INTER PLANT STANDARD – STEEL INDUSTRY		
IPSS	**PARTICULAR REQUIREMENTS OF CONTROL PANELS FOR dc CRANES** (*First Revision*) Based on IS 8623 (Part-1):1993	**IPSS:1-04-043-03** Formerly : IPSS: 1-10-012-84

0. FOREWORD

0.1 This Interplant Standard has been prepared by the Standards Committee on Switchgears and Controlgears, IPSS 1:4 with the active participation of the representatives of the steel plants, concerned organizations and established manufacturers of Cranes; and was adopted in December 2003.

0.2 Inter Plant 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/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.

0.3 The requirements of control panels for cranes are being covered in three separate Inter Plant Standards as follows :

a) 1-04-041-03 General requirements for control panels for cranes *(first revision*)

b) 1-04-042-03 Particular requirements for control panels for ac cranes *(first revision*)

c) 1-04-043-03 Particular requirements of control panels for dc cranes *(first revision*)

Consequently these Inter Plant Standards are to be read in conjunction with one another.

0.4 The provisions of the Indian Electricity Rules, 1956 and other statutory regulations of the government of India and the relevant State Govt shall apply in addition to the various requirements specified in the Inter Plant Standards indicated in 0.3.

0.5 This standard is generally based on IS 8623 (Part-1):1993 `Specification for low voltage switchgear & controlgear assemblies – Part 1 Requirements for type tested & partially type tested assemblies (first revision) .

0.6 This revision has been carried out to update the standard.

1. SCOPE

1.1 This Interplant Standard covers the requirements of control panels for dc cranes with main circuit voltage up to and including 1200 V dc.

1.2 Control panels for dc cranes shall comply with all the requirements of IPSS:1-04-041-03 `General requirements of control panels for cranes (first revision)', if not otherwise indicated in this standard and shall comply with particular requirements specified in this standard.

1.3 This standard also covers some of the salient features of the control schemes employed for the control panels of dc cranes for the hoist, long travel and cross travel mechanisms; mechanisms like slewing, grab, etc are not included. However, these schemes are indicative only; better control circuits may be designed based on future development.

1.4 This standard is intended for enclosed type of control panels only. However, this standard may be applied for open type control panels also with relevant modifications, to be agreed upon between the manufacturer and the purchaser.

1.5 Individual devices and components incorporated inside the control panel shall conform to the relevant Indian Standard Specifications or Interplant Standard for steel industry. Provisions for the same are not covered in this standard.

1.6 This standard does not apply to control panels of dc cranes used in hazardous/explosive atmosphere.

2. TERMINOLOGY

2.1 The provisions of 2 of IPSS:1-04-041-03 shall apply.

3. SERVICE CONDITIONS

3.1 The provisions of 3 of IPSS:1-04-041-03 shall apply.

4. ELECTRICAL CHARACTERISTICS OF CONTROL PANEL

4.1 **Rated voltage of the main circuit** - The rated voltage will be 230 V dc or 460 V dc. The tolerance on the voltage shall be + 6% and - 10%.

4.2 **Rated Thermal Current** - Rated thermal current shall be 75, 150, 300, 600 & 900 A.

4.3 **Rated Short Circuit Current** - Rated short circuit current shall be 35 kA.

5. DESIGN AND CONSTRUCTION

5.1 The provisions of 5 of IPSS:1-04-041-03 shall apply.

6. PANEL WIRING

6.1 The provisions of 6 of IPSS:1-04-041-03 shall apply.

7. TERMINATION

7.1 The provisions of 7 of IPSS:1-04-041-03 shall apply.

8. SPECIFICATION OF COMPONENTS

8.1 The provisions of 8 of IPSS:1-04-041-03 shall apply.

9. EARTHING

9.1 The provisions of 9 of IPSS:1-04-041-03 shall apply.

10. INFORMATION TO BE GIVEN WITH CONTROL PANEL

10.1 The provisions of 10 of IPSS:1-04-041-03 shall apply.

11. TESTS

11.1 The provisions of 11 of IPSS:1-04-041-03 shall apply.

12. GENERAL REQUIREMENTS OF CONTROL SCHEMES

12.1 *Control Scheme for Hoist Operation* - Magnetic controllers are used for hoisting purpose and are powered by series wound dc motors and series wound brakes. These motions are the type which always require power from the motor for hoisting but may require either motor torque for lowering an empty hook and light loads or dynamic braking torque when lowering heavy overhauling loads.

12.1.1 For hoisting, the controller connects the motor to the line, with the armature, a series field, a series brake coil and accelerating resistance in a series circuit. By means of decreasing the amount of resistance in series with the motor, increasing value of speed and torque can be obtained on subsequent master switch point.

12.1.2 For lowering, the connections convert the motor into a shunt machine by connecting the series field with resistance in parallel with the motor armature circuit. The motor develops motor torque when driving down a light load or electrical braking torque when lowering heavy load. Accelerator for hoisting as well as acceleration and deceleration for lowering are provided by controller and time delay relays.

12.1.3 Operation of power type over hoist limit switch (when provided)

12.1.3.1 This limit switch is mounted on the trolley on which the hoist motor is installed and is arranged to be operated or tripped when the hook block reach their limit of travel in the hoisting direction. When the hook block causes the limit switch to operate, its normally closed contacts open and its normally open contacts close and the motor is disconnected from the line and a dynamic braking loop is set up through the armature, the series field and the series resistors. The dynamic braking torque thus produced helps the magnetic brake bring the hoist to a complete stop.

12.1.3.2 If the limit switch fails to reset when the hook block is lowered, a straight series motor connection is set up and then motor speed begins to increase. The overspeed relay picks up and de-energizes the under voltage relay. Thus the motor stops. The relay remains de-energized and the operation cannot be restarted until the master switch is returned to the OFF position.

12.1.3.3 In case the customer needs hoist to be protected by limit switch/limit switches connected in the control circuit it may be provided with a counterweight type and a gear type limit switch connected in series so as to have double safety. To avoid overhoisting due to earth fault in limit switch circuit, one contact shall be provided in positive and the other in the negative side of the directional contactor coil.

12.2 Control Scheme for Bridge and Trolley Operation

12.2.1 Reversing plugging type controllers are designed to meet the requirements of the bridge and trolley of cranes powered with series wound direct current motors. These drives may or may not be equipped with series, shunt or hydraulic brakes depending on the purchaser’s requirements.

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