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Process	Title	Rev	PRCN	By	Appvd	Date
A0048 1 of 3	**Machinery Alignment Guidelines: Shaft Angle and Offset**	Orig	N/A	JTG	JHA	12/7/97

Scope

This process is directed toward providing customers with the information needed to ensure their machinery shaft angles and offsets are within the design parameters of their CCA designed FLEXXOR shaft coupling. CCA has previously presented this information in various formats including as parts of Assembly Processes. This process sheet should be used in conjunction with other processes and drawings provided for your application. Process sheets will explain pertinent concepts while your assembly drawing(s) will provide the information required for your specific application. Axial movement information is not included in this process sheet.

This is not intended as a discussion of numerous alignment methods.

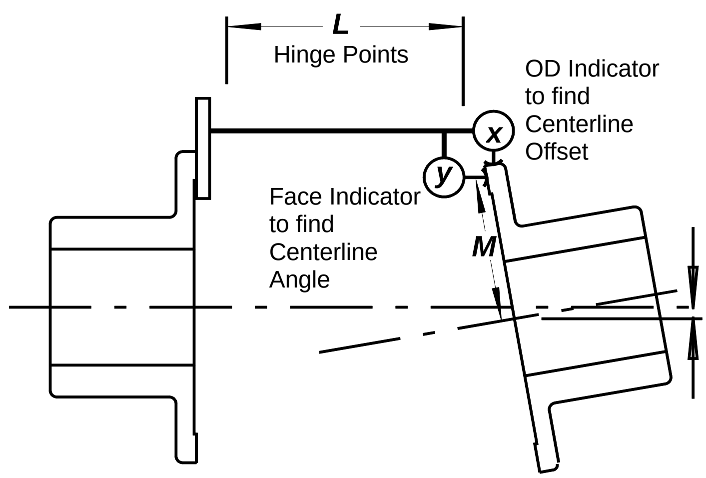
This process assumes users have been properly trained to follow their company's safety standards.

Alignment Overview

Axial movement information is not included in this process sheet. See the installation instructions and drawings provided for axial movement information to ensure correct distance between hubs. This distance is found on the assembly drawing. Thermal growth is discussed in the Installation Instructions. Hub distance must be set so that the coupling's allowable axial travel is never exceeded during entire operating cycle.

Installation mechanics may either align shafts, then mount hubs at correct distance and check their final alignment; or they may install hubs at the correct distance and then align hubs. The latter method is time-effective only if shafts are close to required levels of alignment. For simplicity, our drawing and discussion focus on installing hubs on aligned shafts and then taking a final alignment. NOTE: "Hub" also applies to flanged shafts or CCA provided adapter rings used when specified.

Figure 1 Measuring Shaft Angle and Offset



As seen in Figure 1, there are two types of misalignment. Because it is difficult to measure these angles in degrees, we measure both types of misalignments as slopes.

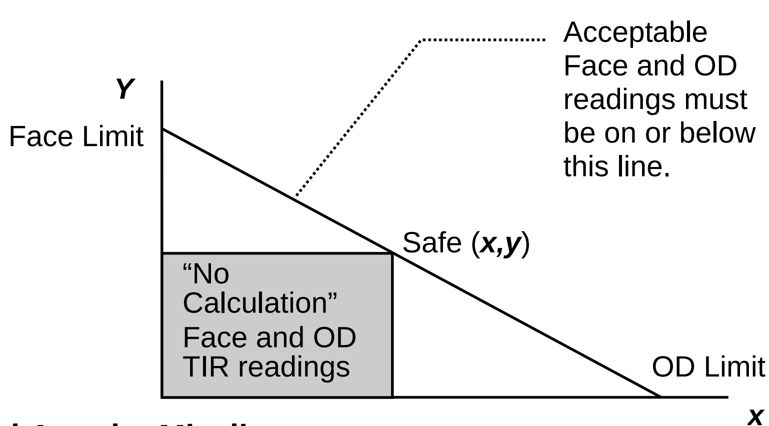
1. Centerline Offset = ***x*** (the indicator TIR)/***L***(the distance between hinge points).
2. Centerline Angle = ***y*** (the indicator TIR)/***M***(the distance between Face Indicator & shaft centerline).

We add them together in the following formula to ensure the installation is within the coupling limits. All points that fall below the line defined by graphing this equation are acceptable.

Equation 1 Total Angular Misalignment

$$\frac{x}{L} + \frac{y}{M} \leq K \_\_\_ or \_\_\_ y \leq MK - \frac{M}{L} x$$

Where:
x = TIR of rim when two shafts are rotated together (your measurement)
L = Distance between hinge points (from Asy Dwg)
y = TIR of face-to-face when two shafts are rotated together (your measurement)
M = Distance between face indicator & shaft centerline (recommendation on drawing)
K = Total Allowable Angular Misalignment (from Asy Dwg)
Note: Use same unit of measure for all readings.



Graph 1 Total Angular Misalignment

A Sample Problem

A Size 500 Type C FLEXXOR might have the these process parameters on its Assembly Drawing.

OPERATION	PROCESS	PARAMETERS	
ALIGNMENT	A0048	K = 0.009	On drawing
		L = 15	On drawing
		M = 7.5	Recommended on drawing
		(Safe OD) x = 0.0675	On drawing
		(Safe Face) y = 0.0338	On drawing

For "No Calculation" Alignment Limits

Installation personnel can use the (Safe OD) ***X*** and (Safe Face) ***y*** values found on the Assembly Drawing for the specific coupling <u>if they have positioned the face indicator as recommended on the drawing</u>. These values will be well within coupling limits.

To Calculate Full Alignment Limits

If one of our Indicator readings exceeds the "Safe" range found on our drawing, we use Equation 1 to find if our readings are acceptable. Suppose installation personnel had an OD TIR of .042 and a Face TIR of .038. They could plug these values into our equation to see if the machinery is aligned within coupling specifications. <u>Use actual ***M*** value</u>.

$$\frac{x}{L} + \frac{y}{M} \leq K \_\_\_ yields \_\_\_ \frac{.042}{15} + \frac{.038}{7.5} = .008 \leq K(.009)$$

Therefore we know our machinery is sufficiently aligned.

My Drawing Doesn't Show "Process Parameters"

Use of Equation 1 is also applicable in cases where the assembly drawing lacks the process parameters shown in the sample above. Measure actual ***L*** and ***M*** values. Contact CCA for the ***K*** value for your application. The value for *K* depends on the style of diaphragms used (CCA has several lines for different application requirements) and how those diaphragms are used in the coupling (single or multiple diaphragm packs).

Safety

These instructions assume the coupling will never exceed its axial movement or torque limits (found on Assembly Drawing) during its entire operating cycle.

Thank you for using FLEXXORS