a hanger wire to the midpoint of the header (**Figure 11**).

Figure 10 – Trim and position secondary spoke

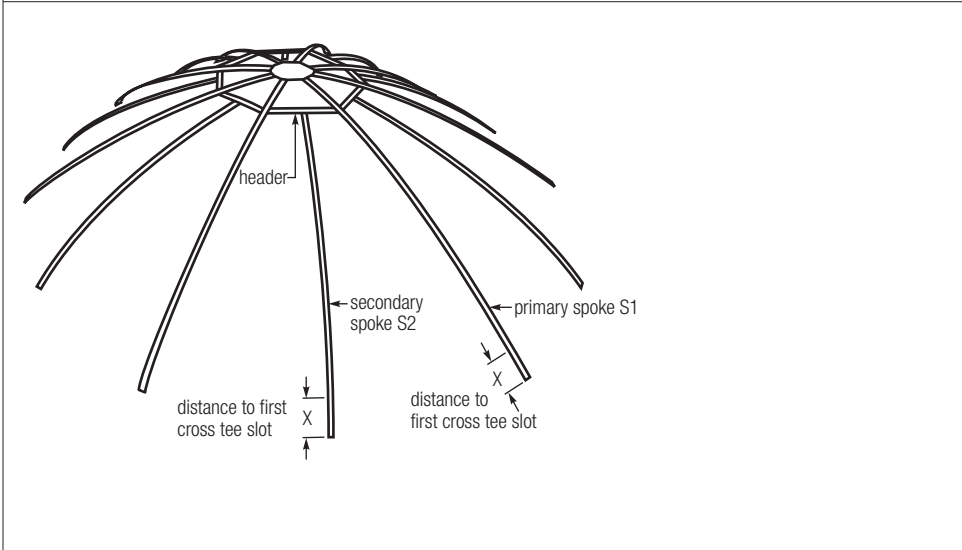
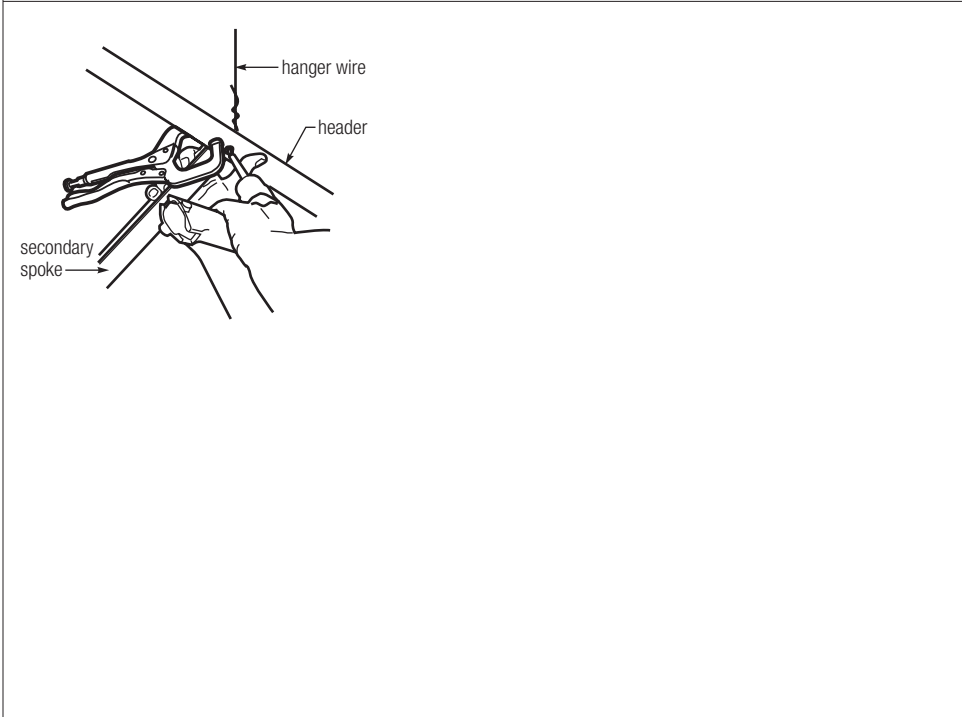


