

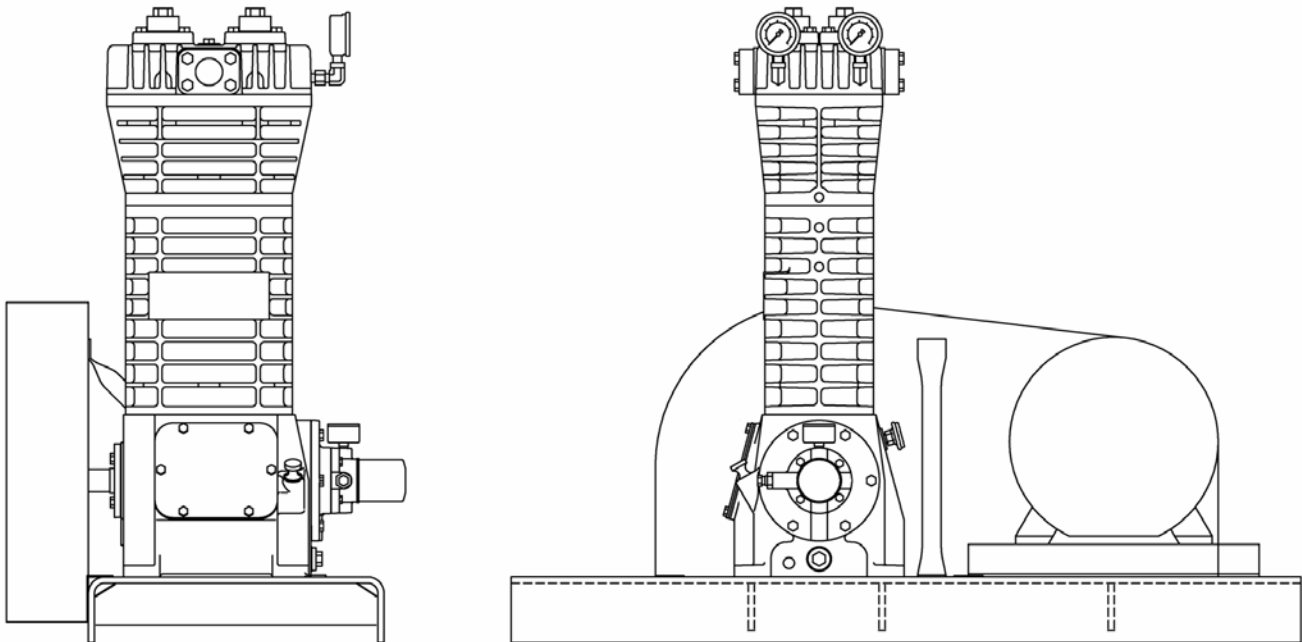
## Compressor Bases, Skids and Foundations

Reciprocating compressors produce unbalanced shaking forces that will produce excessive vibration if an adequate base or foundation are not provided. Virtually all problems associated with excessive compressor vibration or broken mounting bolts can be traced to: poor baseplate design, poor foundation, or poor piping support.

