

# Calculating Load Requirements

Two formulas that define the minimum load required to effect a seal on a particular gasket are Wm1 and Wm2. When these formulas have been calculated, the larger load of the two is the load necessary to effect a seal.

Let:

$$\pi = 3.14$$

P = Maximum internal pressure

M = Gasket factor "M" defined on page 27.  
(M = 3 for spiral wound gaskets)

Y = Seating stress "Y" defined on page 27.  
(Y = 10,000 psi for spiral wound gaskets)

N = Basic width of a gasket per chart on page 26.  
(For raised face flanges see diagram 1a)

B<sub>0</sub> = Basic seating width of a gasket per chart on page 26. (For raised face flanges, B<sub>0</sub> = N/2)

B<sub>1</sub> = Effective seating width of a gasket; must be determined.

ID = Inside diameter of gasket

OD = Outside diameter of gasket  
For gaskets where the raised face is smaller than the OD of the gasket face, the OD is equal to the outer diameter of the raised face.

Find:

$$ID = \underline{\hspace{2cm}}$$

$$OD = \underline{\hspace{2cm}}$$

Given the ID and OD, find the value of N. Then define B<sub>0</sub> in terms of N (See page 26):

$$N = \underline{\hspace{2cm}}$$

$$B_0 = \underline{\hspace{2cm}}$$

Determine if B<sub>0</sub> is greater or less than 1/4", then find B<sub>1</sub>:

If B<sub>0</sub> ≤ 1/4", then B<sub>1</sub> = B<sub>0</sub>;

If B<sub>0</sub> > 1/4", then B<sub>1</sub> = (√ B<sub>0</sub>)/2

$$B_1 = \underline{\hspace{2cm}}$$

Using B<sub>1</sub>, determine G:

$$G = OD - [(B_1)(2)]$$

Now, insert these values in the final equations to determine minimum required load:

$$Wm1 = [\pi (P)(G^2)/4] + [2(B_1)(\pi)(G)(M)(P)]$$

$$Wm2 = \pi (B_1)(G)(Y)$$

When Wm1 and Wm2 have been calculated, the larger of the two numbers is the minimum load required to seat a gasket. In most cases the available bolt load in a connection is greater than the minimum load on the gasket. If not, higher bolt stresses or changes in the gasket design are required for an effective seal.

NOTE:

Flange design code suggestions for low pressure applications calling for minimum seating stress (Y value) are sometimes inadequate to seat the gasket because the bolting and flange rigidity are insufficient to effect a proper seal. Care should be taken to ensure that flange conditions provide a suitable seating surface. For internal pressures to be contained, flange rotation and sufficient residual loads must also be considered in the flange design.