

# ENGINEERING DATA & SPECIFICATIONS

## V-BAND CLAMP/COUPLING LOAD FORMULAS

V-Band Couplings must be designed to provide an axial preload that exceeds the total in-service loads. These loads include: internal pressure; bending moments; and axial tension. For economy, the V-Band Coupling should be designed based on the minimum strength required for the application loading. See the formulas below to determine your application loads or contact a Clampco sales engineer for assistance.

### SYMBOLS

- $L_p$  = Load Intensity due to Pressure, lbs./in. of circumference
- $L_b$  = Load Intensity due to Bending Moment, lbs./in. of circumference
- $L_a$  = Load Intensity due to Axial Tension, lbs./in. of circumference
- $L$  = Total Load Intensity, lbs. / in. of circumference
- $D$  = Flange O.D., in.
- $P$  = Internal Pressure, psi
- $M$  = Bending Moment, in.-lbs.
- $A$  = Axial Tension, lbs.

### Step 1

Determine the Load Intensity due to Internal Pressure,  $L_p$ .

$$L_p = \frac{P \times D}{4}$$

### Step 2

Determine the Load Intensity due to Bending Moment,  $L_b$ .

$$L_b = \frac{4 \times M}{\pi \times D^2}$$

### Step 3

Determine the Load Intensity due to Axial Tension,  $L_a$ .

$$L_a = \frac{A}{\pi \times D}$$

### Step 4

Determine the Total Load Intensity by adding the results of Steps 1, 2, and 3.

$$L = L_p + L_b + L_a$$

### Example

A V-Band Coupling meeting the following:  
 Flange O.D.,  $D = 5.00$  in.  
 Internal Pressure,  $P = 200$  psi  
 Bending Moment,  $M = 1000$  in.-lbs.  
 Axial Tension Load,  $A = 1200$  lbs.

$$L_p = \frac{200 (5.00)}{4} = 250 \text{ lbs. / in.}$$

$$L_b = \frac{4 (1000)}{3.14 (5.00)^2} = 51 \text{ lbs. / in.}$$

$$L_a = \frac{1200}{3.14 (5.00)} = 76 \text{ lbs. / in.}$$

$$L = 250 + 51 + 76 = 377 \text{ lbs. / in.}$$

### Step 5

Use the formula below to convert the total load intensity to an equivalent operating pressure:

$$P = \frac{4 \times L}{D} = \frac{4 (377)}{5.00} = 302 \text{ psi}^*$$

\*Please note:  
 Equivalent operating pressure does not include a Factor of Safety.

## MATERIALS AND TEMPERATURES

For different materials and temperatures, the pressure chart data must be corrected using the following table:

FAHRENHEIT						CELSIUS				
RETAINER MATERIAL	70°F	200°F	400°F	600°F	800°F	21°C	93°C	204°C	315°C	427°C
301/302/304	1.00	.88	.75	.68	.60	1.00	.88	.75	.68	.60
Carbon Steel	.50	.46	.43	.37	—	.50	.46	.43	.37	—

## BAND STRENGTH

Minimum Yield Strength for 300 Series Stainless Steel 1/2 Hard Temper in in.-lbs. [kilograms]

