INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**GENERAL CODE OF PRACTICE FOR DESIGN ON EOT CRANES (MECHANICAL ASPECTS)**	**IPSS: 2-02-003-18 (Second Revision)**
	Corresponding IS does not exist	Formerly: IPSS: 2-02-003-97 (First Revision)

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 1984 and first revised in March, 1997. Thereafter, standard was again revised by the Standard Committee in March, 2018.

0.2 Interplant standardization for steel industry primarily aims at achieving rationalization and unification of parts and 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 Need for a standard for the general code of practice for steel mill duty cranes covering mechanical as well as electrical aspects was long felt. Accordingly this standard was first brought out in 1984 covering mechanical aspects like schemes of various mechanisms and their layouts.

0.4 This revision has been carried out to incorporate the technological developments as well as other changes which came to light during the implementation of this standard.

0.5 The usage of this standard is expected to result in design unification of cranes in the steel industry. The other related standards to be used in conjunction with this standard are given in Appendix – A.

1. SCOPE

1.1 This interplant standard provides guidance on the basic considerations for the mechanical and structural design of the main components and the basic parameters required for the mechanical equipment.

1.2 However, this standard is not intended to substitute a detailed specification on EOT Cranes which the customer has to give.

2. GENERAL CONSIDERATIONS

2.1 To the extent possible, the equipment shall be laid out for easy accessibility, convenience of operation, inspection as well as maintenance. All like components of the cranes shall be interchangeable.

2.2 **Lubrication** – Complete equipment and fittings required to provide proper group lubrication shall be installed on the crane. Separate automatic centralized and motorized dual line grease lubrication system along with provision for manual lubrication shall be used for LT and Trolley. System shall be installed on LT platform and trolley. Generally, automatic track rail lubrication (non – graphite type) and wire rope lubrication system shall also be provided as applicable for class 3 & 4. However graphite type lubrication for LT rail track may also be used if mutually agreed upon between Purchaser and Contractor. Manual lubrication shall be provided in rare cases where components are not accessible.

2.3 **Painting** – All parts of the crane, to be painted shall be thoroughly cleaned to remove rust, scales or any other foreign matter. The parts which would become inaccessible after assembly shall be properly painted before assembly.

Painting Details:-

Surface preparation: Sa $2^{1/2}$

Primer paint:-

2 coats of 2 pack air drying epoxy base polyamide resin based red oxide Zinc Phosphate primer

Epoxy content (% wt.): 15 to 18

Air drying time- 30 minutes (min) overnight (hard dry)

DFT/Coat: 30 Microns

Temperature resistance: up to 120^0 c dry heat

Finish paint:-

2 coats of 2 pack air drying epoxy enamel suitably pigmented

Air drying time- 2 to 3 hours (touch dry), 7 days (full cure)

DFT/Coat: 40 Microns (min)

Total DFT: 140 Microns (min)

Temperature resistance: up to 130^0 c dry

Base: Lemon yellow as per shade no-355 of IS: 5-2007

Shade:-

Strip: Black (100 mm wide)

All electricals shall be as per manufacturer's standard.

3. BASIC CONDITIONS FOR STRUCTURAL DESIGN

The crane structure shall be designed in accordance with IS 807:2006, Çode of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists (second revision). Micro alloy steel may also be used subject to mutual agreement between the purchaser and the manufacturer of the crane.

3.1 **Bridge Girders** – The main girders of the bridge shall be box type construction.

3.1.1 Girders shall be cambered to an amount equal to the deflection caused by dead load plus one half the live load and the trolley. The bridges shall not deflect more than 1/1000 of span for M7 / M8 duty class cranes and 1/750 of span for other cranes with safe working load on the trolley, trolley stationed at mid-span and excluding deflection due to dead load.

3.1.2 Box girders shall be so designed as not to permit accumulation of water or oil inside them. Hand holes or man holes may be provided for ease of inspection and cleaning.

