

# Domed Ceilings and Barrel Vaults



## USG Drywall Suspension System

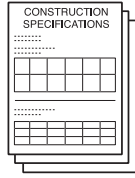
These installation instructions are divided into two parts: **Part 1** applies to domed ceilings, and **Part 2** applies to vaulted ceilings. **Note:** For installation instructions for vaulted ceilings with domed ends, follow Part I for domed ceilings to build the ends first.

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.

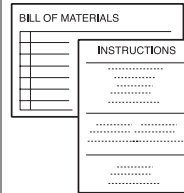
To generate a set of construction specifications on-line, go to [www.usg.com](http://www.usg.com) > Resources > Online Tools.

**Parts**

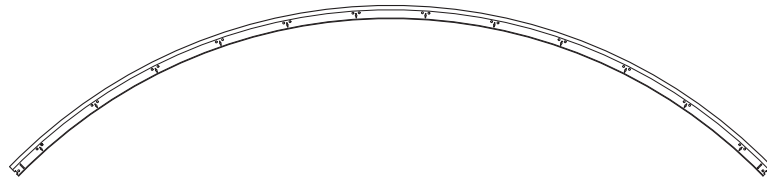
**Construction specifications (supplied separately)**



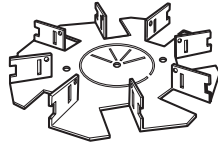
**Bill of materials (BOM)**



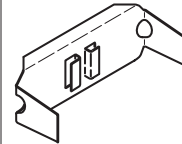
**Custom curved tees**



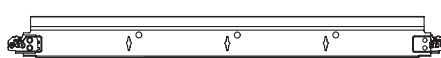
**DGHUB Dome hub (if specified on BOM)**



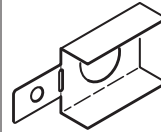
**DGSP180 Main tee splice plates (if specified on BOM)**



**DGLW Cross tees (if specified on BOM)**

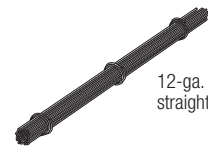


**DGWC24 Wall attachment clips (if specified on BOM)**



**Supplies**

**Hanger wire**



12-ga. galvanized steel wire in straight lengths

**Self-drilling screws**

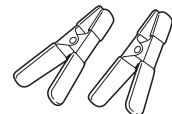


#2 Philips round washer-head or similar

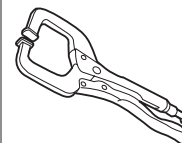
**Tools**

In addition to standard grid installation tools, you should have:

**16 to 32 spring clamps**



**Locking "C" clamp**



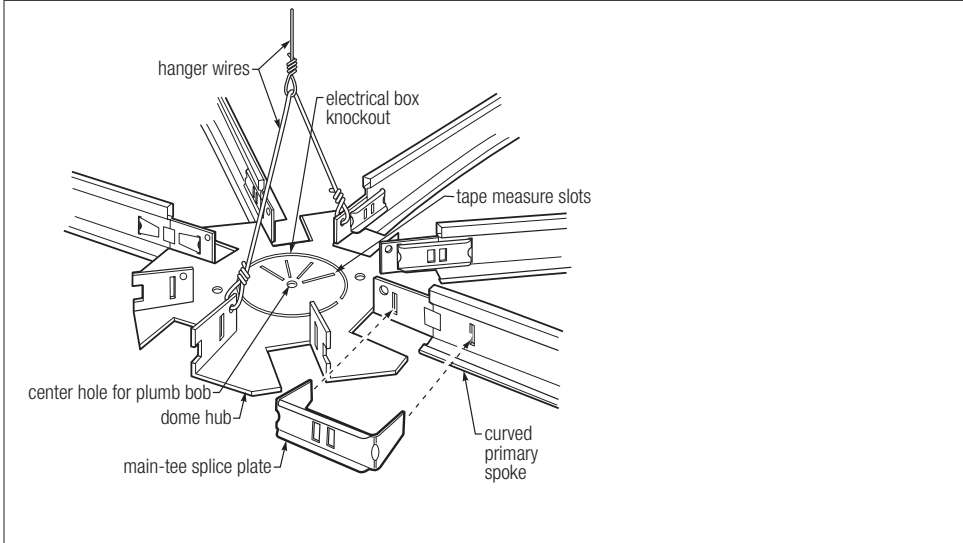
**Step 1**      **Gather construction specifications**      Dome construction specifications are prepared specifically for each dome, and may be provided by the architect, your USG representative, or you can generate a set on-line at [www.usg.com](http://www.usg.com) > **Resources** > **Online Tools**. 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**).

