ENGINEERING INFORMATION—COLUMN LOADING

Column Loading Capacity

The type of load on a jack, and the way the jack is mounted, affects its load bearing capacity.

There are two types of possible jack loads, tension and compression. A jack is under tension when its load pulls the screw away from the jack, while compression loads push the screw toward the jack (see diagram). A jack can be under tension or compression regardless of jack positioning, i.e. vertical, horizontal, upright or inverted.

When tension loaded, the jack retains full rated capacity. Under compression loads however, the screw may not be able to support full capacity. For example, a 2-ton jack with a 15" screw length will be limited to 2293 pounds in compression, about half of the jack's capacity. In compression situations, the load, screw length and jack mounting configuration determine the column strength of the screw. The examples shown illustrate four common mounting configurations.

Unguided

If the screw is the only support for the load, it is considered unguided. The screw must be large enough to support the load and prevent buckling. On the Column Strength load charts, use the row labeled "unguided" for the allowable lengths for this design.

Trunnion Mounting

In a trunnion mounting arrangement, the screw has a pivot on the end and the jack body is mounted on a large pivoting frame, or trunnion. This type of mounting is particularly common in the antenna industry. In practice, the pivot should be as close to the centerline of the ACME nut as the design permits. This will eliminate moment loads caused by loose threads. Use the "trunnion" row on the charts for this mounting arrangement.

Guided

Guided loading is often termed "fixed-fixed" loading. Both ends of the column are rigidly held — the jack body is bolted firmly to a sturdy base, and the load travels on slides, bearings, rollers or other means. The guides should be snug enough to prevent any side load or moment load from reaching the screw. Use the "guided" row in the Column load charts.

Double-clevis Mounting:

Double-clevis jacks have less load capacity than the other common mounting configurations. A double-clevis jack has pivots or clevises at both ends: one on the screw tip and one on the end of the protection tube. This tends to weaken it as a column by creating eccentric loads on the screw. This eccentricity will tend to increase with greater distance and higher loading. For this reason, double-clevis jacks are severely limited both in capacity and maximum length. Double-clevis mounting differs from trunnion mounting because the pivot is located further from the jack body. The column load charts do not apply for this mounting, please consult the factory for load bearing information.

How to use the Column load charts:

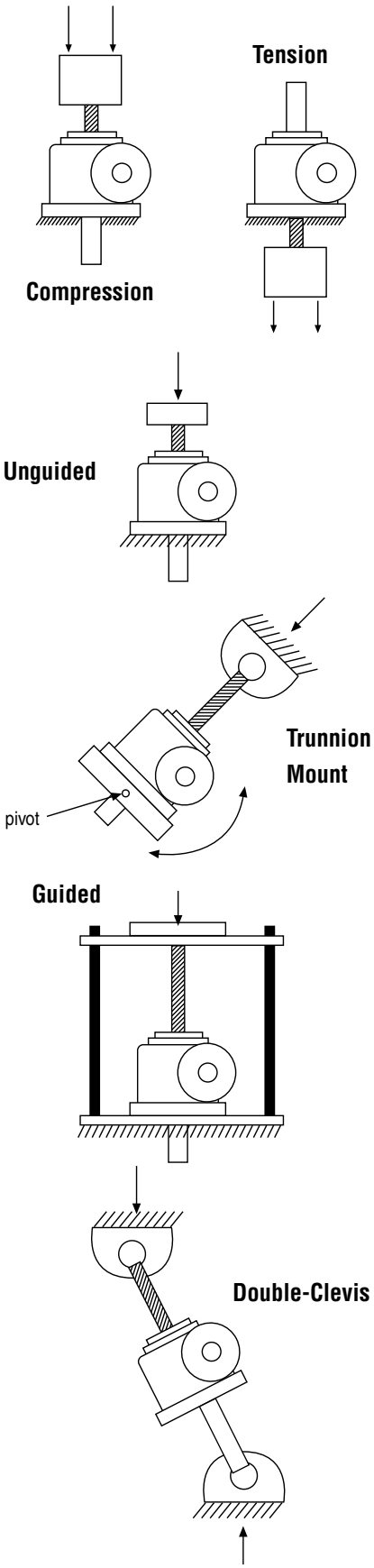
Note: *Charts can be used for Machine screw jacks, Ball screw jacks, Stainless steel jacks, Bevel Gear® jacks, Bevel Ball actuators and metric jacks. Charts only apply to jacks with axial loads. For side loads, horizontal applications and offset loads, contact the factory.*