3.1.3 The joints shall be welded and/or bolted. Bolted joints shall normally be with high strength friction grip (HSFG) bolts.

3.1.4 All diaphragms must bear against the top cover plate. The thickness of the diaphragm must be sufficient to resist the trolley wheel load in bearing on the assumption that the wheel load is distributed over a distance equal to the width of the rail base plus twice the thickness of the cover plate and wearing plate, if provided. The diaphragm plate shall be single piece design with minimum 6 mm thickness.

3.1.5 The bridge girders shall be in single piece unless otherwise agreed. Long travel mechanism mounted on cantilever platform shall be supported by L- type hinged brackets from the girders, isolated from regular walkway platform.

3.2 **End Carriage**: - End carriage shall be fabricated from rolled sections or plates or both in a welded construction to form a box with essential openings which are suitably reinforced. If more than two wheels are required, boggies shall be provided or articulated end carriage shall be used. Both side end carriage shall be of single piece design including wheel pads and crane bridge girder shall be over riding on the end carriage

3.2.1 Unless otherwise specified, wheel base shall not be less than 1/5 of the span for cranes up to 25 m span and 1/6 of span for cranes above 25 m span but not less than 5 m. With more than two wheels on the end carriage, the wheel base shall be taken as the centers between extreme wheels.

3.2.2 Suitable jacking pads shall be provided on each end carriage for jacking up the crane for changing the track wheels. Centre line of jacking pad for long travel wheel and LT rail shall be co-axial and preferably shall be provided on

end carriage in between two girders. End carriage shall be sufficiently strong enough to take the jacking load of crane. Centre line of jacking pad and cross trolley rail shall be coaxial and preferably shall be provided in between two wheels. Where the buffers come in the way of wheel changing, hinged buffers swinging horizontally, opening inside the bay shall be provided.

3.2.3 End carriages shall have built in safety device to prevent the crane from dropping by more than 25 mm in the event of a track wheel axle giving way. Clearance between railhead and bottom flange of the end girder shall not be less than 50 mm.

3.3 **Walkways and Railings** – Walkways of minimum 500 mm width (400 mm near the drive) shall be provided. Mild steel chequered plate platforms shall be provided on bridge girders for easy access to mechanisms, current collectors, cabin, etc. The minimum clearance in front of the electrical panels shall be 500 mm. Staircases shall be 600 mm wide minimum with an inclination of 45 o to the horizontal as far as possible but not more than 60. The walkways are to be so arranged that there is a minimum clearance of 2100 mm between top of trolley platform and the lowest overhead obstruction.

3.3.1 All openings on the flooring of the walkways shall have strong, full length single hinged covers.

3.3.2 Safety railings shall be provided wherever necessary, that is around all accesses on bridge walkways, end carriage, landings, staircases, trolley, etc. Railings shall be of tubular construction with a height not less than 1 m and intermediate railings at a height of 450 mm.

3.3.3 Toe guards 100 mm high minimum shall be provided at all edges and openings.

3.4 **Trolley Frame** – Trolley frame shall be fabricated in one piece unless there are limitations of transportation. In case the frame is made up of two sub-assemblies, the design shall be such that any unit of a mechanism mounted on one sub-assembly does not come over the other sub-assembly or over the cover plate of the splice. Connection between the two parts of the trolley shall be done by high strength friction grip (HSFG) bolts.

3.4.1 Drum bearings and supports for upper sheaves shall be so located that the load on each of the trolley wheel is as nearly equal as possible.

3.4.2 The trolley frame shall be built up of plates and rolled sections to form a rigid structure capable of withstanding all the stresses developed during the operation of the crane. It shall also provide maximum accessibility to mechanical as well as electrical parts placed on it. The design shall be such that a minimum clearance of 700 mm is provided between the highest position of the hook block and the lowest point of trolley obstruction.