### Factors that increase vibration:

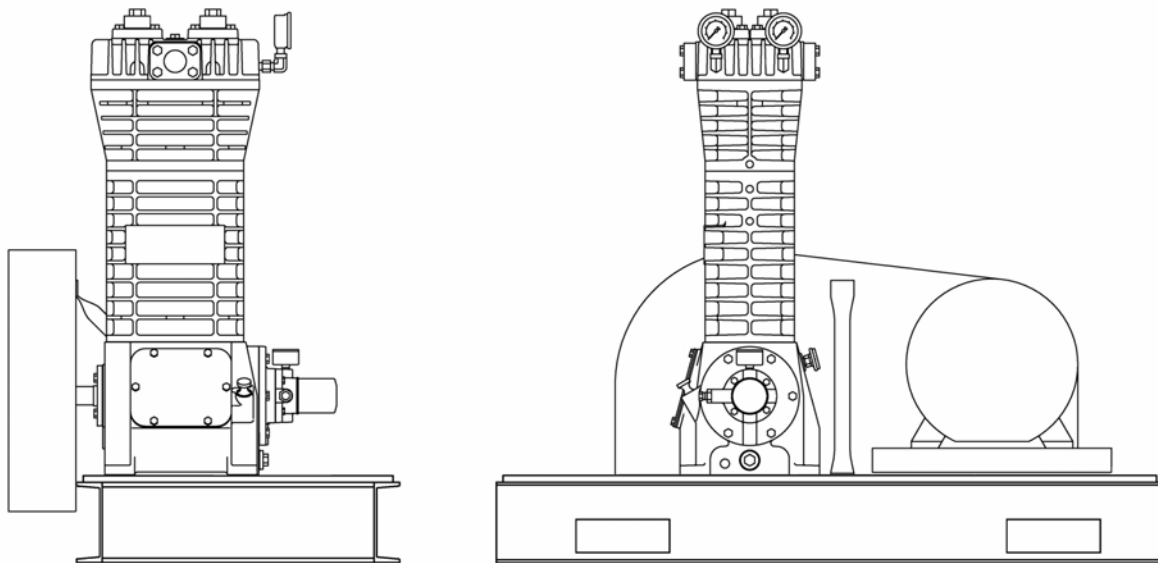
- Compressor size – The 600 and 900 series compressors will vibrate more than the 100 or 300 series.
- Compressor speed – Faster compressor speeds will increase vibration.
- Too small of flywheel – High loads and slow speeds will often require an oversized flywheel.
- Compressor height – Triple seal compressors bear extra consideration.
- Engine drivers – Engines are reciprocating devices that will produce their own unbalanced forces.
- Inadequate Foundation.
- Flexing of baseplate or skid.

Blackmer compressors are typically mounted on either a formed steel baseplate or on a structural steel skid. Either of these may be placed on a concrete foundation or on a larger structural steel skid containing other equipment.



### Formed Steel Baseplate Considerations

- Thickness should be at least 3/8" (1 cm)
- Height should be no more than 4" (100 cm)
- Width must not exceed 26" (66 cm)
- Internal stiffening webs must be welded in if width exceeds 18" and on all 600 / 900 series compressors.
  - Two webs should be placed directly under the compressor.
  - At least one web should be placed under the driver (use two under an engine).
  - Webs should be welded to the top and both sides of the baseplate.
  - An extra web is better than not enough.
- Baseplate must be placed on a concrete foundation or a structural steel skid – not directly on soil.
- Mounting bolt holes should be provided through the top of the base down both sides.
  - Bolt hole spacing along the length of the base should not exceed 26" (66 cm).



**Structural Steel Skid Considerations**

- Top plates may be used as desired. If used – the compressor MUST set directly over full depth beams. (See Fig. 6 and 7)
- Forklift slots, lifting lugs, or ‘oilfield type’ are all acceptable.
- C-section beams, I-beams, or wide-flange I-beam construction are all acceptable.
  - I-beams, or wide-flange I-beam construction should be used if the skid is to be placed on soil.
  - Filling the skid with concrete should be considered if the skid is to be placed on soil.
- Mounting bolt holes should be provided through the bottom flange of the beam down both sides.
  - Bolt hole spacing along the length of the base should not exceed 26” (66 cm)

**1**

**OK**

FOUNDATION

The foundation should be larger than the compressor baseplate and should be deep enough to provide adequate bolting (at least 8 – 10”, 20 – 25 cm).

**NO** gaps should exist between the baseplate and the foundation.

The top of the foundation should be slightly above grade level.

In general, a larger foundation is better.

**2**

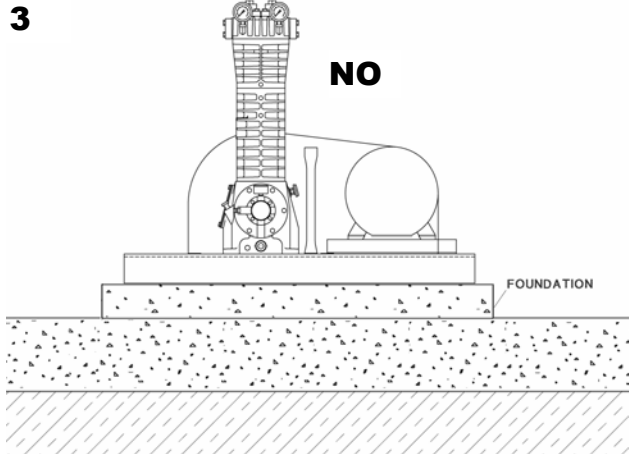
**OK**

FOUNDATION

If the existing floor is not thick enough, cut a hole in it and provide a proper depth foundation for the compressor (at least 8 – 10”, 20 – 25 cm).

