INTER PLANT STANDARDIZATION – STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR MAGNETIC CLUTCH** *(FIRST REVISION)*	**IPSS:1-04-027-11**
	Corresponding IS does not exist	Formerly : IPSS:1-04-027-93

0. FOREWORD

0.1 This Interplant Standard has been prepared by the Standards Committee on Switchgear and Controlgear, IPSS 1:4 with the active participation of the representatives of the steel plants, concerned organizations and established manufacturers of Magnetic Clutch; and was adopted in March 2011.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores or equipment (or while placing orders for additional requirements) by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of sizes (or types) from among those mentioned in this standard, for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

1. SCOPE

1.1 This Interplant Standard covers requirements and tests of magnetic clutches friction type used for transmitting power smoothly to load in machine tools and various drives in steel plants.

1.2 It covers (i) dry type, and (ii) wet type friction magnetic clutches used in machine tools and other drives in steel plants.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions of terms given in IS 1885 (Part-1):1961 `Electrotechnical vocabulary (Part-1) Fundamental definitions' and IS 1885 (Part-31):1971 `Electrotechnical vocabulary (Part-31) Magnetism' shall apply.

3. SITE CONDITIONS

3.1 The following shall constitute normal site conditions :

a) *Ambient termperature* - The reference ambient temperature shall be **50°C.**

b) *Relative humidity* - The relative humidity can be up to maximum of 100%.

c) *Altitude* - Altitude shall not exceed 1000 metres.

d) *Environment* - Ambient air may contain fair amount of conducting dust, water, fumes, oil, steam, etc.

4. RATING

4.1 **Working Voltage** - Rated voltage of clutch coil shall generally be one of the following voltages:

dc 24 V, 48 V, 96 V, 110 V, 220 V

4.2 **Torque Transmission Capacity** - Torque transmission capacity of clutch at a relative speed of 100 rpm between the armature and the friction lining shall be 14.105 kgm.

4.3 **Maximum Speed** - Maximum operating speed of clutch shall be one of the following ratings :

3000 rpm, 1500 rpm, and 1000 rpm.

5. **DESIGN AND CONSTRUCTION**

5.1 The clutch shall consist of following components and sub assemblies :

a) Conductor material shall be Class F insulated enamelled round copper wire.

b) The annular space between coil and the magnet body shall be filled with suitable compound. The filling compound shall be non hygroscopic and shall have low co-efficient of expansion and high thermal conductivity. The coil and the compound shall be able to withstand the rise in temperature corresponding to Class F insulation.

c) The leads shall be firmly secured on the terminals on the magnet body. The coil shall be housed in the magnet body in such a way that no oil and water can enter inside coil.

5.2 **Magnet Body** - Magnet body shall be cast from high permeability steel conforming to Grade 1 of IS 4491:1994 `Specification for steel castings for high magnetic permeability (third revision)' or equivalent forging. Face of the magnet body coming in contact with armature plate shall be finely finished by grinding.

5.3 **Friction Lining**

a) *Dry Type* - Face of magnet shall be lined with a suitable material and shall be designed for high friction, good heat and wear resistance. Lining shall have groove radially so as to allow the cooling. Friction surface material shall have :

i) High coefficient of friction

ii) Uniform coefficient of friction

iii) *Low wear rate* & good heat resistance

iv) Good mechanical strength

v) Low shrinkage, and

vi) Ability to absorb energy by slippage during engagement

Dry type clutch facing shall conform to IS 3649:1966 'Specification for clutch facings for automotive transmission'.

b) *Wet type* – Magnetic clutches which are immersed in oil especially in machine tools shall have metallic friction plate. Friction plate shall be solid plate of steel bonded with bronze or sintered bronze. Plate shall have grooves and shall prevent oil information.

5.4 **Armature** – The armature shall consist of armature plate, armature hub and springs. The armature shall be made of low carbon steel (99.9% Fe). Facing of plate shall be finely finished by grinding. The armature plate core hardness shall be within 50-60 RB with core microhardness of 50-60 RC for a depth of 0.05 mm maximum.

5.4.1 The springs shall be able to quickly move the armature plate away from magnet body when clutch is disengaged.

5.5 **Slipring** – Sliprings, where used, shall be made of brass conforming to IS 410:1977 `Cold rolled brass sheet, strip and foil (third revision)' or high carbon steel with hardness of 50-55 RC.

5.5.1 The sliprings shall be either shrink fitted on the magnet body or fixed with the magnet body with high tensile steel screws. Insulating material of slipring shall be fibre glass mouldings having adequate mechnical strength, excellent anti-tracking resistance, oil and water resistance.

5.5.2 Connection of coil on the slipring shall be rigid and secured to the slipring by means of screws.

5.6 **Brush Holder** – Brush holders shall have good mechanical strength, and oil and water resistance. It shall be properly insulated electrically from the body and between the brush holders.

5.7 **Carbon Brush** – Carbon brushes and springs of brushes shall be designed so as to ensure reliable transfer of currents to the sliprings. The carbon brushes shall be of copper graphite.

6. TESTS

6.1 Each clutch coil and slipring shall be subjected to the following tests at the factory premises and shall be dispatched with test certificate.

6.2 **High Voltage Test** – Clutch coil and slipring shall withstand the following voltage at 50 c/s between coil and body for one minute:

Coils up to 30 V – test voltage 600 V
Coils up to 60 V – test voltage 1000 V
Coils up to 110 V – test voltage 1500 V
Coils up to 250 V – test voltage 2000 V

6.3 **Insulation Resistance Test** – The insulation resistance of clutch coil and slipring shall be not less than 50 M-ohm when tested with 500 V direct reading portable insulation resistance tester in cold condition after high voltage test.

6.4 **Temperature Rise Test** – The clutch assembly shall be subjected to repeated operation of 150 engagements / hour at rated speed and voltage. The temperature of coil shall not exceed 150^{o}C and static temperature rise of the friction lining shall not exceed 40^{o}C.

7. MARKING

7.1 Each clutch assembly shall be provided with metallic name plate giving the following information. However, small size clutches may have the information engraved on the body.

a) Type
b) Manufacturer’s name, trade mark and Sl.No.
c) Load transmission capacity
d) Rated voltage and speed
e) Duty cycle
f) Year of manufacture
g) Reference to this standard i.e. IPSS:1-04-027-11

8. INFORMATION TO BE SUPPLIED BY MANUFACTURER

8.1 Manufacturer shall supply the following additional information along with each clutch coil:

a) Clutch Coil Winding Data

   1) Size of conductor
   2) Number of turns
   3) Materials of inter layer insulation
   4) Materials of filling compound

b) Coil Resistance – Cold and hot

c) Cross Section Drawing of Clutch Assembly

d) Test Certificate

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