INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**REFERENCE GUIDE FOR EOT CRANES**	**IPSS: 2-02-009-18 (First Revision)**
	Corresponding IS does not exist	Formerly: IPSS: 2-02-009-97

0. FOREWORD

0.1 Interplant standardization in steel industry has been initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Interplant Standards is prepared by the Standard Committee on E O T Cranes, IPSS 2:2 with the active participation of the representatives of all the steel plants and leading consultants and was adopted in March, 1996. Thereafter, standard was revised by the Standard Committee in March, 2018.

0.2 Interplant standardization for steel industry primarily aims at achieving rationalization and unification of partsand assemblies of process and auxiliary equipment used in steel plants and these are intended to provide guidance to the steel plant engineers, consultants and manufacturers in their design activities. It is not desirable to make deviations in technical requirements.

0.3 In IS: 3177-1999 (Reaffirmed 2015) “Code of practice for EOT Cranes and gantry Cranes other than steel work Cranes”and IS: 4137 – 2015 “Code of practice for heavy duty EOT Cranes including special service machines for use in steel plants” various parameters like lifting capacities, building widths, span of cranes, height of lifts, speed and accelerations, trolley gauges etc., have been left open to be decided by the customer while placing order for the cranes. IPSS has done extensive studies on these parameters, considering the various technological requirements in the steel plants and made certain recommendations for these items. IPSS has also developed several standards for design and manufacture of cranes and crane assemblies / components. An effort is made in this reference guide to give reference of various IPSS standards and Indian Standards that are applicable for the cranes as a whole and components for convenience of designers, manufacturers and users.

1. SCOPE

1.1 This interplant standard provides guidance on references of various Interplant and Indian Standards that are applicable for the cranes as a whole and their components for convenience of designers, manufacturers and the users.

2. GUIDE TO REFERENCES

2.1 The interplant standards which may be referred to in connection with different design aspects and components of EOT cranes, are indicated in Schedule – 1.

3. LIST OF REFERENCE STANDARDS

3.1 The lists of available reference interplant and Indian Standards are given at Appendix A& B respectively.

SCHEDULE – 1

(Clause 2.1)

REFERENCE GUIDE FOR EOT CRANES

ITEM NO.	DESIGN ASPECTS / COMPONENT PART	REFERENCE
A.	**MAJOR DESIGN PARAMETERS**	**IPSS : 2-02-001-18**
i.	**Nomenclature of Crane based on lifting capacity** Nomenclature of general purpose EOT Cranes, ladle, stripper and soaker cranes are covered in this clause.	IPSS : 2-02-001-18 Clause – 2
ii.	**Service Data** Depending upon the extent and frequency of utilization of the mechanism, the duties of the mechanisms are decided. In any crane all the mechanisms need not have same duty factor. Depending upon the requirement, different mechanisms of a crane can have different duty factor.	IPSS : 2-02-001-18 Clause – 3
iii.	**Speeds** Recommended speeds for LT, CT and hoist mechanisms for different duties and capacities of cranes are given.	IPSS : 2-02-001-18 Clause – 4
iv.	**Acceleration** Acceleration plays a vital role in the life of the mechanisms. The frame size of the motor selected will depend on both speed and acceleration of the mechanism. Undue fast accelerations will require bigger motors and result in enormous forces on the mechanisms which may lead to failure. Considering the duty requirement and the functions accelerations are recommended.	IPSS : 2-02-001-18 Clause – 5
v.	**Braking** Braking is an important operation involving safety and control aspects. It covers both mechanical & electrical criteria.	IPSS : 2-02-003-18 Clause – 4.14
vi.	**Trolley Gauge** To ensure interchangeability of trolleys as a whole of the same capacity crane, trolley gauges for various capacities of cranes are standardized.	IPSS : 2-02-010-18 Clause - 6
vii.	**Building Width and Crane Spans**	IPSS : 2-02-001-18 Clause – 7

