



Piping systems should be designed and installed by qualified personnel only. Improperly installed systems can result in excessive strain on the compressor, resulting in piping or joint failure.

## **Piping Strain**

The suction and discharge pipe flanges must be aligned concentric and parallel to the pump flanges. **The piping must be supported independently near the compressor, and all flanges must match so that no strain will be transmitted to the compressor** after the nuts and bolts have been securely fastened. When tightening the nuts and bolts, always tighten bolts 180° opposite from each other in an alternating pattern to achieve even gasket compression. Do not draw the piping into the compressor by force.

*The piping system should be designed with sufficient inherent flexibility to withstand thermal expansion without creating excessive forces at the flanges. The piping must also be arranged and supported so that no excessive stress can be transmitted to the compressor, either due to the weight of the pipe, or to its expansion and contraction.*

### **Excessive strain on a compressor may be the result of:**

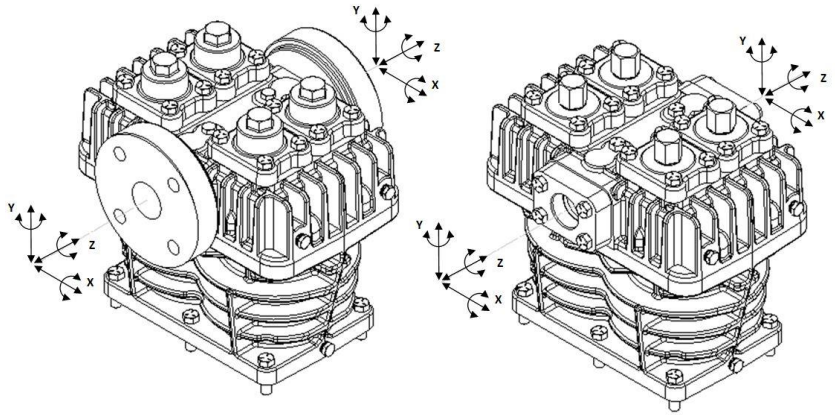
1. Thermal expansion and contraction of the piping. This indicates improper piping design. Expansion joints or loops may have to be installed.
2. Improper pipe support. Frequent problems arise from indiscriminate use of rod hangers (instead of spring hangers), anchors or restraints used during the pipe installation.
3. Misalignment of the pipe flanges to the compressor suction and discharge flanges.
4. Excessive vibration due to foundation stability or mounting design.

The table on the next page shows the maximum Forces and Moments allowed on Blackmer compressor nozzles. These are guidelines only as each piping arrangement is different and outside factors may influence calculations.

## **Pressure Pulsation and Shaking Forces**

Due to the inherent nature of the design of a reciprocating compressor, pressure pulsations and shaking forces will be created in the piping from compression. Piping must be supported under such circumstances as excessive vibration can occur causing an unstable system. It is recommended that a pressure pulsation study or acoustic analysis be completed for complex piping systems as system design can be susceptible to complex vibration and pulsation modes causing damage to pipe joints and welds as well as larger equipment. These studies will determine the need to install pulsation suppression devices.

X – Horizontal (parallel to shaft)  
 Y – Vertical  
 Z – Horizontal (perpendicular to shaft)



Compressor Models	Forces (lb / kg)			Moments (ft-lb / kg-m)		
	F <sub>X</sub>	F <sub>Y</sub>	F <sub>Z</sub>	M <sub>X</sub>	M <sub>Y</sub>	M <sub>Z</sub>
<b>0.75" NPT Models</b>						
LB081, LB161, LB162	25 / 11	25 / 11	25 / 11	50 / 7	50 / 7	50 / 7
NG162, NG172	25 / 11	25 / 11	25 / 11	50 / 7	50 / 7	50 / 7
HD161, HD162, HD163	25 / 11	25 / 11	25 / 11	50 / 7	50 / 7	50 / 7
HD172, HDL172, HD173, HDL173	25 / 11	25 / 11	25 / 11	50 / 7	50 / 7	50 / 7
<b>1" NPT Models</b>						
NG372	40 / 18	40 / 18	40 / 18	60 / 8	60 / 8	60 / 8
HD372, HDL372, HD373, HDL373	40 / 18	40 / 18	40 / 18	60 / 8	60 / 8	60 / 8
<b>1.25" NPT Models</b>						
LB361, LB362	50 / 23	50 / 23	50 / 23	75 / 10	75 / 10	75 / 10
NG362, NG372	50 / 23	50 / 23	50 / 23	75 / 10	75 / 10	75 / 10
HD372, HDL372, HD373, HDL373	50 / 23	50 / 23	50 / 23	75 / 10	75 / 10	75 / 10
<b>1.5" NPT Models</b>						
NG362, NG612	60 / 27	60 / 27	60 / 27	100 / 14	100 / 14	100 / 14
HD612, HDL612, HD613, HDL613	60 / 27	60 / 27	60 / 27	100 / 14	100 / 14	100 / 14
<b>2" NPT Models</b>						
LB601, LB602	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
NG602, NG612	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
HD612, HDL612, HD613, HDL613	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
<b>1.5" 300# ANSI Models</b>						
HD361, HD362, HD363	60 / 27	60 / 27	60 / 27	60 / 27	60 / 27	60 / 27
HDL362, HDL363	60 / 27	60 / 27	60 / 27	60 / 27	60 / 27	60 / 27
<b>2" 300# ANSI Models</b>						
HD602, HDL602, HD603, HDL603	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
LB942, LB943	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
HD942, HDL942, HD943	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
<b>1.5" 600# ANSI Models</b>						
HDL322, HDL342, HDL343	75 / 34	75 / 34	75 / 34	125 / 17	125 / 17	125 / 17
<b>2" 600# ANSI Models</b>						
HDL642, HDL643	100 / 45	100 / 45	100 / 45	150 / 21	150 / 21	150 / 21

