Baldor•Dodge Gear Coupling: Basics

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Introduction

For many years, Baldor•Dodge Para-Flex couplings have provided the highest torque capacities among the Baldor•Dodge elastomeric coupling product lines. Baldor•Dodge Grid-Lign couplings were introduced to compliment the Baldor•Dodge Para-Flex product line by providing comparable torque capacities in a smaller package. The Baldor•Dodge DGF Gear Coupling was introduced to provide a more power dense solution. The Baldor•Dodge Gear Coupling's high torque ratings and large bore capacities give the coupling its power dense qualities. Gear couplings are commonly used on applications such as rolling mills, pumps, compressors, blowers, agitators, cranes, excavators, dredgers, paper making machinery, generators, winders, kneaders, along with many other power transmission applications.

Design & Construction

There are three different standard configurations used with Baldor•Dodge DGF Gear Couplings. These include Flex-Flex, Flex-Rigid, and Rigid-Rigid. These configurations come in both exposed bolt and shrouded bolt designs. The most common configuration is the exposed bolt, Flex-Flex style. This style includes two flex hubs, two mating sleeves, a gasket, two O-ring seals, and the required hardware for the size. The hardware consists of Grade 8 partial threaded hex head cap screws and nuts. The number of fasteners included varies by size. The flex hubs are manufactured from AISI 1045 steel and include external gear teeth. The sleeves are also manufactured out of AISI 1045 and include internal gear teeth. The external teeth of the Flex Hub and the internal teeth of the mating sleeve mesh together to basically create a 1:1 ratio internal spur gear drive. In a Flex-Flex style configuration there are two flex hub/ mating sleeve subassemblies. One connected to the driver shaft and one connected to the driven shaft. These two subassemblies mate together at the flanges on the mating sleeves and are bolted together with the supplied fasteners and nuts. Torque is transmitted through the two subassemblies at the bolted joint. Figure 1 provides details related to the construction of the Baldor•Dodge DGF Flex-Flex style Gear Coupling.

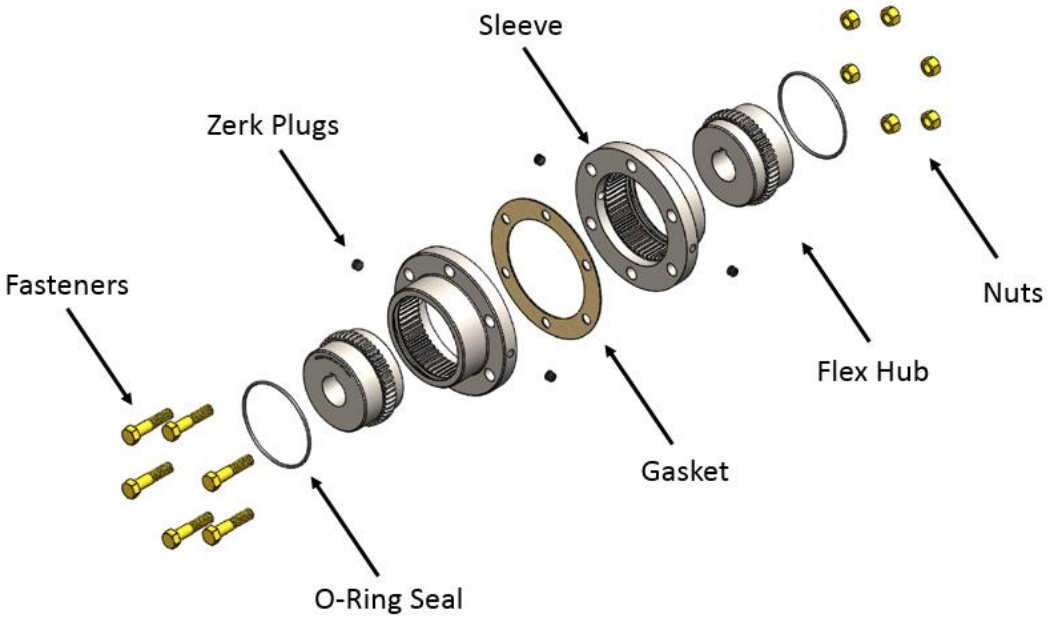

Figure 1: Flex-Flex Gear Coupling Exploded View

The internal gear teeth on the sleeve are longer than the external teeth on the flex hub. There is additional clearance designed into the gear coupling sleeves that allows for a gap between the two flex hubs. This clearance, combined with the longer internal teeth, allows the gear coupling to accept high levels of axial misalignment. Baldor•Dodge also offers a made-to-order configuration, known as a sliding gear coupling, which allows for additional axial movement if needed. In contrast, Baldor•Dodge provides a limited end float kit if reduced axial movement is needed.