	Building width is standardized on 6 m modules – Cranes spans for corresponding building width are given considering walkways required.	
B.	**GENERAL CODE OF PRACTICE FOR DESIGN OF EOT CRANES (MECHANICAL ASPECTS)** This standard covers general aspects of steel mill duty cranes like kinematic schemes for mechanism and their layouts, duty factors, excepted lift, design requirements for various crane components. It is expected to achieve design unification in the cranes through the use of this standard.	**IPSS : 2-02-003-18**
i.	**Structural Design** Design considerations for bridge girders, end carriages, widths of walkways and platforms, design of trolley frames, requirement for repair cages & operator's cabins are considered in this part.	IPSS : 2-02-003-18 Clause – 3
ii.	**Mechanical** Duty factors to be adopted for various classes of mechanisms, total expected life of mechanisms specification for designing rope drums, selection of trolley rails, hoist ropes, design of rope sheaves, track wheels, buffers, kinematic schemes to be adopted for hoist drives, travel drives, type of gearing and gear boxes, selection of bearings, couplings, lifting hooks and brakes are covered in this part	IPSS : 2-02-003-18 Clause - 4
	Relevant Interplant Standards	
1.	Specification for Crane wheels	IPSS : 1-08-001-18
2.	Specification for Sheaves assembly for EOT Cranes	IPSS : 1-08-002-18
3.	Specification for Wire Ropes for Crane	IPSS : 1-08-003-18
4.	Specification for Forged Crane Hooks	IPSS : 1-08-004-18
5.	Specification for Brakes for Cranes	IPSS : 1-08-005-18
6.	Specification for Festoon Cable Trolley	IPSS : 1-08-006-18
7.	Specification for Hook Blocks	IPSS : 1-08-007-18
8.	Specification for Forged Ramshorn Hooks	IPSS : 1-08-008-18
9.	Specification for Laminated Ladle Hooks	IPSS : 1-08-009-18
10.	Specification for Crane Wheel Assembly (live axle type)	IPSS : 1-08-010-18
11.	Specification for Thimbles	IPSS : 1-08-013-18
12.	Specification for Horizontal Gear Boxes for Cranes	IPSS : 1-08-014-18

13.	Code of Practice for clamping of Crane Rails	IPSS : 1-08-017-18
14.	Crane Gear Boxes – Acceptance Norms	IPSS : 1-08-020-18
C	**GENERAL CODE OF PRACTICE FOR DESIGN OF EOT CRANES (ELECTRICAL ASPECTS)** This standard deals with selection of D C Mills duty motors, selection of A C motors, controllers, brakes, resistance boxes, limit switches, safety switches, contactors, lighting, earthing, current collector system, power distribution system and details of control panels. Recommendation regarding electrical duty cycle to be considered for various applications is also given in this standard.	IPSS : 2-02-004-18
i.	**Basic Parameters for Standardization of Steel Plant equipment** In this standard, recommendations on ambient temperature, voltages, humidity, altitude and air are given	IPSS : 1-02-020-18 (Clause 3.1)
ii.	**Selection of d c motors for Hoist LT & CT** **Relevant Interplant Standards** : 1. Specification for d c mill/ crane duty motors (800 series) 2. Specification for dc mill/ crane duty motors (600 series)	IPSS : 2-01-004-18 (Clause – 3.1) IPSS : 1-03-002-08 IPSS : 1-03-005-03
iii.	**Selection of ac motors for Hoist LT & CT** **Relevant Interplant Standards** : 1. Specification for ac mill/ crane duty slipring induction motors. 2. Specification for ac crane duty squirrel cage induction motors	IPSS : 2-02-004-18 (Clause 3.2.3) IPSS : 1-03-003-08 IPSS : 1-03-004-14
iv.	**Selection of Controllers** **Relevant Interplant Standards** : 1. Specification for master controllers. 2. Specification for drum/ cam controllers	IPSS : 2-02-004-18 (Clause – 4) IPSS : 1-10-005-81 IPSS : 1-10-006-81
v.	**Brakes** **Relevant Interplant Standards :** 1. Specification for brake coils for cranes. **2.** Specification for electro- hydraulic thrustors.	IPSS :2-02-004-18(Clause – 5) IPSS : 1-10-009-97 IPSS : 1-10-003-81