3.4.3 The top of the trolley frame shall have non-skid, preferably with chequered plate, platform all over except the openings required for ropes and flexible cables for hook block. The openings in the trolley frame shall be such as to keep the ropes or cables at least 100 mm away from any part of the trolley frame or equipment to prevent any damage at any position of the bottom

block. The openings shall be free from sharp edges. As far as practical, all mechanical and electrical equipment shall be placed above the trolley top plate. For any part placed below the trolley top plate, access for maintenance, repair and replacement shall be provided. The trolley shall be provided with hand rails.

3.4.4 The trolley shall be fitted with substantial safety devices to prevent it from falling more than 25 mm in the event of breakage of a track wheel axle. The safety device shall not interfere with the removal of wheels.

3.4.5 The trolley shall be provided with jacking pads for wheel removal. The jacking pads shall not interfere with wheel removal.

3.4.6 Easy accessibility to the trolley from the bridge walkway shall be ensured.

3.4.7 In case of grab and magnet cranes, a cage shall be hung from the trolley to prevent the grab or the magnet from swinging and hitting the structures. For all rigid mast cranes like the stripper or soaker cranes, the guide rail shall be designed so that the operator's vision and accessibility of equipment on the mast head is ensured. The guide frame shall be connected to the trolley in sheer by means of rivets or bolts. The guide rails for the mast shall be of the removable type to facilitate easy replacement.

3.5 **Repair Cage** – Repair cage shall be provided on the inside of the end carriage for attending to the current collector. If required, repair cages shall also be provided at the corners of the crane to facilitate removal of long travel wheels. The repair cage shall be at least 1000 mm wide to enable two persons to work on it comfortably. The floor of the repair cages shall be 1500 mm below LT wheel centers except the one on which the main current collectors are mounted, where it shall be suitably adjusted.

3.5.1 The cages shall be of structural steel and of rigid welded or riveted construction. It shall be provided with railings and toe guards on all sides except for the repair cage on the down shop load side which shall be provided with easily removable type protection guards for safety reasons.

3.6 **Operator's Cabin** – The operator's cabin shall be of sufficient rigid metal frame and shall be connected to the bridge or trolley as the case may be by means of high strength friction grip (HSFG) bolts. Operator's cabin mounting shall be sufficiently strong and of gusset plate design to ensure that operator's cabin is vibration free.

3.6.1 Operator's cabin shall be provided with a roof, which where possible, shall slope down towards the back of the cabin.

3.6.2 Where totally enclosed cabin is specified, the window shall be of removable or sliding type unless hinged ones are specified. If special vision panels are provided in the floor, they shall be suitably guarded. Arrangements shall be made to ensure that whole exterior of cabin glazing can be safely cleaned without any additional scaffolding. All glazing shall be of toughened plate glass of minimum 6 mm thickness conforming to IS 2553 (Part-1): 1990 Safety glass: Part 1 General purpose (third revision) (Amendment 1) and shall in installed from inside. Air conditioned cabins are to be provided with double glazing. The air conditioned cabin shall be sealed and pressurized

with proper ventilation. The inside pressure shall be 2-3 mm water gauge. The cabin shall be suitably insulated thermally. Easy approach for servicing air conditioners and replacing filters, condensers, etc., shall be ensured.

3.6.3 The dimensions of the cabin shall be determined taking into account the space required for the installation and ease of operation of master controllers, manual controllers, indicating lamps, fire extinguishers, etc., as well as accommodation the operator in a sitting position with free access and place for a second person. In this connection, to the extent possible, guidance may be taken from IS 5533:1969 'Recommendation for dimensions for spaces for human activities (Reaffirmed 1990)", in a judicious manner.

3.6.4 Cabins shall be provided with 5 mm thick detachable type bright steel guard 150 mm below the cabin floor where the cabin is subjected to heat from below. All cabins shall be provided with suitably guarded 400 mm sweep fans so that continuous air flow is ensured for the operator in the seated position. Totally enclosed cabins other than air conditioned ones shall be additionally fitted with a suitably guarded exhaust fan. Open cabins shall be enclosed with standard hand railing 1000 mm high with vertical bars suitably placed. Alternatively enclosure may be made up of 1000 mm high plate. In either case unobstructed vision of the operator shall be ensured.