Since pure axial misalignment is an unlikely scenario, features must also be designed in to accept parallel, axial, and combined misalignment. Baldor•Dodge accomplishes this through two different measures. First, the external gear teeth on the flex hub are crowned. If these teeth were not crowned they would experience high levels of edge loading during a misaligned condition. This crowning relieves this edge loading.

The second feature that allows for misalignment is backlash. Backlash is basically the amount of clearance between the teeth in a gear mesh. The higher the backlash the more misalignment the coupling can accept. However, it should be noted that additional backlash can pose problems for precision indexing applications. Increased backlash can also create issues with reversing applications. If either of these issues present a problem Baldor•Dodge can provide made-to-order style reduced backlash gear couplings. It should be noted that as backlash is reduced, misalignment capabilities are also reduced.

There are three different hub orientation options for the Flex-Flex style configuration. These include both hubs standard, both hubs reversed, and one hub standard and one hub reversed. These options allow for different between-shaft-end and gap dimensions. Reversing the hubs in a flex-flex configuration provides maximum axial movement capability on the standard design (Figure 2).

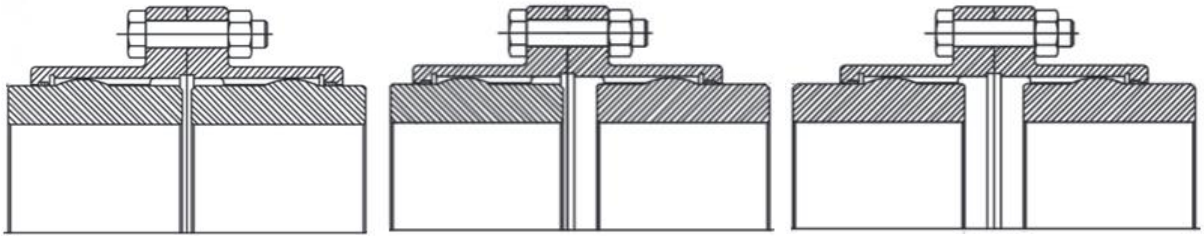

Figure 2: Baldor•Dodge DGF Gear Coupling standard-standard (right), standard-reverse (middle), and reverse-reverse (left) orientations.

Flex-Rigid configurations are also available. These configurations utilize one flex hub and mating sleeve subassembly instead of two like the Flex-Flex configuration. The other half of the coupling is replaced by a rigid hub. The hardware, O-rings, and gaskets used on the Flex-Flex rigid are also used on the Flex-Rigid system. Misalignment ratings are reduced with the Flex-Rigid configuration due to the elimination of one of the flex planes. In a Flex-Flex system each gear mesh represents a flex plane. Having two flex planes allows a gear coupling to accept both parallel and angular misalignment. Having one flex plane will only allow the coupling to accept angular misalignment.

Flex-rigid configurations are commonly used in floating shaft applications. In these applications two gear couplings are typically placed on each end of the floating shaft. Since both gear couplings will be Flex-Rigid and will have one flex plane each, this essentially creates one long spacer style coupling that has two flex planes again. Other applications require the use of a rigid hub to accommodate larger bore sizes. Figure 1 illustrates the components for a Flex-Flex Gear Coupling and Figure 3 illustrates the components for a Flex-Rigid configuration. Cross-section views of these configurations can be seen in Figure 2. Both inboard and outboard hub orientations are shown for the Flex-Flex style in Figure 2.