Figure 11 – Attach secondary spoke and hanger wire to midpoint of header

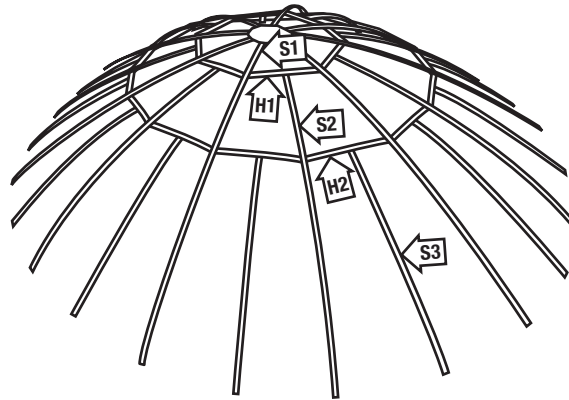


Step 7 **Install additional headers and spokes**

Additional headers and secondary spokes are generally needed for domes larger than 21' in diameter (dimension L).

For construction of additional headers and spokes, refer to tables 1.2 and 1.3 of the Construction Specifications. Progression of assembly is H1, S2, H2, S3, and so on (**Figure 12**).

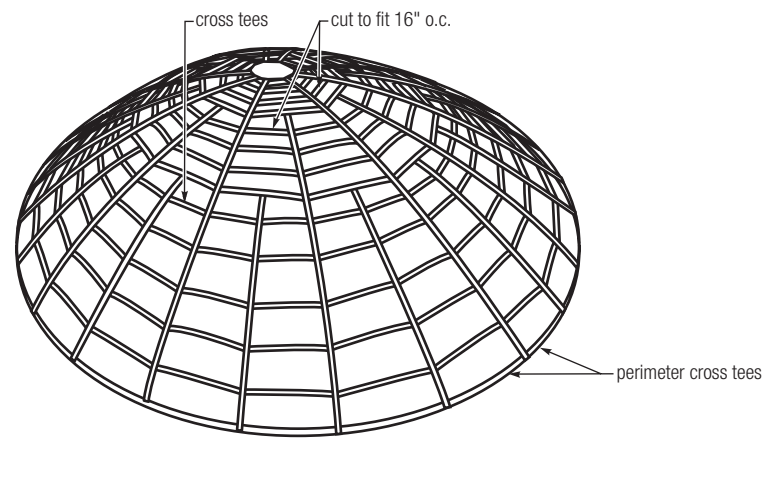
Figure 12 – Assembly progression of headers and spokes



Step 8 **Install cross tees**

Beginning at the perimeter, cut, fit, and screw-attach cross tees into all openings so that the maximum open space is 16 inches (**Figure 13**). For the length of the perimeter cross tee, refer to the general data in the construction specifications.

Figure 13 – Cross-tee installation



Tip: Exact locations of cross tees are not critical in this step since their purpose is only to provide a surface for material attachment.