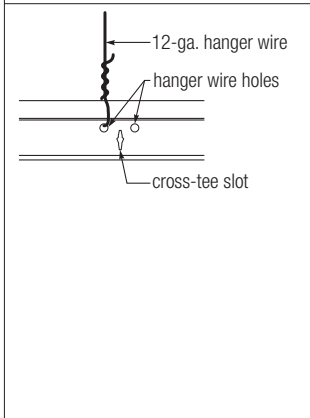
**Tip:** Hub detail provides connection points compatible with USG CURVATURA™ splice plates, access point for plumb bob, tape measure slots to aid in arc measurements, and a knockout for a standard electrical box, if needed.

**Figure 1- Dome hub**

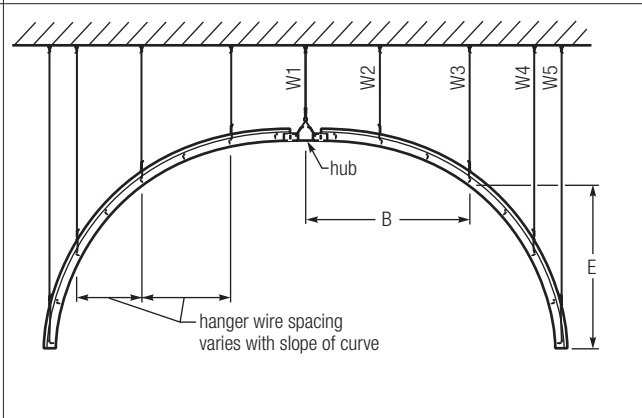


**Step 3**      **Position and install hanger wires**      Curved grid is supplied with sets of punched holes spaced 8” apart (**Figure 2**) along the tee. The two round holes are intended for hangers. Each hanger wire needs to fall in line with a pre-punched hanger hole; because the spokes are curved, 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**