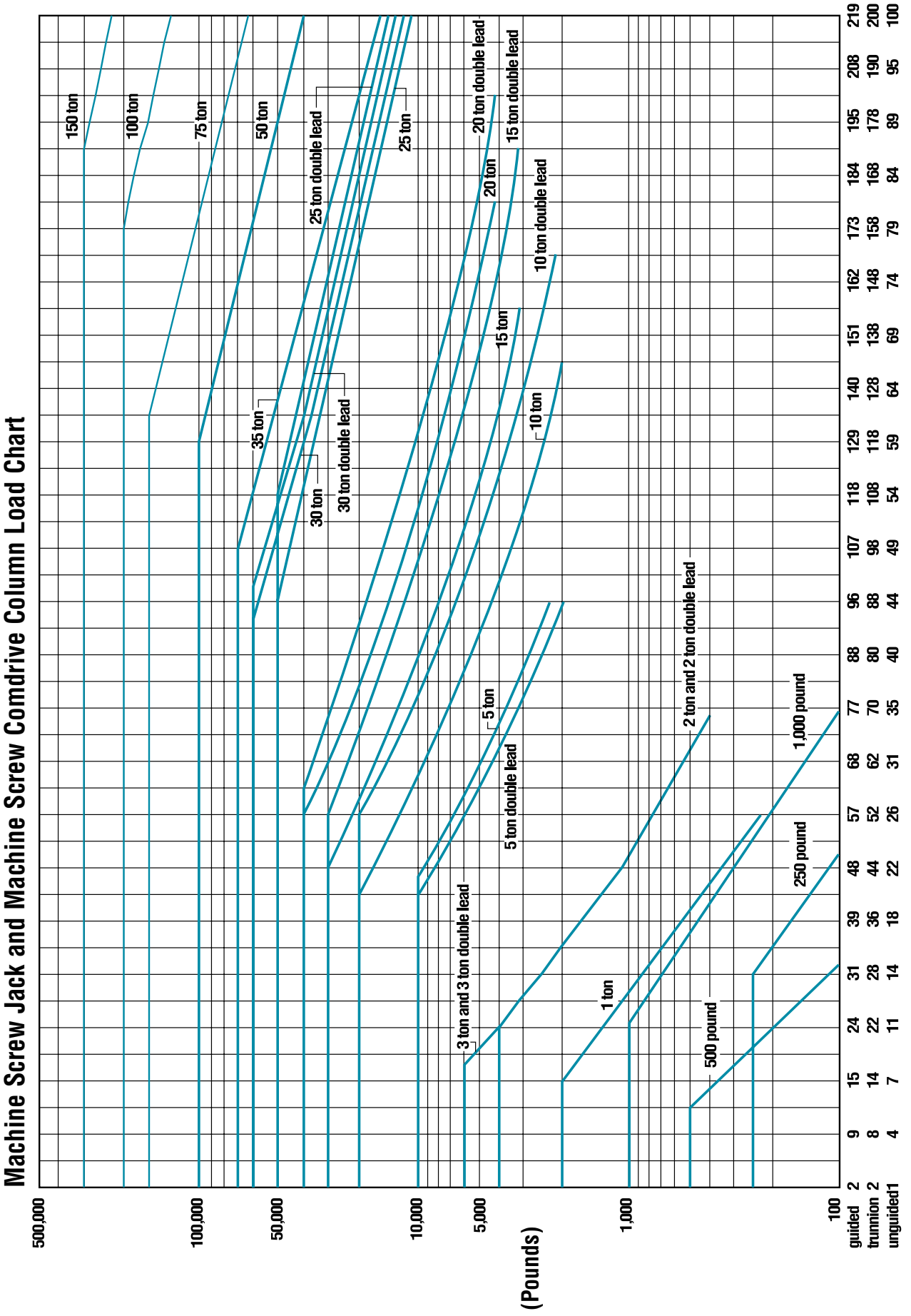
1. Determine the proper mounting arrangement for your application. Locate the appropriate row and find the screw length at the bottom of the chart.
2. Find the load you need to move (in pounds) on the left side of the chart.
3. Find the point on the chart where the load and length intersect. Choose a jack whose line is on or above this intersection.
4. Add the length of the end condition you have chosen and any additional screw extension to the screw length to find "unbraced" screw length. Verify your selection using the unbraced length.

