INTER PLANT STANDARD - STEEL INDUSTRY		
IPSS	**SPECIFICATION FOR PULLING AND LIFTING MACHINES** *Based on IS: 5604-1984*	**IPSS:1-07-027-14**

0. FOREWORD

0.1 This Inter Plant standard has been prepared by the Standards Committee on Paints & Portable Maintenance Equipment, IPSS 1:7, with the active participation of the representatives of all the steel plants, reputed consultants and established manufacturers of pulling and lifting machines and was adopted in December, 1984 and revised in July, 2014 keeping in view of latest technologies.

0.2 Inter Plant Standards for steel industry primarily aims at achieving rationalisation and unification of parts and sub-assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores for existing equipment (or while placing orders for additional requirements) by individual steel plants. It is not desirable to make deviations in technical requirements.

1. SCOPE

1.1 This interplant standard covers the requirements of pulling and lifting machines. standard gives the technical specification for the 4-wheeled trolleys of ½ tonne and 1 tonne capacity to be hauled manually, and used for transporting materials.

Note-1 This Standard is generally based on IS:5604-1984 `Specification for hand operated universal gearless pulling and lifting machines (first revision)' and for convenience of reference, the clause numbers of the Indian Standard for each requirement are given in Appendix A along with the numbers of the matching clauses of this standard.

Note-2 The instruction for the use of proper pulling and lifting machines are given in Appendix-B.

2. RATING & DIMENSIONS

2.1 The rating and dimensions of the pulling and lifting machines shall be as given in Table-1.

TABLE-1 : RATING & DIMENSIONS OF PULLING AND LIFTING MACHINES

Capacity tonne	Run of Rope per Return Stroke mm Min	Effort on Full Load kgf	Telescopic Lever Length mm		Overall Dimension (Approx) mm			Mass Approx kg
			Closed Position, Max	Opened Position, Min	Length	Breadth	Thickness	
2	52	47	74.5	134	454	360	142	18
3.2	25	60	90	115	700	300	150	30

2.2 The capacity for pulling shall be two times the lifting capacity.

2.3 The corresponding hook and wire rope to be used with the above pulling and lifting machines shall be as given in Table-2.

TABLE-2 : HOOK AND WIRE FOR PULLING AND LIFTING MACHINES
(Clause 2.3)

Capacity of Pulling and Lifting Machines (tonnes)	Wire Rope		Safe Working Load of the Hook, kgf	Test Load of Wire Rope with Hook (tones)
	Diameter, mm	Length, m		
2	12	10 20 30	2 000	4
3.2	16	10 20 30 100	3 200	6.4

3. MATERIAL

3.1 The different materials used for the construction of the machines shall conform to the Indian Standards given below:

a) Plates & bars – Structural steel IS:2062-2011 `Specification for structural steel (standard quality) '

b) Carbon & forgings – IS:2004-1991 `Specification for carbon steel forgings for general engineering purposes (second revision)'

c) Aluminium and aluminium alloys or MS galvanized - IS:617-1994 `Specification for aluminium alloy ingots and castings for general engineering purposes (second revision)'

d) Cold drawn steel wire for coil spring – Table 1 of IS:4454-2001 `Specification for steel wires for cold formed springs'

e) Tin bronze – IS:306-1983 `Specification for tin bronze ingots and castings (second revision)' and IS:318-1981 `Specification for leaded tin bronze ingots and castings (second revision)'

f) Phosphor bronze – IS:7811-1985 `Specification for phosphor bronze rods and bars'

g) Thimbles – IS:2315-1978 `Specification for thimbles for wire ropes (first revision)

3.1.1 The wire ropes used in the pulling and lifting machines shall conform to IPSS: 1-08-003-14.

3.1.2 For other materials used the manufacturer shall produce evidence satisfactory to those concerned that such materials have the essential qualities of the standard materials.

3.2 The jaws shall be made from alloy steel containing at least 0.90 percent chromium to ensure resistance to abrasion. The alloy steel after suitable heat treatment (hardening and tempering) shall have the following mechanical purposes:

Tensile strength	900 MN/m2
Elongation (at gauge length 5.65 A)	15%, Min
IZOD impact value	40 Nm, Min
Hardness	300 HN, Min

4. CONSTRUCTION & WORKMANSHIP

4.1 All parts of the machine shall be constructed with a minimum factor of safety of 5.

4.2 Bearings – The crank shall be provided with suitable antifriction bearings. The bearings for the crank shaft shall be sealed of the rolling type conforming to IS:5669-1987 `General plan of boundary dimensions for radial rolling bearings' or may alternatively be of the self-lubricated type conforming to IS:3980-1982 `Specification for sintered metal powder oil-impregnated bearings'.