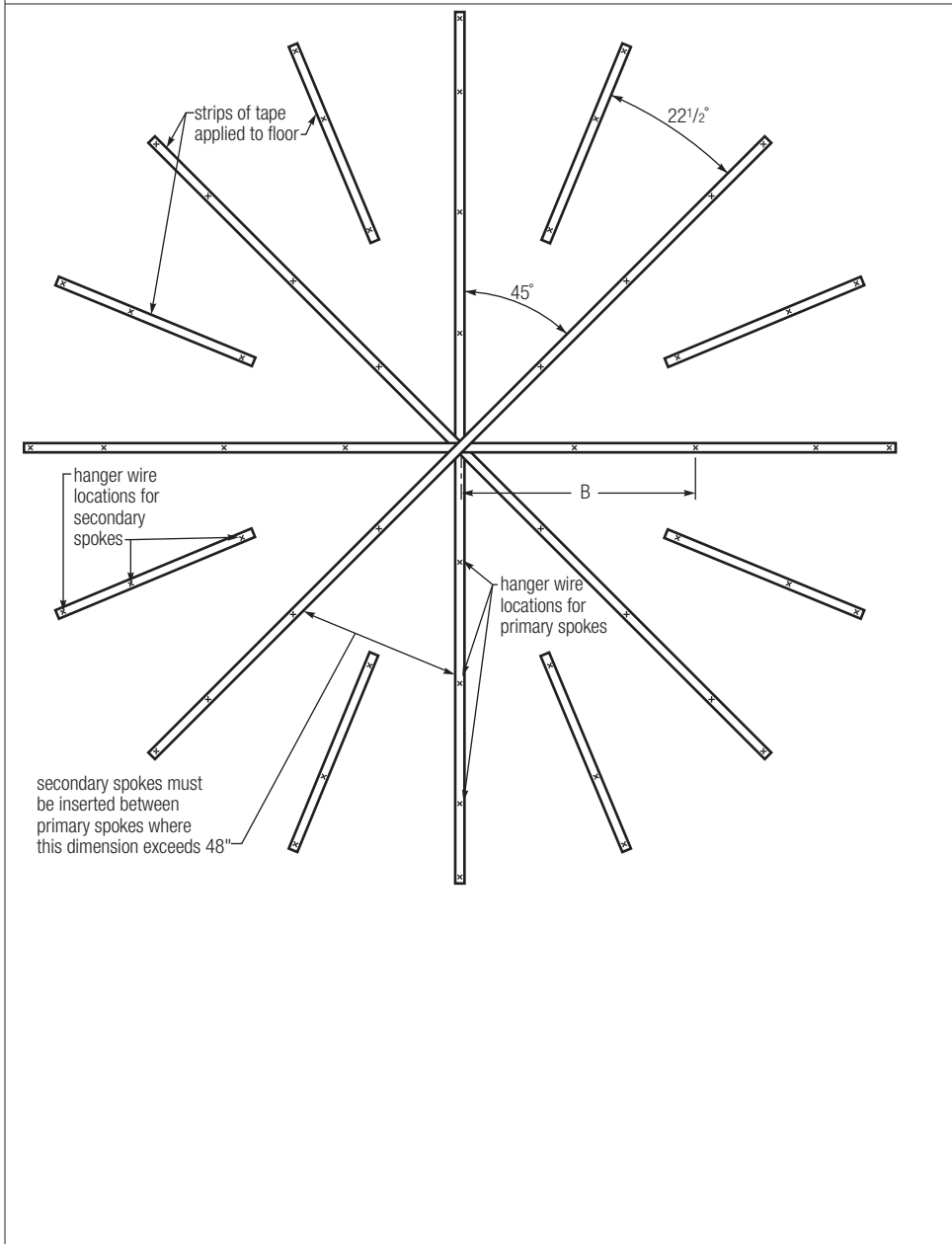
# Domes

**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**



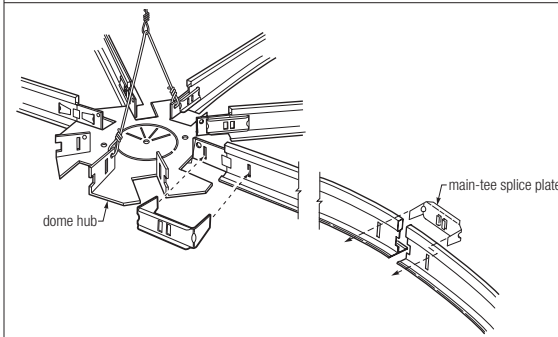
**Step 4 Assemble and hang primary spokes**

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.

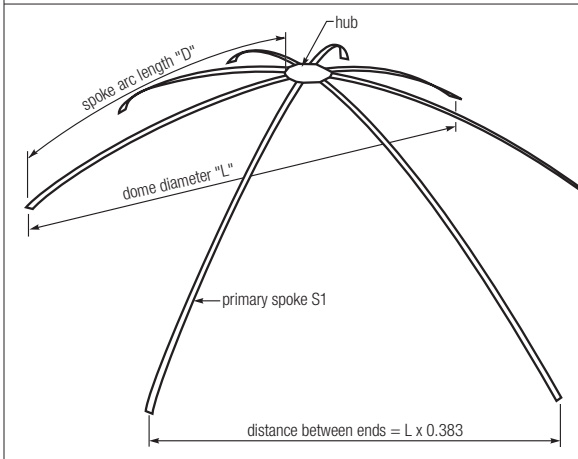
**Tip:** The vertical slots between the hanger holes are not used in dome applications but will be useful later to gauge the correct position of headers and cross tees. The slots are exactly 8" apart along the arc of the tee.