vi.	**Selection of Resistances** **Relevant Interplant Standards :** 1. Specification for resistance boxes for power circuits.	IPSS : 2-02-004-18 (Clause – 6) IPSS : 1-10-002-02
vii.	**Selection of Limit Switches** **Relevant Interplant Standards :** 1. Specification for mechanically operated limit switches for control circuits for voltages upto and including 1000V ac & 1200 V dc.	IPSS : 2-02-004-18 (Clause – 7) IPSS : 1-04-003-03
viii.	**Selection of Emergency Push Button**	IPSS : 2-02-004-18 (Clause – 8)
ix.	**Selection of Contactors** **Relevant Interplant Standards :** 1. Specification for contactors for voltages not exceeding 1000 V ac or 1200 V dc. 2. Specification for moulded case circuit breakers for voltages not exceeding 1000 v ac or 1200 V dc.	IPSS : 2-02-004-18 (Clause – 9) IPSS : 1-04-001-03 IPSS : 1-04-001-03
x.	**Earthing**	IPSS : 2-02-004-18 (Clause – 12)
xi.	**Selection of Current Collector System** **Relevant Interplant Standards :** 1. General requirements for current collector assembly.	IPSS : 2-02-004-18 (Clause – 13) IPSS : 1-10-008-08
xii.	**Specifications for Power Distribution System**	IPSS : 2-02-004-18 (Clause – 14)
xiii.	**Selection for Control Panels** **Relevant Interplant Standards :** 1. General requirements for control panels for cranes. 2. Particular requirements for control panels for ac cranes. 3. Particular requirements for control panels for dc cranes	IPSS : 2-02-004-18 (Clause – 15) IPSS : 1-10-010-84 IPSS : 1-10-011-84 IPSS : 1-10-012-84
xiv.	**Methods for Creep Speed**	IPSS : 2-02-004-18 (Clause – 16)

xv.	**Recommendations regarding electrical duty cycle** In any crane all the mechanical need not have same electrical duty cycle. Depending upon the function and utilization of the mechanism, the required duty cycle has to be selected.	IPSS : 2-02-004-18 (Clause – 3)
xvi.	**Selection of Magnets** **Relevant Interplant Standards :** 1. Specification for Lifting Magnets.	IPSS : 1-10-001-11 IPSS : 1-10-001-11
D.	**CODE OF PRACTICE FOR SELECTION OF ELECTRICAL CABLES FOR USE ON EOT CRANES** This standard deals with type of cables to be used and selection of cables for various applications in EOT cranes.	IPSS : 2-02-005-18
E.	**CODE OF PRACTICE FOR SELECTION OF ELECTRICAL CABLES FOR USE ON EOT CRANES** In this standard guideline for laying of the electrical cables on EOT cranes in steel plants is given for ensuring prolonged life of cables.	IPSS : 2-02-006-18
F.	**GUIDELINES FOR SAFETY IN EOT CRANES** In this standard safety measures to be taken for hoist, CT and LT mechanisms, crane structures, electrical systems, lighting and other aspects are considered.	IPSS : 2-02-007-18
G.	**ACCEPTANCE NORMS FOR EOT CRANES** This standard covers the norms and deviations allowed in the overall dimensions and operating characteristics of the cranes like speed, accelerations, braking paths and alignment required in the structures and mechanisms.	IPSS : 2-02-002-18
H.	**TESTS AND CHECKS FOR ACCEPTANCE OF EOT CRANES** This standard lays down the tests and checks to be carried out for acceptance of EOT cranes for steel plants to be conducted at the manufacturer's works and in the customers' works after erection.	IPSS : 2-02-008-18

APPENDIX – A

(Clause 3.1)

