Technical Specification for Magnetic Coupling

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1. Introduction

This document defines the technical specification for Magnetic Coupling which is used between Rotary Vane Pump and Induction Motor. Figure-1 below shows general arrangement of internal (driven) and external (driver) magnetic couplings with Pump casing. For present application, a vane pump is being employed. Internal coupling shall be assembled on pump shaft made of EN25 material through interference fit. The entire shaft along with internal coupling is immersed in the fluid being pumped (Mixture of Ethylene Glycol (65%) and Water (35%)). External coupling shall be assembled on motor shaft made of SS316 material through interference fit. A wall of Pump casing made of Titanium Grade-5 Alloy (Ti-6Al-4V) material separates the internal and external magnetic couplings as shown in Figure 1.

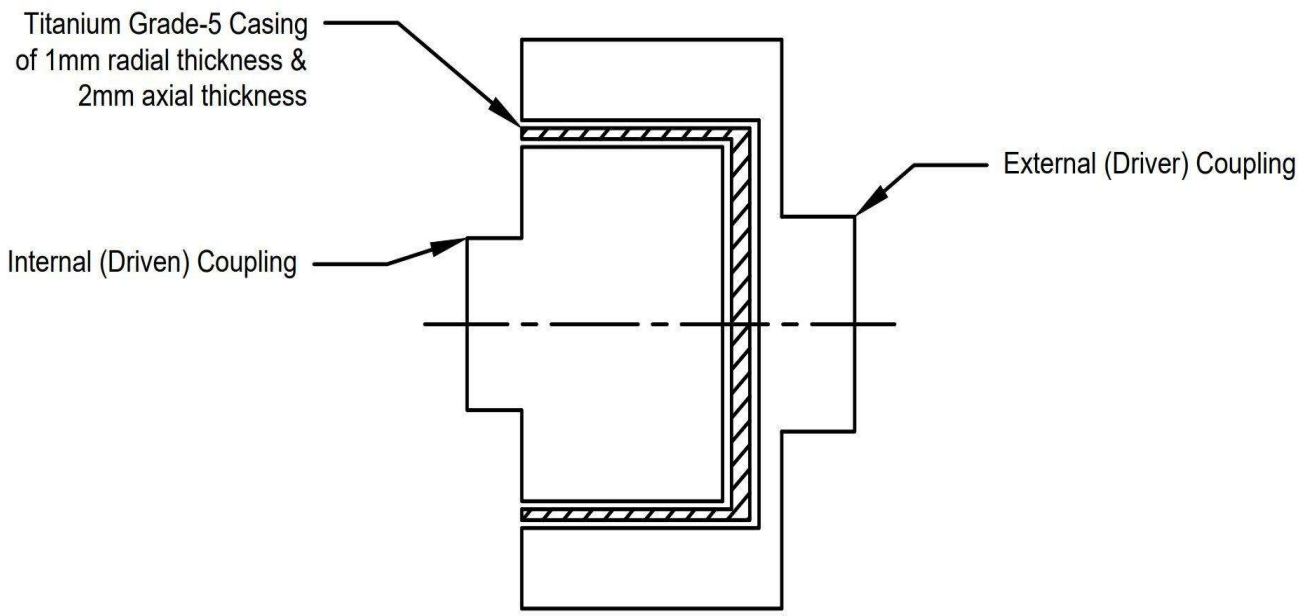

Figure-1: General arrangement of Magnetic Coupling with Pump Casing

2. Scope of supply

i. External (Driver) Magnetic coupling as per the drawing no. 3-PM-45-00001, Rev 00

ii. Internal (Driven) Magnetic coupling as per the drawing no. 3-PM-45-00001, Rev 00

3. Magnetic Coupling Specification

S. No	Description	Quantity
1.	Design torque for the coupling at temperature (45 °C)	1 N-m
2.	Operating temperature	-40 °C to +85 °C
3.	Maximum operating temperature	+150 °C
4.	Operating pressure for Internal coupling	8.5 bar
5.	Operating speed	12000 RPM
6.	Balancing grade	G 2.5 grade as per ISO-1940:2003
7.	Total weight of coupling (maximum)	400 g
8.	Dimensions	As per drawing number: '3-PM-45-00001, Rev 00'
9.	Total radial air gap between internal and external magnetic couplings	2.5 mm (including 1 mm thick casing shroud of Titanium Grade-5 Alloy)
10.	External and internal coupling body material	Titanium Alloy Grade 5 (Ti-6Al-4V) as per AMS4928 P / MIL-T-9047 G
11.	Magnet	Samarium Cobalt (Sm2Co17)
12.	Marking	Following information on parts: a. Manufacturer identification b. Manufacturer P/N

4. General requirements

- The equipment shall be highly reliable which shall be the prime consideration. It shall be capable of safe, proper and continuous operation at all conditions as indicated. The equipment shall be designed for a service life of 3000 hours.
- Design dimension should not go beyond the limits specified. Changes if any, can be made only with prior approval of BHEL in writing.
- The vendor shall submit the dynamic balancing test report.
- Warranty against defects in design, workmanship and materials for a period of 12 months from the date of supply.

5. Quality Assurance and Inspection

- All GOODS shall be supplied with relevant Test Certificates & other shop test certificates, as applicable. MILL Test Certificate as per above mentioned AMS Standard indicating Chemical and Mechanical properties of all the raw materials used (Titanium Alloy Grade 5 and Samarium Cobalt) need to be submitted.
- All materials used shall be new and of tested quality and shall conform to the respective material specifications.
- Pump Motor unit along with Magnetic Coupling will be subjected to the following tests as per MIL-STD-810H by BHEL:
  - i. Altitude Test (60,000ft)
  - ii. High Temperature Storage cum Operating
  - iii. Low Temperature Storage
  - iv. Low Temperature Operating
  - v. Thermal Shock
  - vi. Rain Drip Test
  - vii. Humidity
  - viii. Fungus Direct Effect
  - ix. Salt Fog
  - x. Fluid Contamination Test
  - xi. Dust
  - xii. Acceleration – Operational
  - xiii. Acceleration – Structural
  - xiv. Random Vibration
  - xv. Shock Test
  - xvi. Transit Drop
  - xvii. Bench Handling
  - xviii. Gunfire Vibration
  - xix. Endurance Test
  - xx. Burst Pressure Test

  Vendor must ensure that the Magnetic Coupling and Magnets are intact and there will not be any type of distortion / damage in Magnetic Coupling during or after the performance of these tests.

- Inspection of GOODS shall be carried out at BHEL Stores upon receipt of items. Vendor shall, however, repair/replace the damaged/rejected GOODS to the satisfaction of BHEL at no extra cost.

6. Certificate of compliance/release note:

A release note shall be furnished with the supplies on the following lines:

"CERTIFIED THAT GOODS SUPPLIED AGAINST THE REFERENCED PURCHASE ORDER ARE FREE FROM DEFECTS AND HAVE BEEN INSPECTED, TESTED AND CONFORM TO GIVEN SPECIFICATIONS. THESE GOODS CAN BE USED FOR AEROSPACE APPLICATIONS" or on similar lines.

RECORD OF REVISIONS

REV.NO.	DATE	REVISION DETAILS	REVISED	APPROVED
00	29-11-2022	New Specification	Mullapudi Naveen Kumar	G Raghavender Rao
01	13-12-2022	General Corrections	Mullapudi Naveen Kumar	G Raghavender Rao