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.

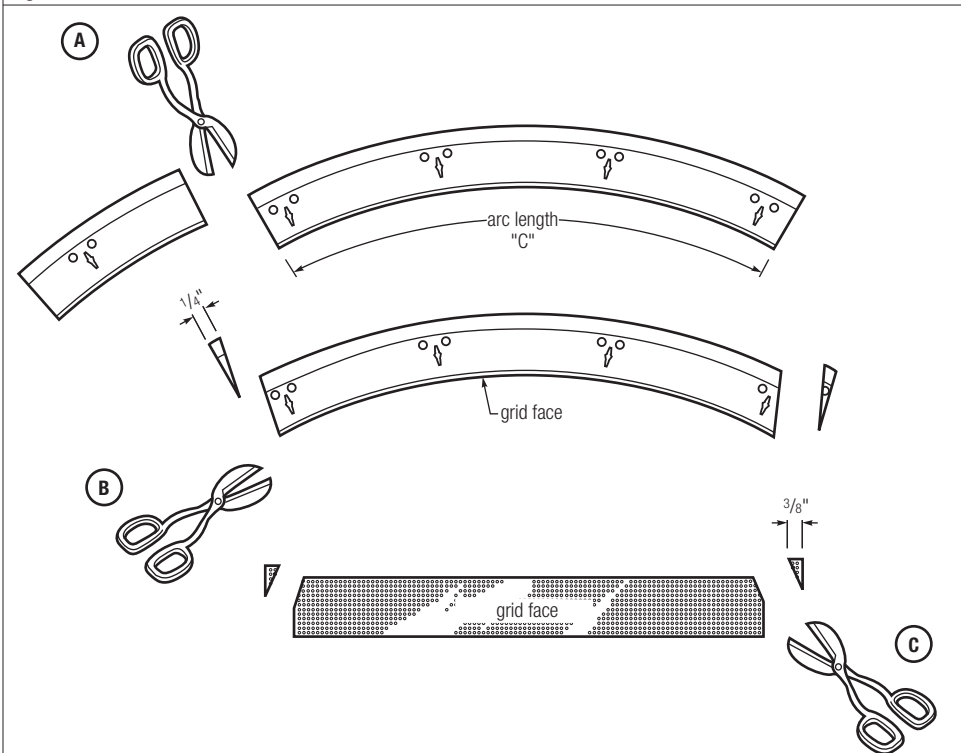
**Step 5**      **Add headers to  
expand spokes**

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.

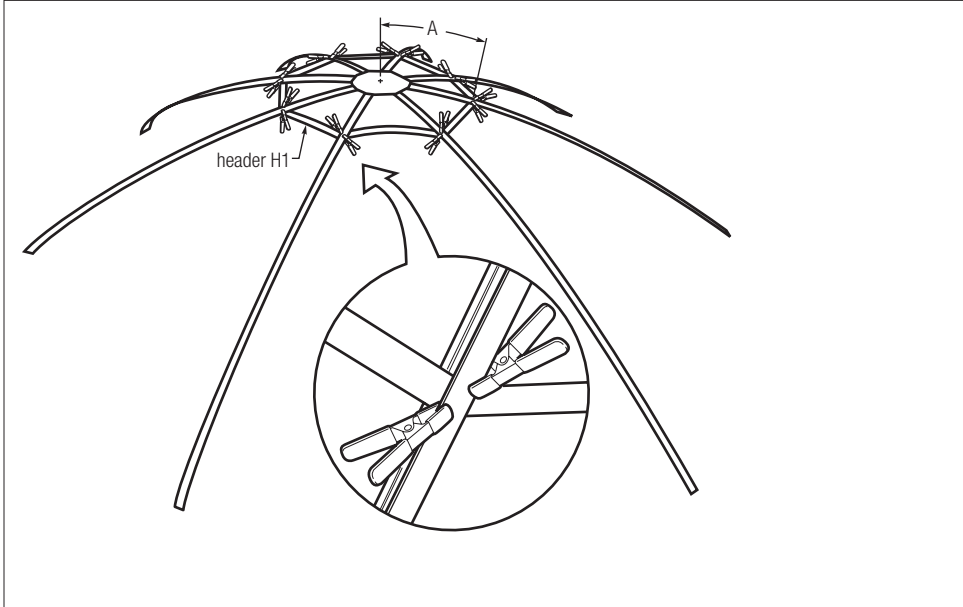
**Figure 7 – Trim headers at both ends**



