YORK
BY JOHNSON CONTROLS

Service Information

File In/With: N/A	SI0206
	New 409
Equipment Affected: YK / YD Centrifugal Chillers	
Coupling Alignment for D-Flange Chiller Arrangements	

General

This service information letter outlines the process that can be used to ensure proper compressor/driveline -coupling alignment on YK and YD centrifugal chillers. These chillers use a D-flange type motor mounting/coupling system designed to maintain a specified alignment tolerance. Proper coupling alignment results in extending the coupling's life cycle and controls the transfer of forces applied to the motor and compressor shafts.

In some instances it may be necessary to field check coupling alignment. This may apply if the compresssor, motor spool piece and motor were assembled at a location other than the manufacturing plant. If a field check is determined to be necessary, it is essential that all parts be examined carefully for dirt, burrs, nicks or other material that could interfere with proper fit and marriage of the parts. Any condition that could interfere with the proper assembly must be corrected before continuing.

Chillers that are shipped from the factory fully assembled do NOT require field alignment checks.

When performing an alignment check, it is essential to determine the extent of the gravity “sag” condition of the dial indicator on its mounting brackets. The “sag” should be minimized by selecting rigid mounting brackets and minimizing dial weight. Sag that can NOT be eliminated must be accounted for in the final readings.

To determine the "sag":

1. Mount the same dial indicator fixture that will be used on the chiller to a rigid pipe or beam in a manner as identical to the chiller setup as possible. Linear distances have the greatest affect so those should be kept closely controlled.
2. Zero the rim indicator on the top of the pipe or beam with sufficient compression of the indicator stylus to later show tens of thousandths of negative travel.
3. Rotate the pipe or beam 180° so the indicator is at bottom and read the indicator. This reading is the sag and can be algebraically subtracted from the alignment readings obtained at the 180° or 6 O’clock position on the hubs.

It is NOT true offset, but is the increased gap from the bar sagging away from the hub rim. For instance, if the sag was 6 thousandths, the dial is zeroed on the hub at 12 O’clock position and reads -8 at the 6 O’clock position on the hub, the true TIR is -8 – (-6) = -2. If the reading at 6 O’clock position was +4, the TIR is 4 – (-6) = +10.

There are many types of motor bearing styles and depending on the axial clearance that exists, it may be very difficult to measure angular alignment using the face method. Special care must be taken to be sure that all dial readings are accurate.

Axial spacing should also be verified, especially if the motor shaft is tapered. With tapers on both ends, several variables influence the total axial gap. Consider the variation in machining of each taper, the surface smoothness or lack of it, temperature when assembled, whether any surfaces have lubricant films, and the exact torque applied to the shaft center bolts.

Once both hubs are pulled up on the tapered shafts - spacing is as results. The only way to adjust is to add shim-washers in the coupling if the spacing is excessive. Historically the space is not too little nor the coupling compressed.

NOTE

Excessive axial space has also been one leading cause of motor drive-end bearing failures.

Straight Shaft Alignment

With straight shaft motors, an incorrect tendency is to adjust the straight-shaft hub such that the face of the hub is precisely flush with the end of the motor shaft. That is NOT necessarily correct. the location of the hub on the straight shaft needs to be set at a position that provides less than 10 thousandths gap in the unstretched coupling shim-packs.

Taper-Taper Shaft Alignment

The coupling should be assembled except for the last three bolts through the motor-end hub, these should be inserted loose to prevent the assembly from sagging. Measure the gap between the shim-pack washers and the hub with a feeler gauge. Anything greater than 0.010" must be taken up by shim washers. If the gap is greater than 0.050”, the distance should be taken by shimming partially at each hub to keep shim washer stack distances under 0.030”. This is done with gas in the compressor so that the shaft is outward, toward the motor.

Shaft Alignment

While the driveline is running in the normal direction, the helical gears cause the compressor shaft to pull away from the motor. At the same time, as the compressor gets to operating temp, the shaft grows in length, so these two situations will offset one another.

1. Fasten indicator clamps on the motor coupling hub or shaft and install indicators so one reads in a radial direction on the rim of compressor hub and the other reads a direction parallel to the shaft on the front face (face toward motor) of the compressor hub near its O.D. (see FIG. 1).
2. Arrange the indicators to read at nearly the same angular position on the compressor hub. The indicator reading on the rim reads parallel misalignment. The indicator reading on the front face reads angular misalignment.
3. Using marking dye, make a small index mark on the rim of the compressor coupling hub. All alignment readings will be taken with indicators reading at this index mark.
4. Simultaneously rotate the compressor and motor shafts 360°. Read indicators #1 and #2 compare the readings.