Example:

A jack must lift 5 tons (10,000 pounds) over a distance of 31 inches. The load places the screw in compression. The jack will be mounted firmly by its base, and the load will be attached to a load pad (Type 2 end) and is not guided.

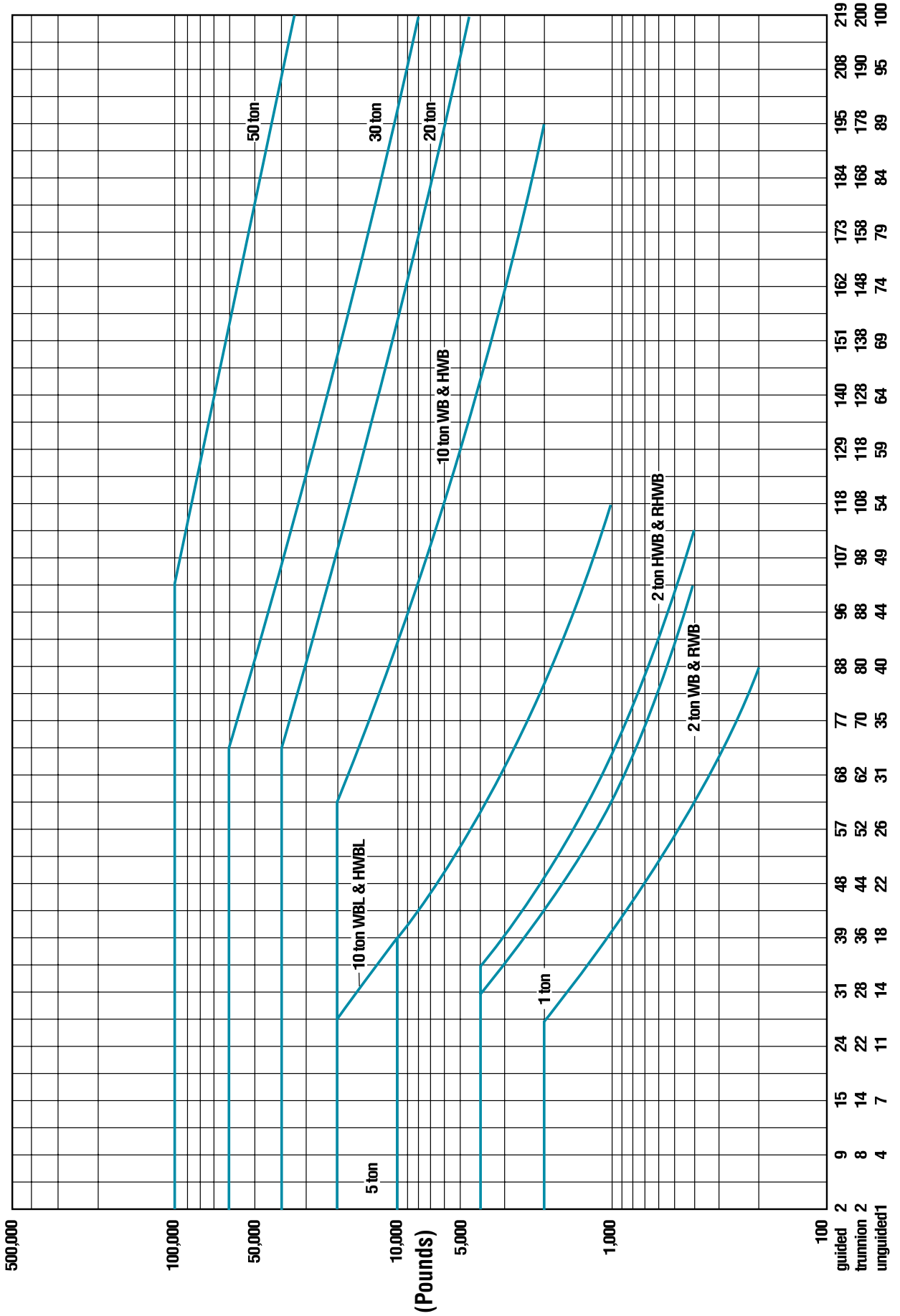
1. Look at the "unguided" row at the bottom of the Machine Screw Jack Column Load Chart (page 9) and find the 31" mark.
2. Find the 10,000 lb. mark on the vertical axis (left side of the chart). Move to the right along this line until it crosses the 31" line. Any jack above this point should be suitable.
3. From this, the 10-ton double lead jack is selected. Look at the dimensions from the jack body for the Type 2 end for this jack. The Type 2 end adds 2" from the top of the jack to the end of the screw. Thus the total unbraced length of the screw is 33 (31 + 2).
4. Use this new unbraced screw length to verify your selection. In this case, the intersection point still falls below the 10 ton double lead jack line, so this selection is correct.