**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.

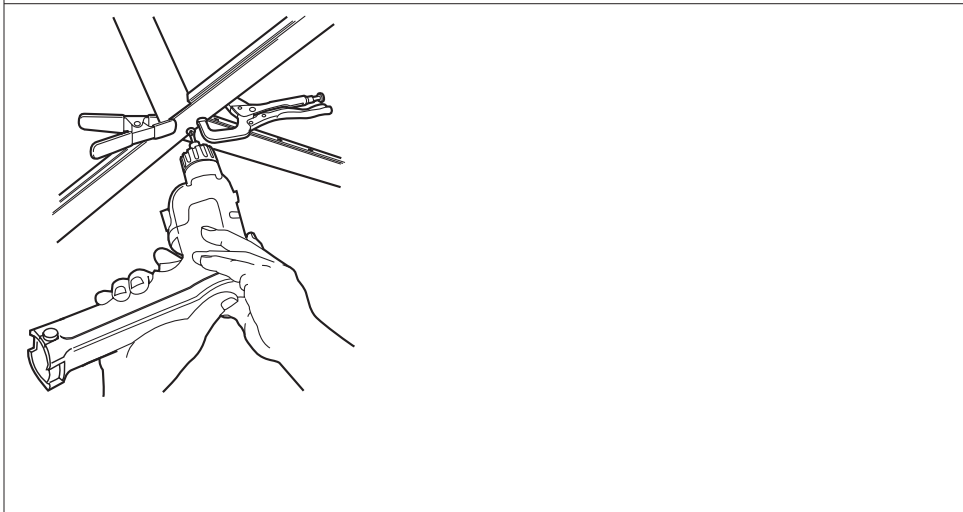
**Figure 8 – Hold headers in place with spring clamps**