3.6.5 The crane is operated from a seated position. The seat shall be so located that the operator gets the full view of his working area and is able to take or leave his seat without any obstacle.

3.6.6 The emergency stop and reset device shall be of hand operated type and shall be located in an easily accessible position for the operator.

3.6.7 The cabin shall preferably be provided with foot operated multiple ringing alarm bell which is readily accessible from the cabin. It should be so located that the sound of the alarm is directed towards the bay and is audible to a distance of at least 30 meters. Foot pedals shall be conveniently located for efficient operation. The indicating lamps shall be in the field of the vision of the operator. The disconnecting devices and other switches shall be within easy reach of the operator.

3.6.8 The cabin shall be provided with adequate illumination so that the equipment in the cabin is well lighted. A low voltage socket outlet shall be provided in the cabin for use of hand lamp with flexible lead.

4. BASIC PARAMETERS FOR MECHANICAL EQUIPMENT

4.1 **Design of Mechanisms** – In the design of components on the basis of ultimate strength, the values of stress factor used shall be the product of basic stress factor and the duty factor for the appropriate mechanism class. The basic stress factor shall not be less than 5 and the duty factor as given in Table – 1. Components designed on the basis of life shall have rated life not less than those specified in Table – 1.

4.2 Rope drum shall be of fabricated construction or of seamless pipes for diameter up to Ø500 mm. For dia. above 500 mm, only fabricated construction shall be considered. Fabricated drum shall be stress relieved. The length of rope required for the specified lift and in addition not fewer than two dead turns at each anchored end and at least one spare groove at the other end. Each rope end shall be clamped with minimum two clamping wedges with at least two numbers of bolts on each clamping arrangement. Rope drum shall have flanges on both sides with minimum height of 50 mm to prevent coming out of rope.

4.3 **Hoist Ropes** – Ropes shall conform to IPSS: 1-08-003-18 "Steel wire ropes for cranes (fifth revision)". Steel cored ropes shall be used for hot metal and outdoor cranes as well as in places where the ropes are to be used under water or to operate in damp atmosphere and these shall be galvanized to protect them against corrosion. Reverse bend in rope shall be avoided wherever possible.

4.4 **Rope Sheaves** – The sizes of sheaves shall conform to IPSS: 1-08-002-18 "Sheaves assembly for EOT Cranes (third revision)". The equalizer sheave / bar shall be mounted wherever feasible above the trolley floor with easy accessibility. Equalizer sheaves shall be so arranged that it turns and swivels to maintain rope alignment under all circumstances.

4.4.1 All sheaves shall be suitably guarded and the clearance between the flange and the inside of the guard should not be more than 3 mm.

4.5 **Track Wheels** – Track wheels shall conform to IPSS: 1-08-001-18 "Crane wheels (third revision)". The wheels may be flangeless if guide rollers are provided on either side to take up the horizontal thrust.

4.5.1 The wheels shall be capable of taking up mis-alignments in the span as specified in IPSS: 2-02-002-18 "Acceptance norms for EOT cranes". The minimum diameter of cross travel and long travel wheels shall be 200 mm and 400 mm respectively.

4.6 **Trolley Rail** – Trolley track rails shall be of standard rail section and clamped to the girder with double bolt clamping plates spaced not more than 900 mm apart. A wearing plate 10 mm thick and 10 mm less than the rail base shall be provided alternatively resilient pads may be provided. Rails shall be prevented from creeping in the longitudinal direction by rail stops, riveted or welded. In case multiple lengths of rails are used to build up the full length, it is desirable that adjacent rails are joined by thermit welding. The rail joint shall come over a diaphragm.