**3**

**NO**

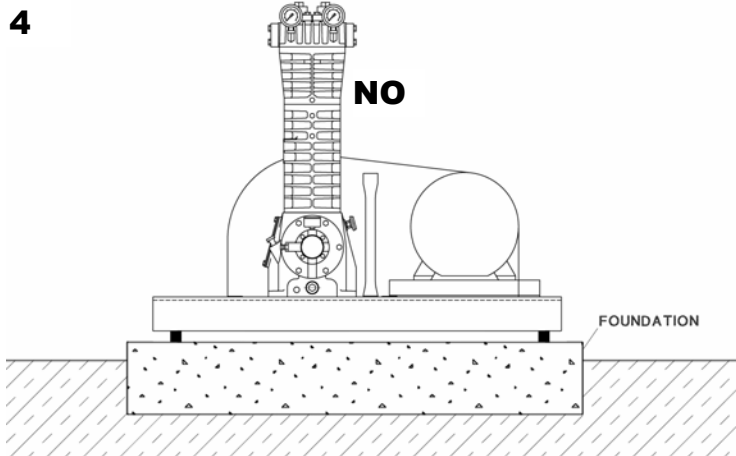


Placing a shallow foundation over an existing floor will not provide enough mass to prevent vibration nor enough depth to allow proper bolting.

Any foundation placed on top of an existing floor should be at least 8 – 10" (20 – 25 cm) deep.

**4**

**NO**

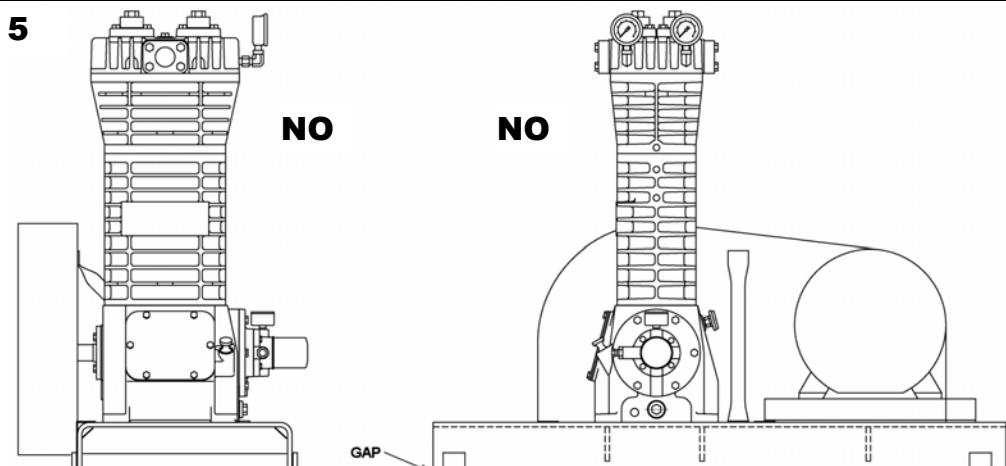


Do not place the compressor base on shims or spacers. The base **MUST** be supported along its entire length.

If vibration isolation devices are used the baseplate and the isolation device **MUST** be properly designed; standard baseplates will **NOT** work. See 'Isolation Devices'.