**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.

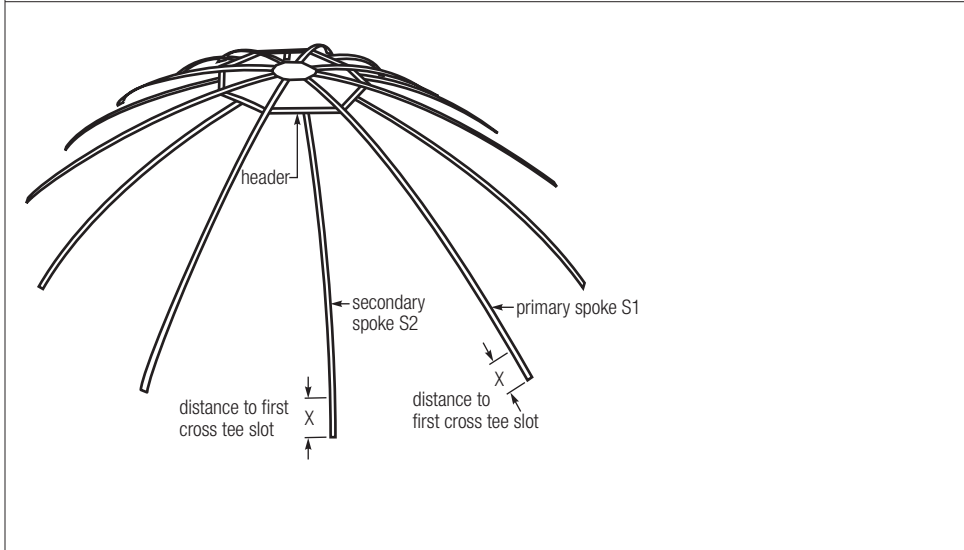
**Figure 9 – Screw-attach headers**



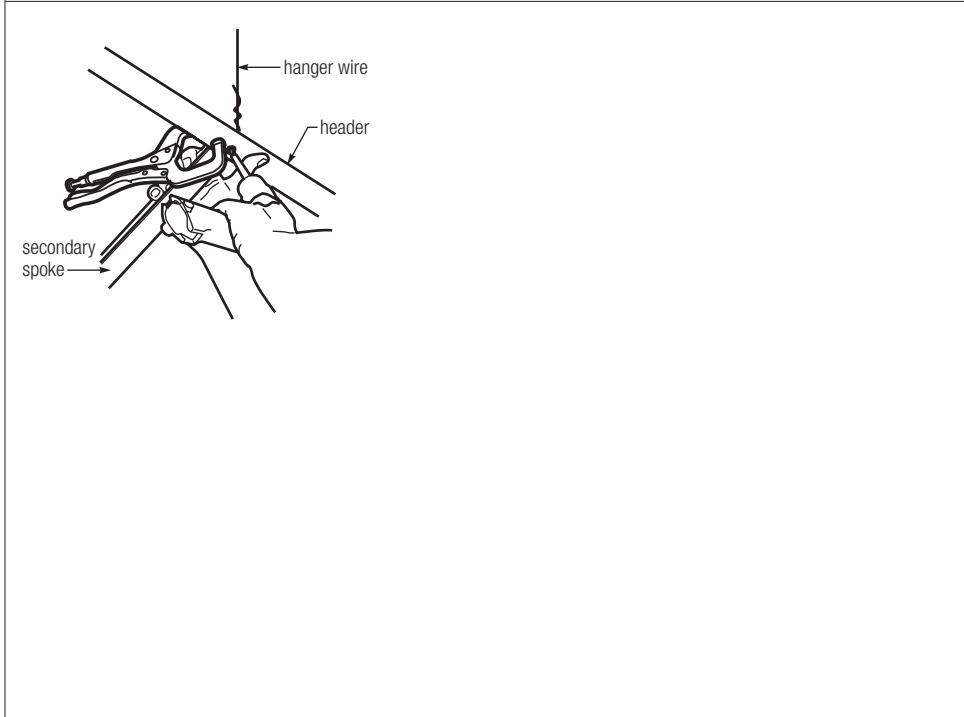
**Step 6**      **Install secondary  
spokes**

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**

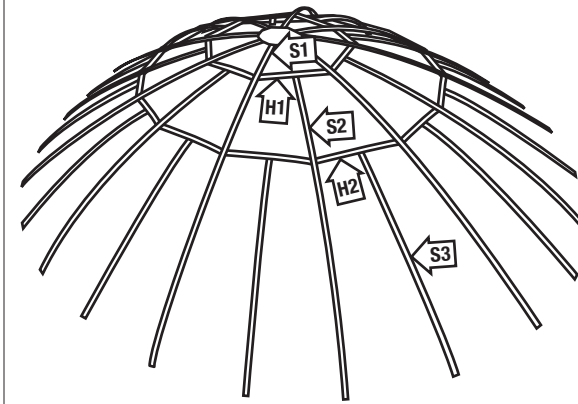


**Step 7**      **Install additional headers and spokes**

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**).