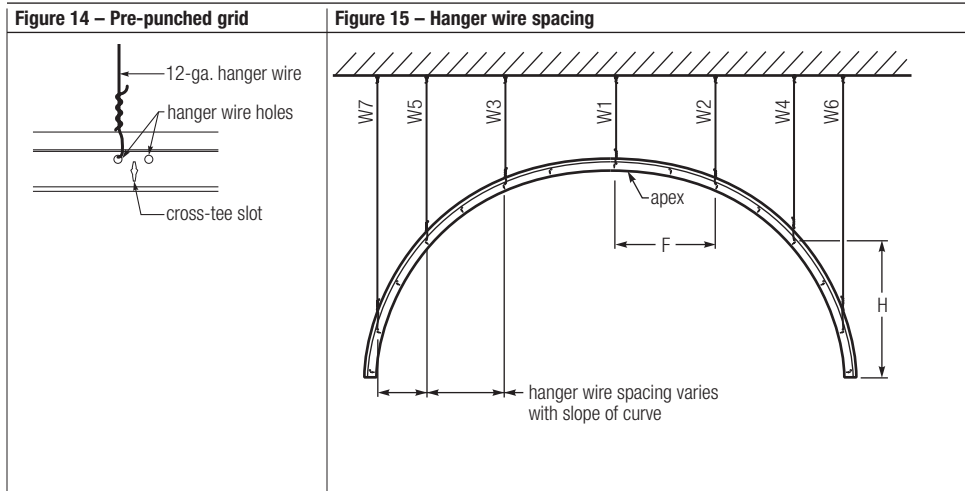
Step 9 **Finish the dome**

Brace the completed dome suspension system against the surrounding structure as necessary to prevent movement. Apply lath and plaster to the exposed surface of the suspension system as indicated on the architectural plans. Use STRUCTO-BASE™ plaster only. Check the architectural plans for any perimeter transition treatments that may be required. Examples may be found in the USG drywall suspension system brochure (AC3152).

Barrel Vaults

Step 1 **Gather construction specifications** Vault construction specifications are prepared specifically for each vault and may be provided by the architect, your USG representative, or you can generate a set on line at www.usg.com > **Resources > Online Tools**. The construction specifications include important tables, diagrams and dimensions that you will need to complete the vault successfully. For additional help, contact your USG representative.

Step 2 **Install hanger wires** Curved main tees are supplied with sets of punched holes (**Figure 14**) spaced 8" apart along the tee. The round holes are for hangers. Each hanger wire needs to fall in line with a pre-punched hanger hole; because the spokes are curved, the horizontal distance between hanger wires will vary along the rib (**Figure 15**). See Table 2.1 of the Construction Specifications for hanger locations. The distances shown (dimension F) are the distance along the floor and are measured from the apex of the vault. Hanger wires should be installed symmetrically on either side of the apex.



Tip: It may be easiest to mark hanger locations on the floor and then use a laser to project these points to the ceiling.

Tip: Extra hanger holes are provided to help work around obstructions; however, the space between any two hanger wires must not exceed the specified maximum indicated on the construction specifications.

Refer to the construction specifications to determine spacing of main-tee ribs. Using Table 2.1 of the Construction Specifications as a guide, install additional rows of hangers for each main-tee rib.

Barrel Vaults

Step 3 **Install main tee ribs**

The construction specifications indicate the total arc length required for each main-tee rib (dimension G). Begin constructing each rib by hanging a main tee at the apex. Hang the main tee so that a cross-tee slot is at the apex (**Figure 16**). Work outward at both ends, connecting curved tees as needed using splice plates provided (**Figure 17**). Grid face elevations (measured from perimeter) are shown in Table 2.1 of the Construction Specifications to aid leveling of ribs (dimension H). If the barrel vault terminates into a wall, the perimeter hanger wire may be omitted. Instead, tie back or mechanically fasten the main-tee perimeter as required.

Figure 16 – Hang main tees

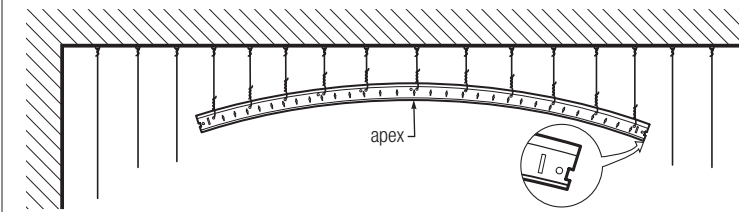
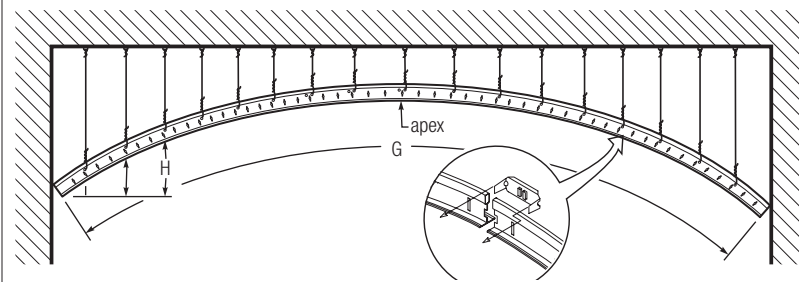