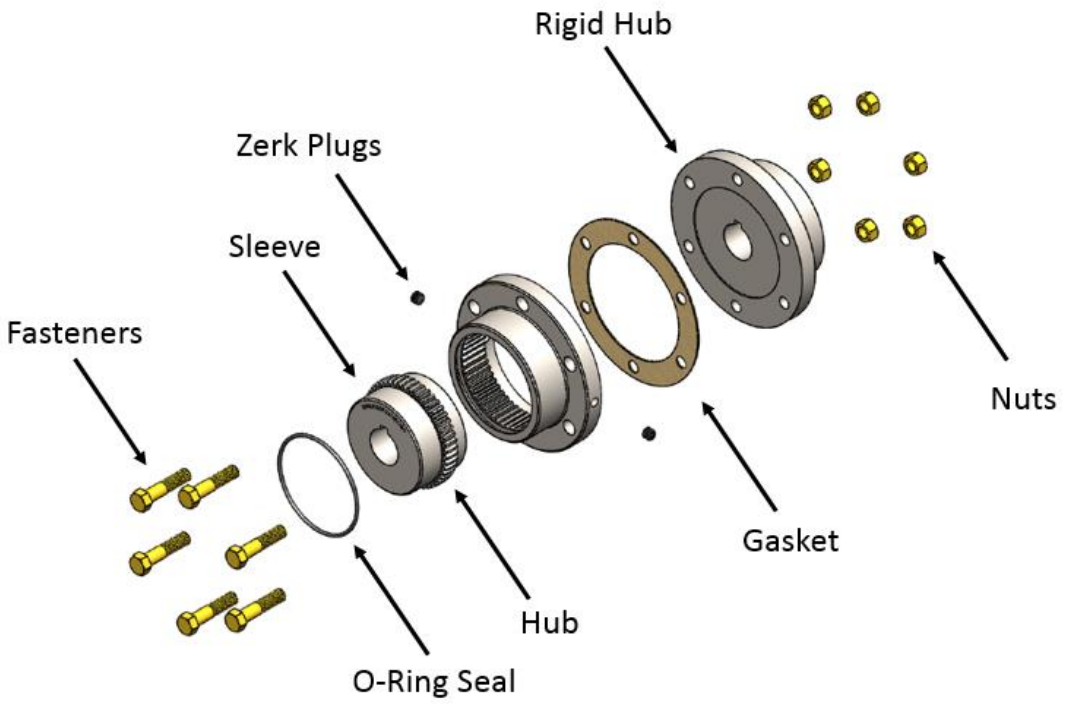

Figure 3: Flex-Rigid Gear Coupling Exploded View

For sizes 1.0 -5.0 the Baldor•Dodge Gear Coupling can accommodate 1.5° maximum of angular misalignment per flex coupling half. For sizes 6.0 -7.0 the Baldor•Dodge Gear Coupling can accommodate 0.75° maximum of angular misalignment per flex coupling half. Table 1 summarizes misalignment capabilities for standard Flex-Flex configurations. Max parallel offset is based on the angular misalignment per gear mesh. Flex-Rigid configurations do not accept parallel misalignment.

Table 1: Maximum Misalignment

DGF Gear Size	Maximum Parallel Offset	Maximum Axial Misalignment Per Gear Mesh	
	Inches	*Inches*	*Degrees*
1	0.055	0.625	1.5°
1.5	0.060	0.500	1.5°
2	0.085	1.375	1.5°
2.5	0.105	1.562	1.5°
3	0.115	1.312	1.5°
3.5	0.130	1.125	1.5°
4	0.150	1.375	1.5°
4.5	0.175	2.125	1.5°
5	0.200	2.687	1.5°
5.5	0.220	3.000	1.5°
6	0.120	2.812	1.0°
7	0.135	2.625	1.0°

Baldor•Dodge DGF Gear Couplings are supplied standard with interference fit bores. Interference fits are necessary for reducing fretting corrosion and preventing hub slipping on the shaft. When high torque loading and high speeds are applied to couplings the likelihood for fretting corrosion and hub slipping increase. Due to the high torque and high speed capacities of gear couplings, interference fits are typically recommended. Baldor•Dodge does offer clearance fit bores on a made to order basis. All interference fit bores coincide with AGMA 9002 and ISO R775 standards.

Baldor•Dodge DGF Gear Couplings are designed to match AGMA 9008 flange dimensions. This makes Baldor•Dodge DGF Gear couplings interchangeable half-for-half with other AGMA style gear couplings. It should be noted that AGMA 9008 only specifies flange dimensions and not tooth profiles. For this reason, hubs are not interchangeable with other manufacturer's sleeves and sleeves are not interchangeable with other manufacturer's hubs.

Gear couplings require lubrication to reduce wear and heat generation between the mating hub and sleeve teeth. Fitted O-rings seal are used between the flex hub and the mating sleeve to protect the lubricant from contamination. It is recommended that Baldor•Dodge Coupling Grease be used on typical gear coupling applications. Baldor•Dodge C.O. Engineering should be consulted for recommendations related to specific applications. More information related to Baldor•Dodge Coupling Grease can be found in Baldor•Dodge White Paper WP0153.

For additional information or questions related to Baldor•Dodge Gear Coupling Basics, Baldor•Dodge Bearings and PT Component Customer Order (C.O.) Engineering should be contacted. Contact information for Baldor•Dodge C.O. Engineering can be found on the Baldor•Dodge Engineering Support webpage at http://www.baldor.com/brands/baldor-Baldor•Dodge/product-support/engineering-support.