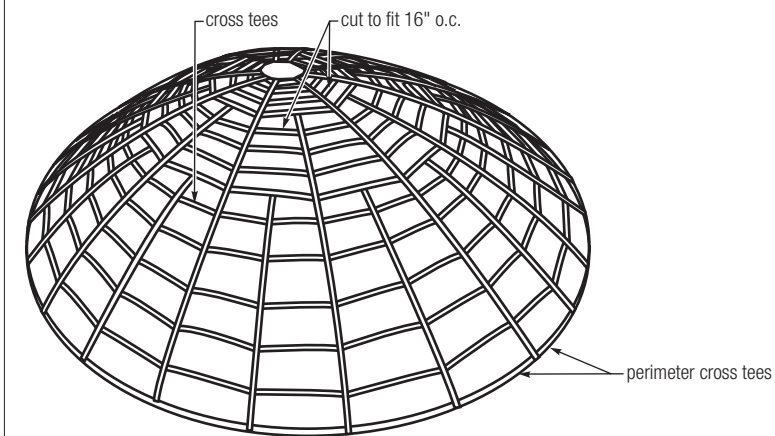
**Figure 12 – Assembly progression of headers and spokes**



**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**

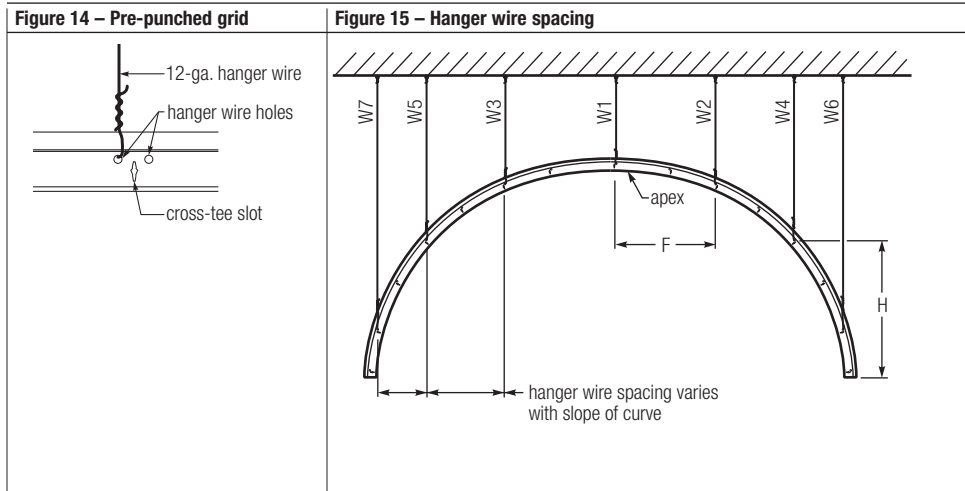
Brace the completed dome suspension system against the surrounding structure as necessary to prevent movement. Apply lath and plaster to the exposed surface of the suspension system as indicated on the architectural plans. Use **STRUCTO-BASE™** plaster only. Check the architectural plans for any perimeter 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](http://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.

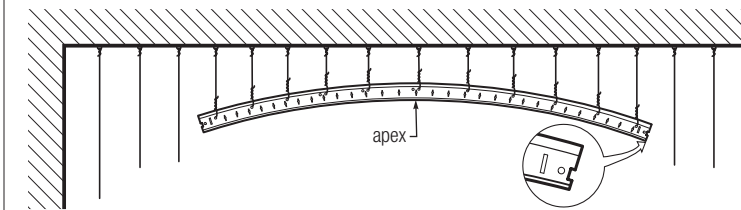
Refer to the construction specifications to determine spacing of main-tee ribs. Using Table 2.1 of the Construction Specifications as a guide, install additional rows of hangers for each main-tee rib.

