

## Calculation of Connection "Sweep Loss"

DESIGN DATA

L = Required overall connection length, inches  
 R = 42 inches inside head crown radius  
 $r_i$  = 10" inside barrel radius of connection  
 $r_o$  = 16" outside barrel radius of connection  
 P = 12" inches projection of connection  
 IP = 1.50" inside projection of connection  
 T = 3.88" minimum required studding outlet thickness

DESIGN DATA

L = Required overall connection length, inches  
 R = 42 inches inside head crown radius  
 $r_i$  = 10" inside barrel radius of connection  
 $r_o$  = 16" outside barrel radius of connection  
 IP = 0.0" inside projection of connection  
 T = 3.88" minimum required studding outlet thickness

Formula for "Sweep Loss" Calculation of Studding Outlet Connections:

$$\text{Sweep Loss \#1} = R - \sqrt{R^2 - r_i^2}$$

$$\text{Sweep Loss \#2} = R - \sqrt{R^2 - r_o^2}$$

### NOTATION

SL1 = Sweep loss to inside radius of connection, inches  
 SL2 = Sweep loss to outside radius of connection, inches  
 R = Inside radius of shell or head crown radius, inches  
 $r_o$  = Outside barrel radius of connection, inches  
 $r_i$  = Inside barrel radius of connection, inches  
 T = Minimum required studding outlet thickness, inches  
 L = Required overall studding outlet length, inches  
 P = Projection of connection from centerline of equipment, inches  
 IP = Inside projection of connection, inches  
 D = Inside depth of head, inches

#### Example 1: Minimum Connection Length Per Fig. 2

Determine the required overall connection length of a 20" – 600# RF Studding Outlet set through a 48" OD ASME F&D head with a 42" inside dish radius.

From the "Sweep Loss" chart or by using the above formula determine connection sweep loss #1 and #2.

$$SL1 = R - \sqrt{R^2 - r_i^2} = 42 - \sqrt{42^2 - 10^2} = 1.21 \text{ in.}$$

$$SL2 = R - \sqrt{R^2 - r_o^2} = 42 - \sqrt{42^2 - 16^2} = 3.17 \text{ in.}$$

Determine the required overall connection length "L".

$$L = T + SL2 - SL1 + IP = 3.88 + 3.17 - 1.21 + 0.0 = 5.84"$$

#### Example 2: Maintain Connection Projection Per Fig. 2

Determine the required overall connection length of a 20" – 600# RF Studding Outlet with internal projection set through a 48" OD ASME F&D head with a 42" inside dish radius.

D = 8" inside depth of head

From the "Sweep Loss" chart or by using the above formula determine connection sweep loss #2.

$$SL2 = R - \sqrt{R^2 - r_o^2} = 42 - \sqrt{42^2 - 16^2} = 3.17 \text{ in.}$$

Determine the required overall connection length "L".

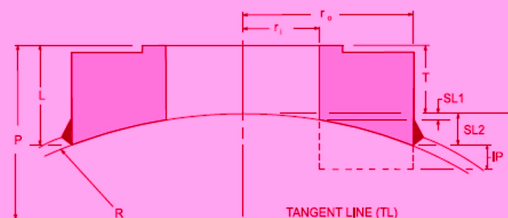


Fig. 2 Radially Installed Connection In Sphere

NOTE: In no case shall the required overall thickness "L" be less than the required minimum thickness "T".