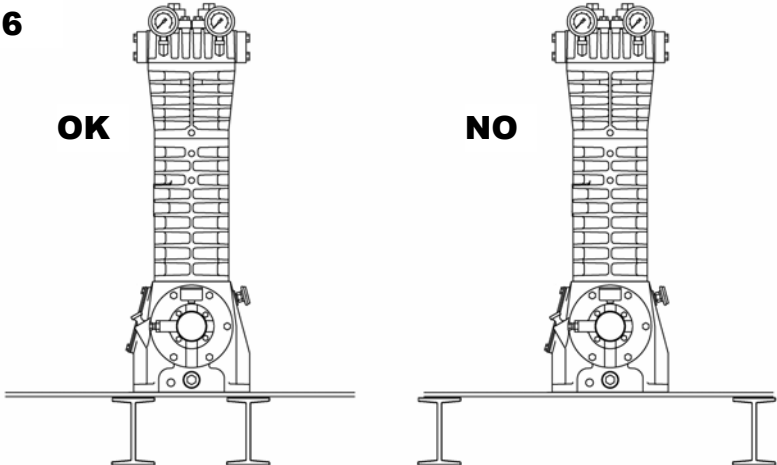
**5**

**NO**      **NO**



Tabs for anchor bolts should **NOT** be welded to the side of a baseplate. Should the tab extend below the edge of the baseplate, the baseplate will not be able to set firmly on the foundation, causing vibration.

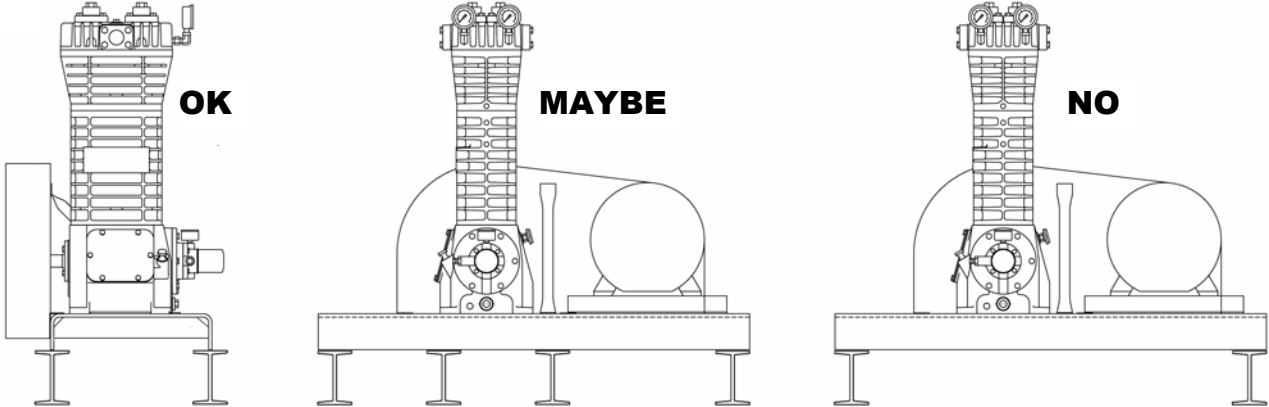
**6**



**OK** **NO**

Do not set the compressor on an unsupported top plate as it will flex, causing vibration. Always place full depth beams directly under the compressor.

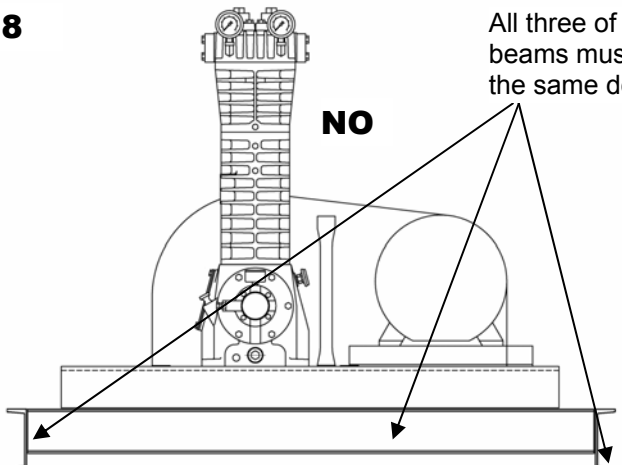
**7**



**OK** **MAYBE** **NO**

Support the formed steel base along its ENTIRE length. If cross beams must be used, ensure that one or two pass directly under the compressor and that their spacing is not excessive.