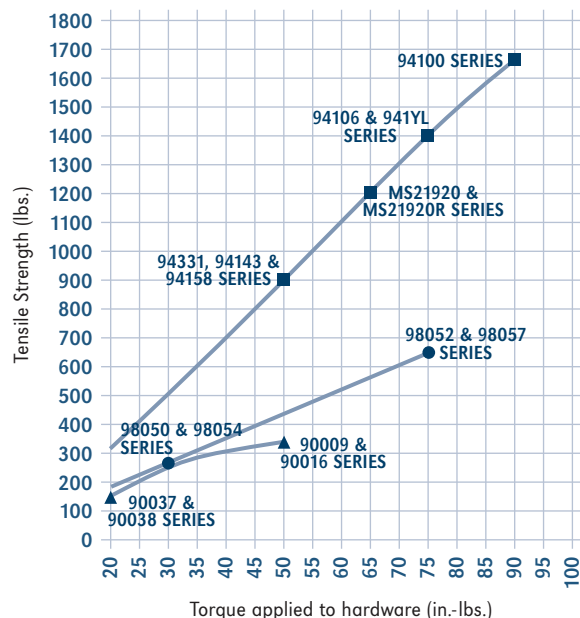
MATERIAL THICKNESS IN INCHES [MILLIMETERS]	BAND WIDTH IN INCHES [MILLIMETERS]							
	.500 [12.70]	.625 [15.88]	.750 [19.05]	.875 [22.22]	1.000 [25.40]	1.125 [28.57]	1.250 [31.75]	
.020 [.64]	1100 [499]	1375 [624]	1719 [780]	1650 [748]	1925 [873]	2200 [998]	2475 [1123]	2750 [1247]
.025 [.64]	1375 [624]	1719 [780]	2063 [936]	2406 [1091]	2750 [1247]	3094 [1403]	3438 [1559]	
.031 [.79]	1705 [773]	2131 [967]	2558 [1160]	2984 [1353]	3410 [1547]	3836 [1740]	4263 [1934]	
.040 [1.02]	2200 [998]	2750 [1247]	3300 [1497]	3850 [1746]	4400 [1996]	4950 [2245]	5500 [2495]	
.050 [1.27]	2750 [1247]	3438 [1559]	4125 [1871]	4813 [2183]	5500 [2495]	6188 [2807]	6875 [3118]	
.062 [1.57]	3410 [1546]	4263 [1934]	5115 [2320]	5968 [2707]	6820 [3094]	7673 [3480]	8525 [3867]	

## MATERIAL SPECIFICATIONS

Common materials used to manufacture Clampco clamps.

CORROSION RESISTANT MATERIAL	COMMERCIAL DESIGNATION	PROCUREMENT SPECIFICATION
STEEL SHEET & STRIP	TYPE 301 ANNEALED TYPE 301 1/4 HARD TYPE 301 1/2 HARD	AMS 5901 AMS 5517 AMS 5518
STEEL SHEET & STRIP	TYPE 302 ANNEALED TYPE 302 1/4 HARD TYPE 302 1/2 HARD	AMS 5516 AMS 5903 AMS 5904
STEEL SHEET & STRIP	TYPE 304L ANNEALED TYPE 304 ANNEALED TYPE 304 1/4 HARD TYPE 304 1/2 HARD	AMS 5511 AMS 5513 AMS 5910 AMS 5911
STEEL SHEET & STRIP	TYPE 316 ANNEALED TYPE 316 1/4 HARD TYPE 316L ANNEALED TYPE 316 1/2 HARD	AMS 5524 AMS 5907 AMS 5507 ASTM-A-666
STEEL SHEET & STRIP	TYPE 321 ANNEALED	AMS 5510
STEEL BARS & FORGINGS	TYPE 410	AMS 5504
STEEL BARS & FORGINGS	TYPE 431	AMS 5628
STEEL BARS & FORGINGS	TYPE A286	AMS 5732 AMS 5735 AMS 5737
STEEL SHEET & STRIP	TYPE A286 ANNEALED	AMS 5525
STEEL SHEET & STRIP	C276 HASTELLOY	ASTM-B-575
STEEL SHEET & STRIP	6061-T6 ALUMINUM	AMS 4027
STEEL SHEET & STRIP	INCONEL 718	AMS 5596

## PERFORMANCE COMPARISON BAND TENSION VS. APPLIED TORQUE



- **T-BOLT BAND CLAMPS**
  - High performance
  - Safe and effective
  - Good for light, medium, and heavy-duty applications
- **BARREL HARDWARE CLAMPS**
  - Low profile design
  - Good for light and medium-duty applications
- ▲ **WORM DRIVE CLAMPS**
  - Economical
  - Easy-to-use
  - Good for light-duty applications