# Barrel Vaults

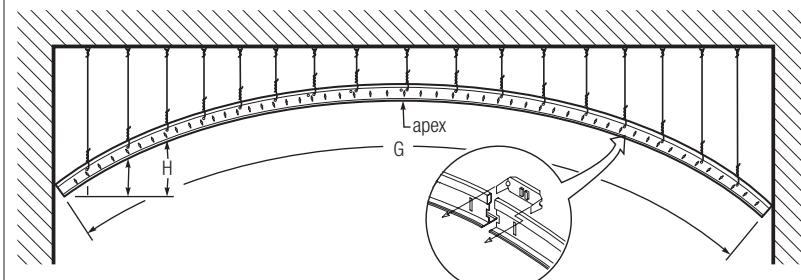
**Step 3**      **Install main tee ribs**

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**



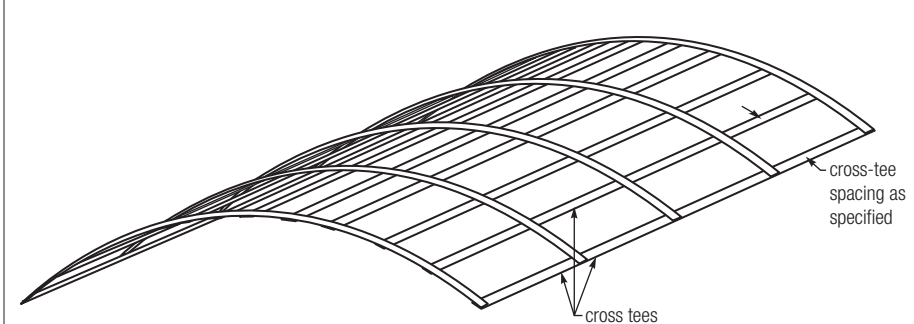
**Figure 17 – Join curved tees**



**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**



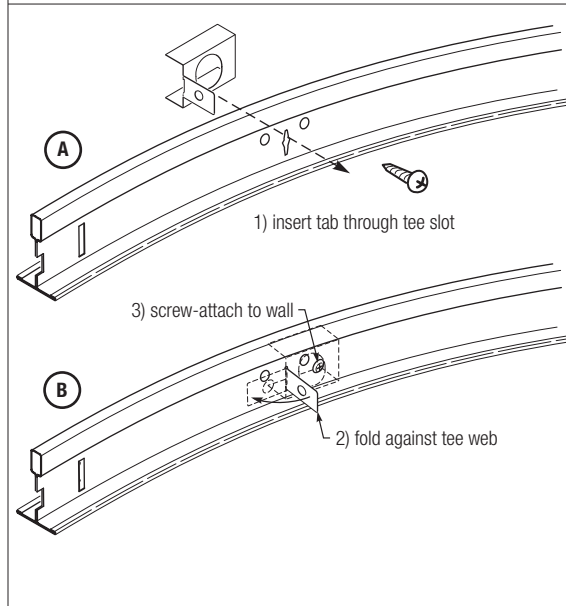
**Step 5**

**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).

Technical Service 800 USG.4YOU  
Samples, Literature 888 874.2450  
Customer Service 800 950.3839  
usg.com  
Literature number AC3157

**Product Information**

See usg.com for the most up-to-date product information.

**Note**

All products described here may not be available in all geographic markets and are subject to change without notice. Consult your local sales office or representative for information.

**Notice**

We shall not be liable for incidental or consequential damages, directly or indirectly sustained, nor for any loss caused by application of these goods not in accordance with current printed instruction or for other than intended use. Our liability is expressly limited to replacement of defective goods. Any claim shall be deemed waived unless made in writing to us within thirty (30) days from date it was or reasonably should have been discovered.

**Safety First!**

Follow good safety and industrial hygiene practices during handling and installing of all products and systems. Take necessary precautions and wear appropriate personal protective equipment as needed. Read material safety data sheets and related literature on products before specification and/or installation.



Manufactured by  
USG Interiors, Inc.  
550 West Adams Street  
Chicago, IL 60661

The following are trademarks of  
USG Interiors, Inc. or a related  
company: CURVATURA, SHEETROCK,  
STRUCTO-BASE, USG.

AC3157/rev. 6-06  
© 2006, USG Interiors, Inc.  
Printed in U.S.A.