Endura Magnetic Coupling Torque Ratings

MAGNETIC COUPLING SIZES for ENDURA PUMPS

Three magnetic coupling sizes, 1", 1.5", and 2", cover the entire range of Group I operation to the run-out at maximum impeller diameter and are sized conservatively to the specific gravity of SG = 2. Group II is covered by two sizes, 2" and 3". Neodymium Iron Boron (NdFeB) drives are used as the standard, and Samarium Cobalt (SmCo) drives are used for high temperature. Mag couplings are rated by their torque transmission capability. At different speeds, these torque ratings translate to different horsepower ratings, in accordance with the formula:

$$\text{Horsepower (Hp)} = \frac{\text{Torque (ft– lb) x Speed (RPM)}}{5252}$$

NdFeB Magnets, METAL **Shell (at room temperature):**

Rated Torque & Horsepower at RPM:

SIZE	Torque (ft-lb)	1450 RPM	1750 RPM	2880 RPM	3550 RPM
Group I					
1"	39	11	13	21	26
1.5"	59	16	20	32	40
2"	78	22	26	43	53
Group II					
2"	173	48	58	95	117
3"	260	72	87	143	176

NdFeB Magnets, NON-METALLIC TTZ **Shell (at room temperature):**

Rated Torque & Horsepower at RPM:

SIZE	Torque (ft-lb)	1450 RPM	1750 RPM	2880 RPM	3550 RPM
Group I					
1.5"	38	11	13	21	26
2"	57	16	19	31	39
Group II					
2"	63	17	21	35	43
3"	95	26	32	52	64

NdFeB Magnets, Metal Shell Eddy Current Losses:

Horsepower Losses at RPM:

	316 SS		Alloy-C	
SIZE	1750 RPM	3500 RPM	1750 RPM	3500 RPM
Group I				
1"	0.5	1.8	0.4	1.7
1.5"	0.8	2.7	0.6	2.6
2"	1.0	3.6	0.8	3.4
Group II				
2"	2.3	8.4	1.9	7.8
3"	3.5	12.6	2.9	11.7

Notes

1) Coupling horsepower capabilities shown above must be greater than the required BHP at run-out obtained from individual performance curves. The required BHP is a summation of the hydraulic power required to pump the liquid plus the eddy current losses in the shell. Refer to individual curves.
2) Above values are for NdFeB magnets and eddy current losses. To obtain torque capability of SmCo magnets at ambient temperature, multiply the above values by 0.9.
3) NdFeB magnets can be used to 250 °F. Above this temperature, SmCo magnets should be used, up to 600 °F. Torque capability of NdFeB must be de-rated by 1% for each 15 °F. SmCo must be de-rated by 1% for each 50 °F.

Magnets are attached to the carrier via high temperature epoxy and additionally retained by individual slots. Inner magnets are hermetically sealed in a material consistent with the metallurgy of the pump. Couplings are 100% tested for the seam integrity and are two-plane balanced.

PROTECTION FROM DECOUPLING

During normal operation, the outer (drive) magnet and the inner (driven) magnet are rotated synchronously, with no slip between the two; i.e. the pump shaft speed equals the motor shaft speed.

If the breakaway torque of the magnetic coupling is exceeded, decoupling of the inner and outer magnet will occur. When starting the motor, decoupling could occur if the ramp up speed of the motor exceeds the inner magnet's ability to remain synchronized with the outer magnet. In this case, a slow start device on the motor or a VFD may be required. Decoupling is also possible during operation if abrupt system transients are encountered or extreme changes in operating conditions occur. If decoupling occurs, the motor must be stopped immediately or excessive heat will be generated, which can permanently demagnetize the coupling and cause additional problems with the pump.

The remedies to decoupling are:

a) Increase the time needed for the motor to come up to full speed, i.e. a slow start.
b) Use a larger magnetic coupling.
c) Make sure fluid viscosity is not significantly higher than expected.
d) Make sure a discharge valve is not wide open, causing high power demand.
e) Use a motor power sensor to stop the motor in the event of decoupling.