This chart includes a 2:1 Factor-of-Safety based on the Euler-Johnson equation for column loading (Oberg, Erik et al: Machinery's Handbook, 24th Edition. c. 1992 Industrial Press Inc.)
The horizontal portion of each line represents the jack's maximum dynamic capacity. Under static conditions, these lines can be exceeded. Please contact factory for assistance.

Ball Screw Jack & Ball Screw Comdrive Column Load Chart



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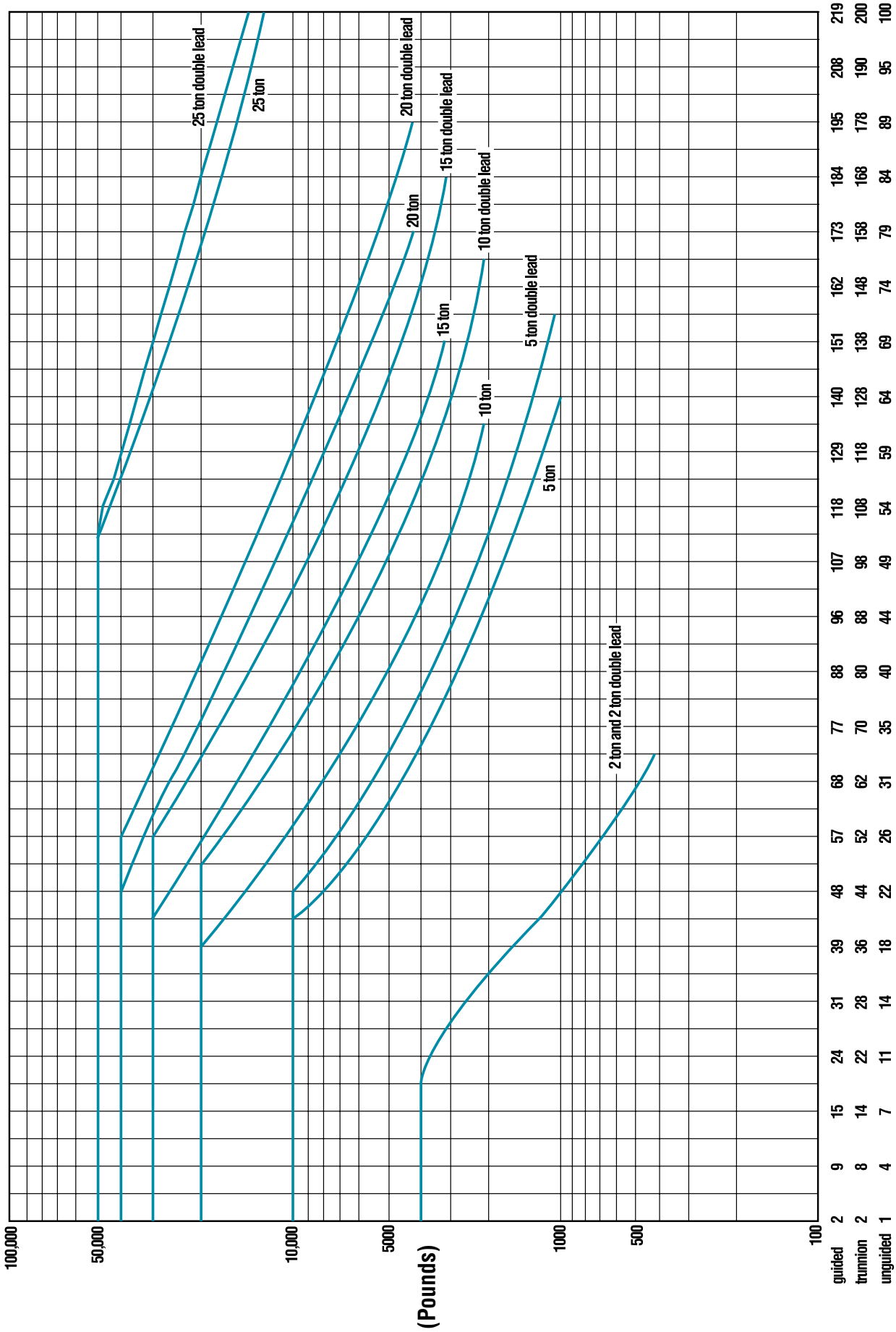
Stainless Steel Screw Jack Column Load Chart



