

Title: **Annex G Tanks - Wind Girders Designed as Open Roof Tank**

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Purpose: **Annex G Tanks - Wind Girders Designed as Open Roof Tank**

Source: SC Member Discussion

Revision: 2

Impact: None. Clarification simply refers to Section 5.9 for Open top Tank Design and G.5.3 for Dome Support methods.

Notes: Revision 1 ballot comments were focused on avoiding an intermediate Windgirder requirement (simply leave the 5.9 reference for open top tank design). Revision 2 addresses these comments and indicates the option on support types.

Proposal: Existing in black. **Changes in red.**

G.1.3 General Application

G.1.3.1 General

The top of the tank shell shall be structurally suitable for attachment of the dome roof structure. The tank shall be designed as an open-top tank, and its wind girder shall meet the requirements of 5.9. The top tank wind girder shall be designed to sustain radial forces transferred from the dome (see G.5.2).

G.1.3.2 New Tanks

When this Annex is specified for a new tank, the tank shall be designed to support the aluminum dome roof. The roof Manufacturer shall supply the magnitude and direction of all the forces acting on the tank as a result of the roof loads, together with details of the roof-to-shell attachment. ~~The tank shall be designed as an open-top tank, and its wind girder shall meet the requirements of 5.9. The top of the tank shell shall be structurally suitable for attachment of the dome roof structure.~~ The tank Manufacturer and the foundation designer shall be responsible for designing the tank and foundation, respectively, for the loads and moments transmitted from the roof, as provided by the roof manufacturer. ~~If the Purchaser specifies a roof with fixed supports, the supports shall be rigidly attached directly to the tank and the top of the tank shall be designed to sustain the horizontal thrust transferred from the roof (see G.5.2).~~ The as-built minimum and maximum diameter at the top of the tank shall be reported to the roof manufacturer by the Purchaser or the tank Manufacturer.

G.1.3.3 Existing Tanks

When this Annex is specified for an aluminum dome roof to be added to an existing tank (with or without an existing roof), the roof Manufacturer shall verify that the tank has sufficient strength to support a new roof and meet the applicable requirements of Section 5.11. Information on the existing tank shall be provided by the Purchaser including minimum tank shell course thicknesses, tank shell course heights, design corrosion

allowance, and existing anchorage details. The Purchaser shall specify the existing or new appurtenances to be accommodated by the roof Manufacturer. The roof Manufacturer shall supply the values of the forces acting on the tank as a result of the roof loads. The Purchaser shall verify the adequacy of the foundations. Unless otherwise specified, any reinforcement required to enable the tank to support the roof shall be the responsibility of the Purchaser. The design and erection of the roof shall accommodate the actual tank shape. The responsibility for determining the tank shape shall be specified by the Purchaser. ~~The existing tank shall be equipped with a wind girder that meets the requirements of 5.9 for an open-top tank.~~

G.5.2 Roof Supports

●G.5.2.1 Support Type

The Purchaser shall determine the Roof Support method, based on evaluation of input from the Manufacturer (Tank and/or Dome).

G.5.2.2 Sliding Supports

The roof attachment points may incorporate a slide bearing with low-friction bearing pads to minimize the horizontal radial forces transferred to the tank. The primary horizontal thrust transferred from the dome shall be resisted by an integral tension ring.

G.5.2.3 Fixed Supports

The roof may have fixed supports attached directly to the tank, and the top of the tank shall be analyzed and designed to sustain the horizontal thrust transferred from the roof, including that those resulting from the combination of wind on the dome and shell or from differential thermal expansion and contraction. For roofs with fixed supports on a new tank, the maximum acceptable radial tank deflections at the top of the tank shall be coordinated between the tank Manufacturer and roof manufacturer. For roofs with fixed supports on an existing tank, the maximum acceptable radial tank deflections at the top of the tank shall be coordinated between the Purchaser and roof manufacturer.

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Figure G.1—Data Sheet for a Structurally-Supported Aluminum Dome Added to an Existing Tank

(INFORMATION TO BE COMPLETED BY THE PURCHASER)

1. PURCHASER/AGENT _____
 ADDRESS _____
 CITY _____
 STATE _____ ZIP _____
 PHONE _____
 FAX _____
 2. USER _____
 3. ERECTION SITE: NAME OF PLANT _____
 LOCATION _____
 4. TANK NO. _____

5. Roof Supports (see G.5.2): Sliding or Fixed _____
 (Editor Note: renumber balance of Figure G 1 --- DATA SHEET)

API Std 650 Annex L Storage Tank Data Sheet

(Instructions)

11. Open-Top and Fixed-Roof Data (see page 6 of the Data Sheet for Floating Roofs)
 — Open Top?* (Yes/No) Specify “Yes” if tank has no fixed roof or has an external floating roof. Specify “No” for all other tanks.

NOTE The remaining entries in this line apply to fixed roofs ONLY:

— Fixed Roof Type*: Enter description, such as supported cone with internal structure, supported cone with external structure, structurally-supported aluminum geodesic dome, self-supporting cone, self-supporting dome, self-supporting umbrella, flanged only flat top, or other. See 5.10.1 or Annex G.
●Annex G Structurally-Supported Aluminum Dome Roof Supports Type (see Annex G.5.2) Sliding (Integral Dome Tension Ring on slide bearings) or Fixed (External Tension Ring)* _____

— Roof Support Columns*: Specify pipe or structural shape. If structural shape is specified, indicate the kind (e.g. wide flange, back-to-back channel, etc.).

Data Sheet

11. Open-Top and Fixed Roofs: (See Sheet 6 for Floating Roofs) Open Top? * Yes No
 Fixed Roof Type* _____

Annex G Structurally-Supported Aluminum Dome Roof Supports Type Sliding (Integral Dome Tension Ring on slide bearings) or Fixed (External Tension Ring)* _____

Cone Roof Support Columns*: Pipe Or Structural Shape _____
 Cone Slope* _____. Dome or Umbrella Radius* _____ Weld Joints* _____

 (Lap, Butt, Other)