NOTE

All readings should be taken with the spoolpiece and shim-packs removed as they can cause skew to the sleeve bearing shaft.

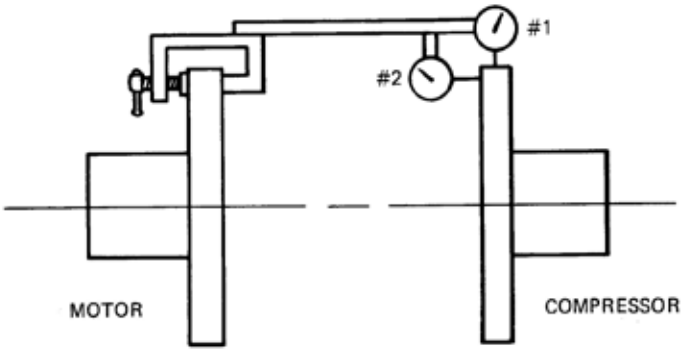

FIG. 1 – CHECKING COUPLING ALIGNMENT

The maximum tolerance for the combined total for parallel and angular misalignment is shown in the table in inches T.I.R. If it is determined that this total value can NOT be achieved within the constraints of the parts at hand, it may be necessary to investigate further to determine which component is preventing from doing so.

The maximum allowable misalignment for a dry flexible coupling is a combination of both parallel and angular readings. To obtain the Total Combined Misalignment Value, add the T.I.R. value from the rim and the T.I.R. value from the face.

NOTE

This total must NOT exceed the "Max. Total T.I.R." shown in TABLE 1.

TABLE 1 – MAXIMUM TOLERANCE

COUPLING ASSEMBLY	COUPLING PART NUMBER	SHAFT END DISTANCE	MOTOR - COMPRESOR SHAFTS *	MAX. TOTAL T.I.R.
364-49975-000	029-20006-000	6.875	S-T	0.050
364-49208-000	029-20204-000	4.875	S-S	0.050
364-51837-000	029-24118-000	6.75	S-T	0.056
364-51838-000	029-20921-001	6.50	T-T	0.056
364-52351-000	029-21381-000	7.00	S-T	0.053
364-51816-002	029-20899-001	6.75	T-T	0.053
364-51816-001	029-24887-000	6.75	T-T	0.053
364-51817-000	029-25108-000	6.75	T-T	0.052

*S = straight shaft, T = tapered shaft.

COUPLING RE-ASSEMBLY (see FIG. 2)

Re-install the spool and disc packs using the bolts and lock nuts provided. Proper torque values are stamped on the coupling.

After alignment and re-assembly are completed, install the compressor coupling guard.

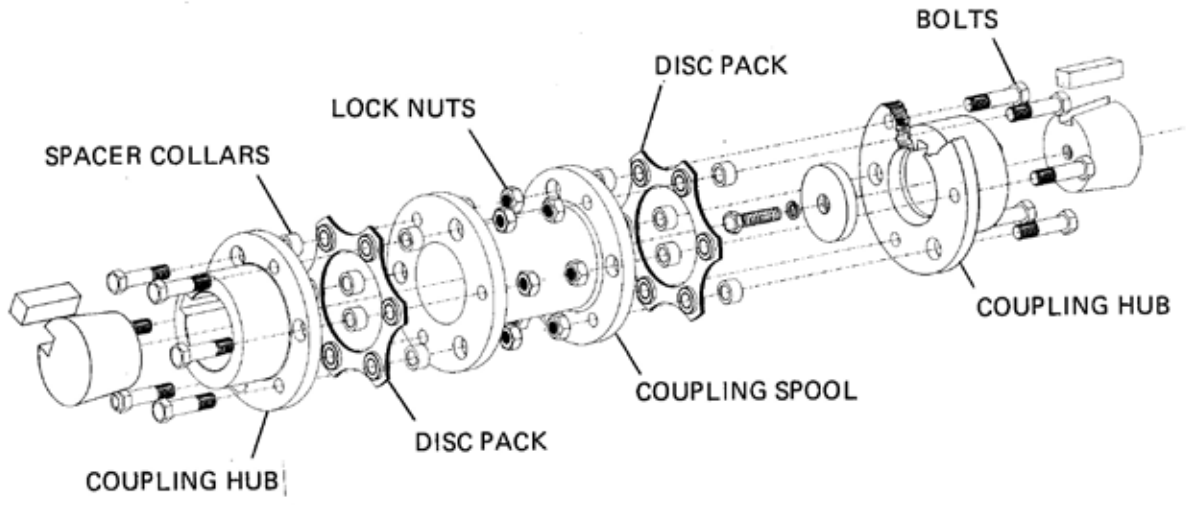

FIG. 1 – COUPLING ASSEMBLY