4.7 **Buffers** – Hydraulic buffers shall be provided on all the four corners for all class 3 & 4 cranes for LT & CT motions. Spring loaded case buffers may be permitted for class 1 and 2 duty cranes. Buffers shall be rigidly bolted in place, preferably above and in line with the center line of the track rail, such that the bolts are not in direct shear. Buffer shall have adequate energy absorbing capacity to bring the unloaded crane to a smooth stop from a speed of 50 percent of rated speed at a deceleration rate not exceeding 5 cm/sec^2 at 50 percent of rated travel speed. The location of the buffers shall be such that a minimum clearance of 100 mm is available between the buffer

edge in compressed condition and any projected crane component. Suitable buffers of the above types shall be provided either on the trolley or on the end of the bridge girders.

4.8 **Drives** – The drives for various mechanisms shall be according to the following schemes.

4.8.1 **Hoist Drives** – The electric motor of hoist mechanism shall be connected to the gear box through a geared coupling / flexible shock absorbing type coupling. The output of the gear box shall be connected to the rope drum by means of barrel coupling for all cranes of class M7 & M8 as well as for all class of cranes with hoist capacity of 25 Ton and above. All bolts of gear coupling shall be machined fit bolts. Rope drum connections without shaft shall be barrel coupling. Geared coupling may be considered for cranes with hoist capacity of below 25 Ton for class M3 & M5.

4.8.1.1 **Magnet Crane** – The scheme of hoist mechanism of a magnet crane shall be similar to the hoist mechanism scheme in conformity with 4.8.1. The cable reeling drum shall be spring loaded or shall be driven by hoist drum by suitably enclosed gear transmission unless otherwise specified. A suitable clutch to disengage the cable reeling drum, when not in use, shall be provided in the later case.

4.8.1.2 **Tong crane** – For hook on type motorized tong / grab, the scheme of hoist mechanism is similar to that of magnet crane. In case tong / grab is permanently suspended from the rope drum, its operation is controlled by providing a separate rope drum with independent driving mechanism. The scheme of mechanism for hoisting and lowering of the tong is similar to that of hoist mechanism according to 4.8.1.

4.8.1.3 **Ladle Crane** – The scheme of hoist mechanism for ladle crane shall be with twin motor drives through planetary gearing, such that in case of failure of one of the motors, the other motor can handle hot metal ladle to complete the operation with half speed. However, if mutually agreed between Purchaser and Contractor, non-planetary gear boxes may also be used for hoists of ladle handling cranes. Each hoisting drive shall be equipped with two brakes. Electronic weighing device may be incorporated suitably according to the agreement between the purchaser ad the manufacturer with digital display of 300 mm size outside the cabin and smaller digital display inside the cabin.

4.8.1.4 **Rotating Trolley Crane** – Slew gear / ring shall be used between the upper and the lower trolley. The rope reeving shall be such that it arrests the swing of the beam.

4.8.2 **Travel Drive** – The drive for travel mechanism shall consist of either geared motor unit or electric motor connected to the gear box through a geared coupling / flexible shock absorbing type coupling. The output shaft of the gear box shall be connected with the driving wheel by means of a floating shaft and geared coupling. The brake shall be mounted on the input shaft of the gear box preferably on the extended portion of shaft. The layout of the

travel mechanism shall be such as to provide proper accessibility for maintenance. Adequate number of positively driven wheels shall be provided so as to eliminate the possibility of any skidding.

4.8.2.1 Individual drives for long travel motion shall be preferred as compared to central drive for larger spans, say more than 13 m. When using a central drive, it should be mounted as closed as practicable to the center of the span. Precaution shall be taken to ensure synchronized running of drives in case of individual drives.

4.8.2.2 For individual wheel drive, in the event of one corner motor failing, the motor on the other corner of the same side shall also trip to prevent any skewing of the crane. The remaining motors shall be capable of running the crane with reduced acceleration.

4.8.3 Layout of the equipment for the drives shall be such that it provides easy accessibility, inspections and maintenance. No part of cross travel and hoist mechanism shall project beyond the trolley platform.