**8**

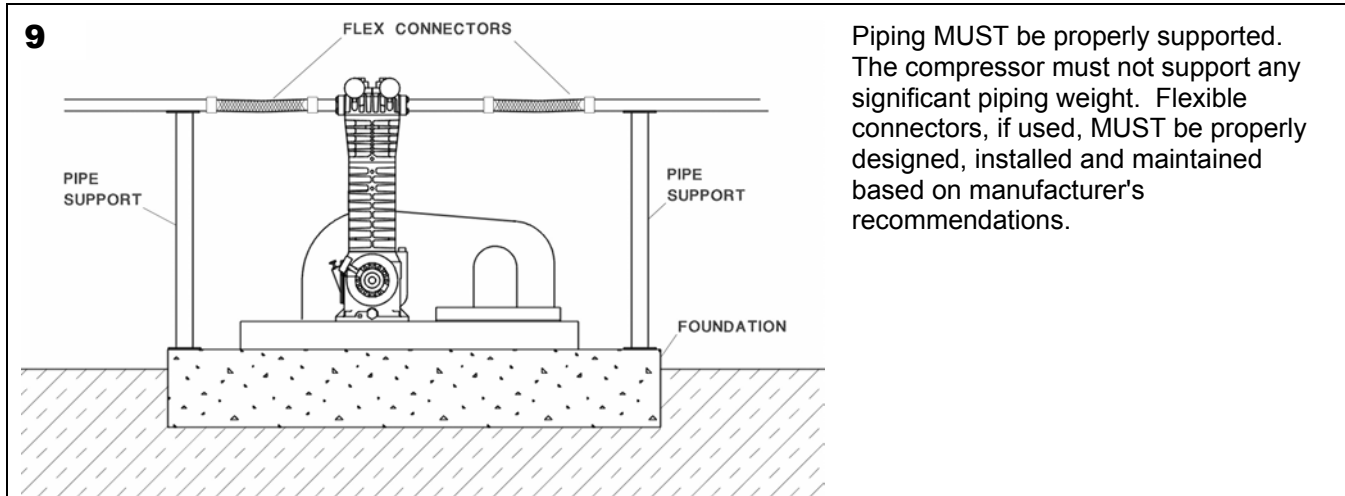


**NO**

All three of these beams must be the same depth.

The compressor base **MUST** be placed on a full depth beam. In this sketch the compressor's formed steel base is supported along its length by a 4" structural steel beam which is in turn connected to 6" beams at each end. The 4" beam will flex.

Compressors not mounted at grade level (those not mounted in the ground floor of a building, those mounted on a scaffolding, or in a ship) will have a variation of this type of mounting. The mass and the stiffness of the supporting structure in these situations must be carefully considered.



### Anchor Bolts

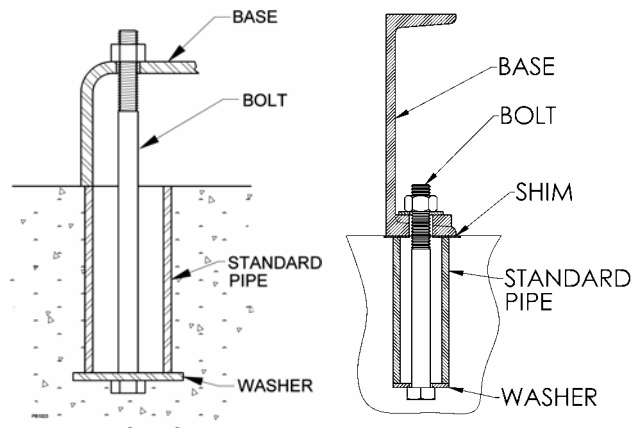
The compressor be secured to the foundation by anchor bolts as shown. This arrangement allows for slight shifting of position to accommodate alignment with the mounting holes in the base plate.

'J'-bolts or 'L'-bolts embedded in the concrete may also be used. Expansion type bolts should not be used.

Set the anchor bolts in concrete for new foundations. When compressors are to be located on existing concrete floors, holes should be drilled into the concrete to hold the anchor bolts.

Anchor bolts should be checked regularly to ensure that they are tight.

**10**



### Grouting:

Grouting of formed steel bases will add additional stability to the mounting. Holes will have to be drilled in the top of the baseplate (one between each set of ribs) to allow grout to enter and air to exit.

### Isolation devices

A wide variety of vibration isolation devices incorporating springs or elastomers are available. In general these devices should only be used if the compressor is to be mounted on an upper story in a building, on a scaffold, in a ship, etc. Mountings incorporating these devices require careful design consideration and must take into account the total skid weight, center of balance, compressor & Driver RPM, etc.