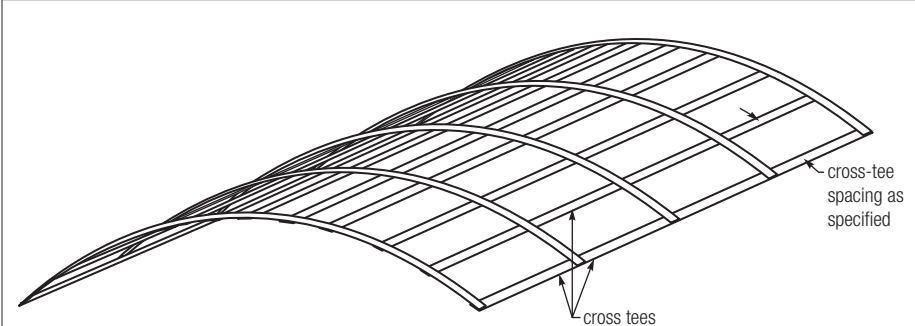
Figure 17 – Join curved tees



Step 4 **Install cross tees**

Install cross tees to connect main-tee ribs (**Figure 18**). Use spacing as indicated on the Construction Specifications.

Figure 18 – Cross-tee installation



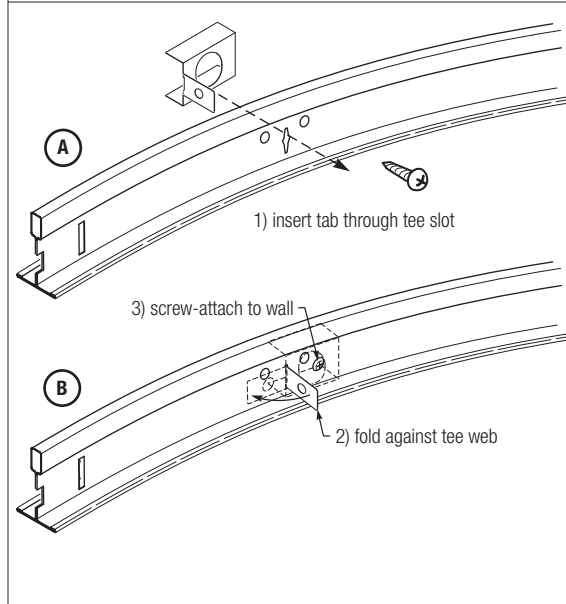
Step 5

**Cut and terminate
cross tees for
perimeter cuts**

For perimeter cuts, cut in and terminate cross tees at both ends of the vault.

1. If the vault terminates at a perpendicular wall, attach a complete main-tee rib against the wall using wall attachment clips (**Figure 19**). Space the clips about 4' on center (every sixth slot). Use the ledge of this rib to attach cross tees. Cut cross tees to fit and permanently attach them using self-drilling screws.
2. If the barrel vault terminates at a half dome, cut cross tees to fit and mechanically fasten the cut ends to the face of the dome spokes.

Figure 19 – Insert clip



Step 6

Finish the vault

Apply SHEETROCK® brand gypsum panels to the exposed surface of the suspension system as indicated on the architectural plans. Check the architectural plans for any additional perimeter transition treatments that may be required. Examples may be found in the USG drywall suspension system brochure (AC3152).

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