LIST OF REFERENCE INTERPLANT STANDARDS

Sl. No.	IPSS Number	Description of IPSS
1.	IPSS : 1-02-004-18	The two stage oil hydraulic hand pumps used for remote control hydraulic jacks.
2.	IPSS : 1-02-020-18	Basic parameters for standardization of steel plant equipment.
3.	IPSS : 1-03-002-08	Specification for dc mill/ crane duty motors (800 series)
4.	IPSS : 1-03-003-08	Specification for ac mill/crane duty slipring induction motors.
5.	IPSS : 1-03-004-14	Specification for ac crane duty squirrel cage induction motors.
6.	IPSS : 1-03-005-03	Specification for dc mill/crane duty motors (600 series).
7.	IPSS : 1-04-001-03	Specification for contactors for voltage not exceeding 1000 V ac or 1200 V dc.
8.	IPSS : 1-04-003-03	Specification for mechanically operated limit switches for control circuit for voltage upto and including 1000 V ac or 1200 V dc.
9.	IPSS : 1-04-004-11	Specification for moulded case circuit breakers for voltage not exceeding 1000 V ac or 1200 V dc.
10.	IPSS : 1-08-001-18	Specification for crane wheels.
11.	IPSS : 1-08-002-18	Specification for sheaves assembly for EOT cranes.
12.	IPSS : 1-08-003-18	Specification for steel wire ropes.
13.	IPSS : 1-08-004-18	Specification for forged crane hooks.
14.	IPSS : 1-08-005-18	Specification for Brakes for cranes.
15.	IPSS : 1-08-006-18	Festoon cable trolley.
16.	IPSS : 1-08-007-18	Specification for Hook blocks.
17.	IPSS : 1-08-008-18	Specification for forged ramshorn hooks.
18.	IPSS : 1-08-009-18	Specification for laminated ladle hooks.
19.	IPSS : 1-08-010-18	Specification for crane wheel assembly (live axle type)
20.	IPSS : 1-08-013-18	Specification for Thimbles.
21.	IPSS : 1-08-014-18	Horizontal gear boxes for cranes.
22.	IPSS : 1-08-017-18	Code of practice for clamping of crane rails.
23.	IPSS : 1-08-020-18	Crane gear boxes – Acceptance Norms.
24.	IPSS : 1-10-001-11	Lifting Magnets.

Sl. No.	IPSS Number	Description of IPSS
25.	IPSS : 1-10-002-02	Resistance boxes for power circuits.
26.	IPSS : 1-10-003-02	Specification for electro-hydraulic thrustor.
27.	IPSS : 1-10-005-11	Specification for master controller.
28.	IPSS : 1-10-006-81	Specification for Drum/ cam controllers.
29.	IPSS : 1-10-008-08	General requirements for current collector assembly.
30.	IPSS : 1-10-010-84	General requirements for control panels for cranes.
31.	IPSS : 1-10-011-84	Particular requirements for control panels for ac cranes.
32.	IPSS : 1-10-012-84	Particular requirements for control panels for dc cranes.
33.	IPSS : 2-02-001-18	Design parameters for EOT cranes.
34.	IPSS : 2-02-002-18	Acceptance norms for EOT cranes.
35.	IPSS : 2-02-003-18	General code of practice for design of EOT cranes (Mechanical aspects).
36.	IPSS : 2-02-004-18	General code of practice for design of EOT cranes (Electrical aspects).
37.	IPSS : 2-02-005-18	Code of practice for selection of electric cables for use on EOT cranes.
38.	IPSS : 2-02-006-18	Code of practice for laying of electric cables on EOT cranes.
39.	IPSS : 2-02-007-18	Guidelines for safety in EOT cranes.
40.	IPSS : 2-02-008-18	Tests and checks for acceptance of EOT cranes.

APPENDIX – B

(Clause 3.1)

LIST OF REFERENCE INDIAN STANDARDS

Sl. No.	IS Number	Description of IS
1	**DESIGN**	
i.	IS : 807-2006 (Reaffirmed 2015)	Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
ii.	IS : 3177-1999 (Reaffirmed 2015)	Code of practice for electric overhead travelling cranes and gantry cranes other than steel works cranes.
iii.	IS : 4137-2015	Code of practice for heavy duty electric overhead travelling cranes including special service machines for use in steel work.
iv.	IS : 5533-1969	Recommendations for dimensions for spaces for human activities.
2.	**MATERIALS**	
i.	IS : 210-2009	Gray iron castings
ii.	IS : 2062-2011	Steel for general structural purposes.
iii.	IS : 8500-1991	Structural steel – micro alloyed (medium and high strength qualifies).
iv.	IS : 1030-1998	Carbon steel castings for general engineering purposes.
v.	IS : 1239 (Part 1) - 2004	Mild steel tubes, tubular and other wrought steel fittings : Part 1 Mild steel tubes.
	IS : 1239 (Part 2) - 2011	Mild steel tubes, tubular and other wrought steel fittings : Part 2 Mild steel tubular and other wrought steel pipe fittings.
vi.	IS : 1387-1993	General requirements for the supply of metallurgical materials.
vii.	IS : 1570-1988 (Part 1 to 5)	Schedules for wrought steels for general engineering purposes.
viii.	IS : 1875-1992	Carbon steel billets, blooms, slabs and bars for forgings.
ix.	IS : 2004-1991	Carbon steel forgings for general engineering purposes.