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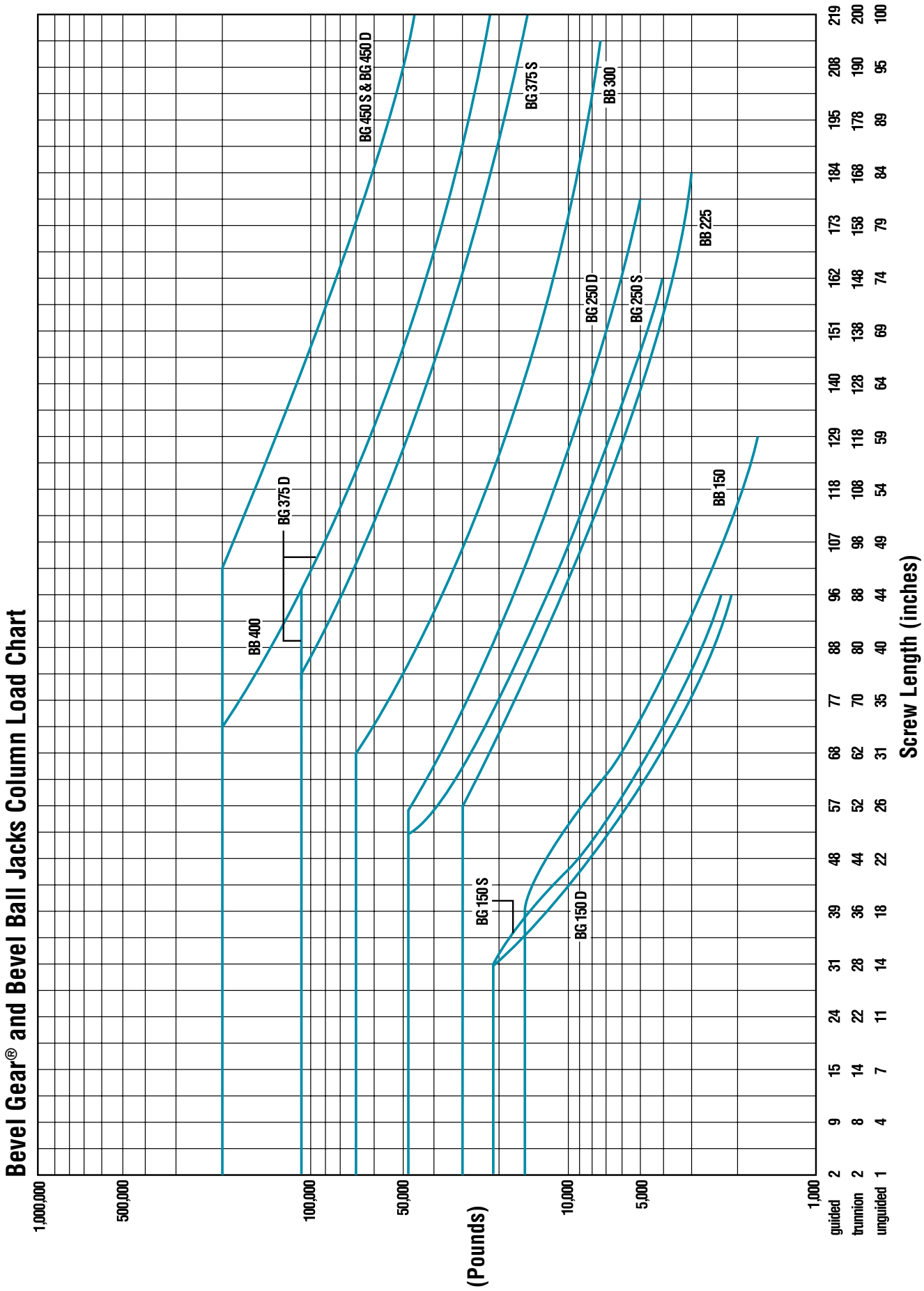
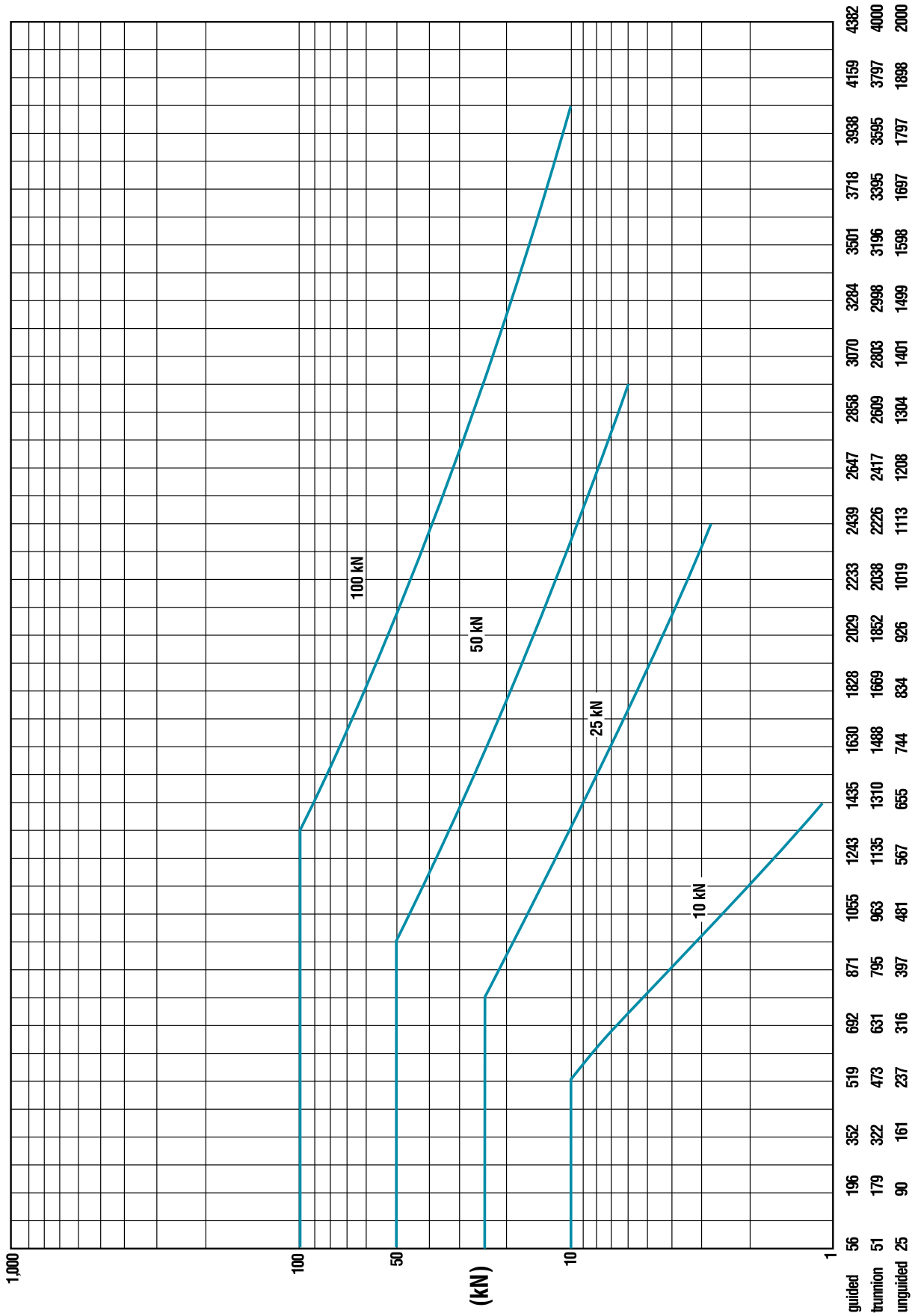


This chart includes a 2:1 Factor-of-Safety based on the Euler-Johnson equation for column loading (Oberg, Erik et al: Machinery's Handbook, 24th Edition. c. 1992 Industrial Press Inc.)
The horizontal portion of each line represents the jack's maximum static capacity.

Metric Screw Jacks Column Load Chart



This chart includes a 2:1 Factor-of-Safety based on the Euler-Johnson equation for column loading
The horizontal portion of each line represents the jack's maximum static capacity. Under static conditions, these lines can be exceeded. Please contact the Factory.