4.9 **Gearing** – Helical spur gears conforming to IS 4460 (Part 1 to 3): 1995 “Gears – Spur and helical gears, calculations of load capacity (first revision)’shall normally be used for all motions. Worm and bevel gears may be used where absolutely necessary. Helical gears shall be used for high speed reductions. All pinions shall preferably be integral with the shaft. All gear shall be made of alloy or carbon steel and suitably case carburized, hardened, tempered and profile ground.

4.10 **Gear Boxes** – All gears shall be enclosed in oil tight housings. The gear boxes shall be splash lubricated. The gear boxes shall be fabricated. All fabricated gear boxes shall be stress relieved. The cover shall be easily removable without disturbing the other parts to facilitate inspection and maintenance. Inspection covers at suitable places shall be provided. Breather vents, oil level indicators and easily accessible magnetic drain plugs shall also be provided. Suitable oil seals on the input and output shafts shall be provided. For hoist and LT drives, horizontal gear boxes with horizontal split shall be used. All planetary and vertical gear boxes shall be forced lubricated type. Lubrication system shall be interlocked with drive motor.

4.11 **Bearings** –Antifriction bearings shall be used throughout except where specified otherwise or mutually agreed.

4.12 **Couplings** – Motor shafts and gear box input shaft extensions shall be connected through flexible couplings. Solid couplings shall be used for connecting intermediate lengths of the long travel and cross travel shafts. Geared or universal couplings shall be wheel axle. Couplings shall be made of forged or cast steel. All couplings shall be provided with suitable guards.

4.13 **Lifting Hooks** – Standard shank hooks shall be used unless otherwise specified. Hooks shall conform to IPSS:1-08-004-18 or IPSS:1-08-008-18 or IPSS:1-08-009-18. All hook blocks (see IPSS: 1-08-007-18) shall be of completely enclosed type except for rope openings. Wherever specified, a

locking device shall be fitted to prevent rotation of hook. Closing fingers shall be provided in all shank hooks.

4.14 **Brakes** – Double shoe brake shall be provided for each drive. Two brakes conforming to IPSS: 1-08-005-18 shall be provided on hoist mechanism for class 3 and 4 for 25 Ton capacity and above. The brake shall be mounted on the input shaft of the gear box in case a single brake is provided for a mechanism. Hoist brake shall be so selected that one brake along can safely hold the full load.

The braking path of the hoist motion should be within the distance given below with all the brakes applied simultaneously, except the affect of brakes with time lag:

Speed of Hoist S (meter/minute)	Braking Path Max (m)
Upto 6	s/100
Above 6 & below 12	s/120
Above 12	s/150

For LT and CT motions, braking torque shall be checked so that it is capable of arresting the motion within a distance, in metres, equal to 10 percent of speed, in m/min, when travelling with rated load at rated speed, provided there is no skidding.

Hoist mechanism of hot metal handling crane shall have two brakes on each drive and each brake alone shall be capable of safely arresting the motion under rated load. Provision of emergency safety brakes shall be made on rope drums with hot metal handling cranes.

TABLE 1

(Clause 4.1)

DUTY FACTOR AND LIFE OF MECHANISM

Mechanism Class		Strength	Duty Factor		Average Life	
			Wear	All Motions	Running times In h /day	Total Life in working Hours, Min.
2	M5	1.2	0.5	0.5	5	9000
3	M7	1.4	0.6	0.5	9	30000
4	M8	1.6	0.7	0.6	12	40000

NOTE: The running time per day & total life relate to mechanism class only

APPENDIX A

(Clause 0.5)