x.	IS : 2644-1994	High tensile steel castings for general engineering and structural purposes.
xi.	IS : 2707-1996	Carbon steel castings for surface hardening.
xii.	IS : 7283-1992	Hot rolled bars for production of bright bars and machined parts for engineering applications.
3.	**MECHANICAL DETAILS**	
a.	**Threaded Fasteners**	
i.	IS : 1364 (Part 1)-2002	Hexagon head bolts, screws and nuts of product grades A and B : Part 1 : Hexagon head bolts (size range M1.6 to M 64)
	IS : 1364 (Part 2)-2002	Hexagon head bolts, screws and nuts of product grades A and B : Part 2 : Hexagon head screws (size range M1.6 to M 64)
	IS : 1364 (Part 3)-2002	Hexagon head bolts, screws and nuts of product grades A and B : Part 3 : Hexagon nuts (size range M1.6 to M 64)
	IS : 1364 (Part 4)-2002	Hexagon head bolts, screws and nuts of product grades A and B : Part 4 : Hexagon thin nuts (chamfered) (size range M1.6 to M 64)
	IS : 1364 (Part 5)-2002	Hexagon head bolts, screws and nuts of product grades A and B : Part 1 : Hexagon thin nuts (un-chamfered) (size range M1.6 to M 10)
ii.	IS : 1367 (Part 1)-2002	Technical supply conditions for threaded steel fasteners: Part 1: Introduction and general information.
	IS : 1367 (Part 2)-2002	Technical supply conditions for threaded steel fasteners: Part 2: Product grades and tolerances.
	IS : 1367 (Part 3)-2002	Technical supply conditions for threaded steel fasteners: Part 3: Mechanical properties and test methods for bolts, screws and studs with full load ability.
	IS : 1367 (Part 5)-2002	Technical supply conditions for threaded steel fasteners: Part 5: mechanical properties and test methods for set screws and similar threaded fasteners not under tensile stresses.
	IS : 1367 (Part 6)-1994	Technical supply conditions for threaded steel fasteners: Part 6: Mechanical properties and test methods for nuts with specified proof loads.
	IS : 1367 (Part 7)-1980	Technical supply conditions for threaded steel fasteners: Part 7: Mechanical properties and test methods for nuts with specified proof loads.

	IS : 1367 (Part 8)-2002	Technical supply conditions for threaded steel fasteners: Part 8: Mechanical properties and performance properties for prevailing torque type steel hexagon nuts.
	IS : 1367 (Part 9)-1993	Technical supply conditions for threaded steel fasteners: Part 9: Surface discontinuities on bolts, screws and studs.
	IS : 1367 (Part 10)-2002	Technical supply conditions for threaded steel fasteners: Part 10: Surface discontinuities on nuts.
	IS : 1367 (Part 12)-1981	Technical supply conditions for threaded steel fasteners: Part 12: Phosphate coatings on threaded fasteners.
	IS : 1367 (Part 13)-1983	Technical supply conditions for threaded steel fasteners: Part 13: Hot dip galvanized coating on threaded fasteners.
	IS : 1367 (Part 14)-2002	Technical supply conditions for threaded steel fasteners: Part 14: Stainless steel threaded fasteners.
	IS : 1367 (Part 16)-2002	Technical supply conditions for threaded steel fasteners: Part 16: Designation system and symbols.
	IS : 1367 (Part 18)-1996	Technical supply conditions for threaded steel fasteners: Part 18: Marking and mode of delivery.
iii.	IS : 3640-1982	Hexagon fit bolts.
iv.	IS : 3757-1985	High strength structural bolts.
v.	IS : 6639-1972	Hexagonal bolts for steel structures.
b.	**Wire Ropes**	
i.	IS : 3973-1984	Code of practice for the selection, installation and maintenance of wire ropes.
ii.	IS : 6594-1977	Technical supply conditions for steel wire ropes and strands.
c.	**Keys and Keyways**	
i.	IS : 2048-1983	Parallel keys and keyways.
ii.	IS : 2291-1980	Tangential keys and keyways.
iii.	IS : 2292-1974	Taper keys and keyways.
iv.	IS : 2293-1974	Gib-head keys and keyways.
v.	IS : 13741 (Part 3) -1993	Carbide tips : Part 3 : Carbide tips for single point tool blanks for sliding head type automats.
d.	**Welding**	

