Hot Alignment Measuring Step

1. At ambient temperature measure the height of all bearing centerline, driver and driven machines by using special tool.

2. At operating temperature check the height of all bearing centerline again.

3. Compare both data and subtract for cold alignment then compensate to align both shaft at ambient temperature.

Noted: Should do from ambient temperature through operating temperature only. In vice versa will take longer time for machine to cool down (about 24 hrs.)

1. SCOPE

This specification supplies the data necessary to perform the site shaft alignment and misalignment maps.

2. ALIGNMENT CONSIDERATION

Alignment must be accomplished prior to initial starting after the equipment has been installed on its permanent site, and whenever any change has been made in the relative position of the driving to driven equipment. Improper alignment may cause vibration and, at worst, premature bearing failure. Always check alignment after replacement of the driving or driven equipment.
Alignment must be checked before and after suction and discharge pipes are assembled to the compressor.
Cold alignment compensates for the thermal growth of operating equipment by correctly offsetting the driving and driven equipment. The offset allows the equipment to grow into alignment at normal operating conditions.
Ideal full load (hot) alignment occurs when all drive train member centerlines exactly coincide. It is intended to position the cold centerline of each drive train component such that at full load temperature, each member of the drive train will move to the ideal position.

3. ALIGNMENT MEASUREMENT

3.1 RADIAL ALIGNMENT MEASUREMENT

Zero the radial dial with reference to vertical, as shown on the figure 1.
Rotate both shafts in the direction expected for operation and record measurements at every at 90° intervals.
Dial indicator reads minus when the plunger moves outward and plus when the plunger moves inward.
Vertical misalignment (rv) is expressed as:

$rv = b / 2$

where "b" is the reading of the dial indicator a 180°
Apart from slight errors, the algebraic sum of 90° (w) and 270° (z) readings coincides with the 180° reading

$b = w + z$

whereas their algebraic semi-difference indicates horizontal radial misalignment (ro):

$ro = (w - z) / 2$

It's imperative to take into account the plus and minus signs of w and z

Fig.1

3.2 AXIAL ALIGNMENT MEASUREMENT

Axial alignment (angular alignment) of the shafts, is measured by means of two dial indicators set at zero when they are positioned at 12 and 6 o'clock.

Rotate both shafts and record measurements at every 90° intervals, as shown on fig. 2.
Assuming that both indicators are attached to the shaft P, the indicator button will track on shaft Q, the results are:
-on vertical plane (av), axial misalignment is expressed as:

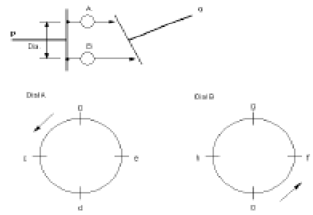
$av = (d - g) / 2$

(+ or - signs should be considered)
- on horizontal plane (ao), axial misalignment is expressed as:

$ao = ((c - e) - (f - h)) / 2$

(+ or - signs should be considered)

Fig. 2



3.3 LASER TOOL READINGS

In the next pages are shown the values relative to the mechanical tool radial and axial readings. If a laser tool is used for the alignment, the laser values shall be obtained starting from the data in the figures, in the following way:

- Radial - Vertical reading : refer to dimension A or B depending on the direction of the reading (from machine 1 to 2 or vice-versa)
- Radial – horizontal reading: refer to dimension C
- Axial –vertical reading: refer to the acceptable values range in the axial readings dial gauge at six o'clock, and multiply each value by the ratio 100/D where D is the axial reading diameter for the mechanical tool.
- Axial – horizontal reading: should be always in the range of +- 0.01 mm.

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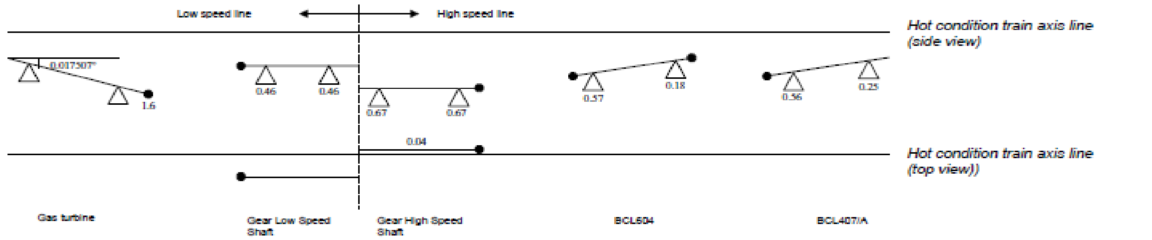
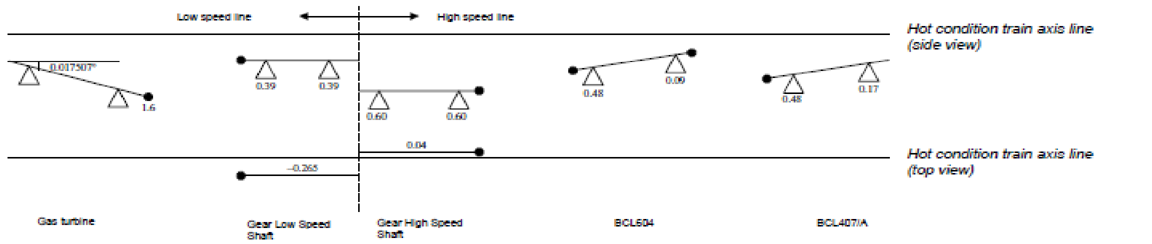
Appendix A <2>

● - Shaft end
△ - Support

20 °C Train sketch at cold. Dimensions are mm; Drawings not in scale. The values under supports/shaft end represent the growth from cold to hot condition. For distances between supports and overhangs ref.to sh.3



30 °C Train sketch at cold



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