4.3 Heat Treatment – All components before machining shall be normalized or hardened and tempered.

4.4 All components of the pulling and lifting machines shall be treated for rust prevention.

4.5 The plain end of the wire rope shall be welded and tapered such that it can be inserted in the pulling and lifting machines easily.

5. TOLERANCES

5.1 Tolerances on Forgings – Tolerances on forgings shall conform to the requirements of IS: 3469-1974.

5.2 Machining Tolerances – Machining tolerances shall conform to medium class of IS: 2102-1993 `Allowable deviations for dimensions without specified tolerances (first revision)'.

6. TESTS

6.1 Proof Loading – The lifting and pulling machine shall be tested prior to the operational test with a static load of twice the safe working load which it shall withstand without permanent deformation of any component part for 30 seconds.

6.2 Operation Test – After proof loading, the lifting and pulling machine shall be made to lift to 1.5 times the safe working load through a distance of 30 cm which will ensure that every part of the block mechanism comes under load. During the test there shall be no permanent deformation.

6.3 Examination – After proof loading and the operational test, the block shall be thoroughly examined by a competent person. It complies with this standard only if it is found free from deformation cracks, flaws or other defects.

7. DESIGNATION

7.1 The designation of a pulling and lifting machine of capacity 2 tonnes shall be:

Pulling and lifting machine: 2Ton IPSS: 1- 07- 027-14

7.2 The designation of wire rope and hook to be used with a pulling and lifting machine of 1.6 tonnes capacity and length of rope 20 m shall be:

Wire rope with hook – 1.6T x 20m IPSS: 1- 07- 027-14

8. INSPECTION CERTIFICATE OF TEST AND EXAMINATION

8.1 Inspection – The representative of the purchaser shall have access to the works of the manufacturer for the purpose of witnessing the specified test and inspecting the testing machine and methods of examination.

8.2 Certificate of Test & Examination – A certificate of test and examination shall be issued with every consignment of pulling and listing machine, giving the following information for each one:

a) Manufacturer's name
b) Description
c) Range of lift
d) Wire rope size and grade
e) Number of pieces tested
f) Proof load applied
g) Operational test load applied, and
h) Rating

9. MARKING – Each pulling and lifting machine shall be indelibly marked with the following information:

a) Manufacturer's name or trade-mark
b) Description of the pulling and lifting machine and wire rope, and
c) Designation

10. GUARANTEE – Each pulling and lifting machine shall be guaranteed for satisfactory performance for 18 months from the date of supply of 12 months of use, whichever is less.

APPENDIX – A
(Clause 1)

COMPARATIVE STUDY OF IPSS:1-07-027-14 `SPECIFICATION FOR PULLING & LIFTING MACHINES'

AND

IS:5604-1984 `SPECIFICATION FOR UNIVERSAL GEARLESS HAND OPERATED PULLING AND LIFTING MACHINES (FIRST REVISION)'

Requirement		Clause Reference In IPSS	Clause Reference In ISs
Requirements which are identical between IPSS & IS	Material Tolerances Inspection, certificate of test and examination Instruction for use	3 5 9 Appendix B	3 6 10 Appendix B
Requirements selected for steel plant use out of several choices given in ISs	Construction and work-manship Tests	4 6	5 9
Supplimentary requirements not contradicting ISs	Designation Marking Guarantee	8 10 11	- - -
Deviations from ISs	Nil	-	-

APPENDIX – B
(Clause 1)

INSTRUCTIONS FOR THE USE OF PULLING & TESTING MACHINES

B-1 Never lift or drag a load in excess of the safe working load marked on the machine. The machine has been proof loaded to twice the safe working loads under carefully controlled conditions.

B-2 Before use, examine the wire rope to ensure that the same is in good condition and the constructions are according to the specification.

B-3 Keep the wire sufficiently lubricated along the whole length. In special cases the wire rope may be used dry, but the life of the wire rope in such case will be considerably reduced. If the wire rope slips when the machine is in operation, stop the operation and lower down the load. The machine should be opened and the reason for the trouble should be found out.

B-4 Do not allow dirt and sand together on the wire or to get into the casing of the machine. There should be adequate provision for lubricating the machine.

B-5 Never lift with the point of the hook. All machines should be registered and at periodic intervals should be thoroughly cleaned, inspected and lubricated.

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