i.	IS : 816-1969	Code of practice for use of metal arc welding for general construction in mild steel.
ii.	IS : 818-1968	Code of practice for safety and health requirements in electric and welding and cutting operations.
iii.	IS : 822-1970	Code of procedures for inspection of welds.
iv.	IS : 1323-1982	Code of practice for oxyacetylene welding for structural work in mild steel.
e.	**Gears**	
i.	IS : 2467-1963	Notation of toothed gearing.
ii.	IS : 2535-1978	Basic rack and modules of cylindrical gears for general engineering and heavy engineering.
iii.	IS : 3734-1983	Dimensions for worm gearing.
iv.	IS : 4460 (Part 1 to 3)-1995	Gears – Spur and helical gears – Calculation of loads capacity.
v.	IS : 5037-1969	Basic rack and modules of straight bevel gears.
4.	**ELECTRICAL DETAILS**	
a.	**Motors**	
i.	IS : 325-1978	Three phase induction motors.
ii.	IS : 900-1992	Code of practice for installation and maintenance of induction motors.
iii.	IS : 1231-1974	Dimensions of three phase foot mounted induction motors.
v.	IS : 2223-1983	Dimensions of flange mounted ac induction motors.
b.	**Cables and Conductors**	
i.	IS : 694-1990	PVC insulated cables for working voltage up to and including 1100 V.
ii.	IS : 1554 (Part 1)-1988	PVC insulated (heavy duty) electric cables Part 1 : For working voltages up to and including 1100 V.
	IS : 1554 (Part 2)-1988	PVC insulated (heavy duty) electric cables Part 2 : For working voltages from 3.3kv up to and including 11kV.
iii.	IS : 8130-1984	Conductors for insulated electric cables and flexible cords.
iv.	IS : 9968 (Part 1) -1988	Elastomer – insulated cables Part 1 : For working voltages up to and including 1100 V.
	IS : 9968 (Part 2) - 1981	Elastomer – insulated cables Part 2 : For working voltages from 3.3 kV up to and including 11 kV.
c.	**Conduits**	

i.	IS : 9537 (Part 2) -1981	Conduits for electrical installations Part 2 : Rigid steel conduits.
ii.	9537 (Part 3) - 1983	Conduits for electrical installations Part 3 : Rigid plain conduits of insulating materials.
d.	**Switchgears**	
i.	IS : 6875 (Part 1) -1973	Control switches (switching device for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V ac and 1200 V dc. Part 1 : General requirements.
	IS : 6875 (Part 2) -1973	Control switches (switching device for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V ac and 1200 V dc. Part 2 : Push buttons and related control switches.
ii.	IS : 10118-1982	Code of practice for selection, installation and maintenance of switchgears and control gears.
	Part 1	General
	Part 2	Selection
	Part 3	Installation
	Part4	maintenance
iii.	IS : 13138-1991	High voltage ac circuit breakers.
iv.	IS : 13947 (Part 1) -1993	Low voltage switchgears and control gears Part 1 : General rules.
	IS : 13947 (Part 3) -1993	Low voltage switchgears and control gears Part 3 :Switches, dis-connectors, switches dis-connectors and fuse combination units.
	IS : 13947 (Part 4) -1993	Low voltage switchgears and control gears Part 4 :Contactors and motor starters, sec 1 Electromechanical contactors and motor starters.
e.	**Earthing**	
i.	IS : 3043-1987	Code of practice for earthing.