LIST OF REFERENCE STANDARDS

Sl. No.	IS / IPSS Standards No.	Description of the Standards
1	IS 807 : 2006	Code of practice for design, manufacture erection and testing (structural portion) of cranes and hoists first revision (with amendment 1)
2	IS 5 :2007	Colors for ready mixed paints and enamels
3	IS 2553 (Part-1) : 1990	Safety glass : Part 1 General purpose (third revision) (Amendment 1)
4	IS 2932 : 2003	Enamel, synthetic, exterior (a) undercoating, (b) finishing (second revision)
5	IS 3177 : 1999	Code of practice for electric overhead travelling cranes and gantry cranes other than steel works cranes (first revision)
6	IS 4137 : 1985	Code of practice for heavy duty electric overhead travelling cranes including special service machines for use in steel work (first revision)
7	IS 4460 : 1995 (Part 1 to 3)	Gears – Spur and helical gears, calculations of load capacity (first revision)
8	IS 5533 : 1969	Recommendation for dimensions for spaces for human activities (Reaffirmed 1990)
9	IPSS : 1-02-020-84	Basic parameters for standardization of steel plant equipment
10	IPSS: 1-03-002-08	Specification for dc mill / crane duty motors (800 series) (Third revision)
11	IPSS:1-03-003-08	Specification for ac mill / crane duty slipring induction motors (second revision) (Amendment 1)
12	IPSS:1-03-004-14	Specification for ac crane duty squirrel cage induction motors (second revision)
13	IPSS:1-03-005-03	Specification for dc mill / crane duty motors (600 series) (With amendment 1 & 2)

14	IPSS:1-04-001-03	Specification for Contractors for voltage not exceeding 1000 v ac or 1200 v dc (first revision)
15	IPSS:1-04-003-03	Specification for Mechanically operated limit switches for control circuit for voltages up to and including 1000 v ac or 1200 v dc (first revision)
16	IPSS:1-04-004-11	Specification for moulded case circuit breakers for voltages not exceeding 1000 V ac or 1200 v dc
17	IPSS:1-08-001-18	Specification for Crane Wheels (first revision)
18	IPSS:1-08-002-18	Specification for Sheaves assembly for EOT Cranes (first revision)
19	IPSS:1-08-003-18	Specification for Steel wire ropes for cranes (third revision)
20	IPSS:1-08-004-18	Specification for Forged crane hooks (first revision)
21	IPSS:1-08-005-18	Specification for Brakes for cranes (first revision)
22	IPSS:1-08-006-18	Festoon cable trolley
23	IPSS:1-08-007-18	Specification for hook blocks
24	IPSS:1-08-008-18	Specification for forged Ramshorn hooks
25	IPSS:1-08-009-18	Specification for Laminated ladle hooks
26	IPSS:1-08-010-18	Specification for crane wheel assembly (Live axle type)
27	IPSS:1-08-013-18	Specification for Thimbles
28	IPSS:1-08-014-18	Horizontal gear boxes for cranes

29	IPSS:1-08-017-18	Code of practice for clamping of crane rails
30	IPSS:1-08-020-18	Crane gear boxes – Acceptance Norms
31	IPSS:1-10-001-11	Lifting Magnets (First revision)
32	IPSS:1-10-002-02	Resistance boxes for power circuits (with amendment 1)
33	IPSS:1-10-003-02	Specification for Electro – hydraulic thrustor
34	IPSS:1-10-005-81	Specification for Master controller
35	IPSS:1-10-006-81	Specification for Drum/cam controllers (with amendment 1)
36	IPSS:1-10-008-08	General requirements for current collector assembly
37	IPSS : 2-02-001-18	Design parameters for EOT cranes (with amendment 1)
38	IPSS : 2-02-002-18	Acceptance norms for EOT Cranes
39	IPSS: 2-02-003-18	General code of practice for design of EOT cranes (Mechanical aspects) (first revision)
40	IPSS : 2-02-004-18	General code of practice for design of EOT cranes (electrical aspects) (first revision)
41	IPSS : 2-02-005-18	Code of practice for selection of electric cables for use on EOT cranes (first revision)
42	IPSS : 2-02-006-18	Code of practice for laying of electric cables on EOT cranes

43	IPSS: 2-02-007-18	Guidelines for safety in EOT Cranes
44	IPSS : 2-02-009-18	Reference Guide for EOT Cranes

———————————