INTERPLANT STANDARD — STEEL INDUSTRY

IP SS

TAPERS — DIMENSIONS AND TOLERANCES

IPSS : 1-02-035-86

BASED ON IS : 1715-1973

0. Foreword

0.1 This standardization activity in steel industry has been initiated under the aegis of Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This Interplant Standard, prepared by the Standards Committee on Hydraulic and Lubricating Equipment, IPSS 1 : 2, with the active participation of the representatives of all the steel plants was adopted by the Approval Committee on Consumable Stores and General Equipment, IPSS 1, on 13 February 1986.

0.2 Interplant Standards for steel industry primarily aim at achieving rationalization and unification of parts and sub-assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores or equipment for existing or new installations 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.

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1. Scope

1.1 This Interplant Standard specifies the dimensions of a rational series of self holding tapers selected from the existing Morse and metric series and other tapers used in general engineering practices. It also specifies the dimensions of counter-bores for tool shanks and tolerances on taper for tool shanks.

1.2 This standard relates to self-holding tapers of circular cross-section.

1.3 The self-holding tapers recommended in this standard have sufficiently small included angle which ordinarily retains a tool shank in a socket without a fastening device.

1.4 The other tapers mentioned in this standard have various applications as enumerated in Table 1.

Note — This standard is generally based on IS : 1715-1973 'Dimensions for self-holding tapers (*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.

2. Dimensions

2.1 The dimensions for self-holding tapers for shanks and sockets shall be as given in Tables 2 and 3.

2.2 The diameter of the gauge plane *D* and the taper are basic dimensions for self-holding tapers. The other dimensions are derived from these dimensions and suitably rounded off.

2.3 In special cases, where a shortened taper is required, the taper may be shortened at the small end maintaining the diameter at gauge plane.

3. Tolerances

3.1 The tolerance on taper shall be ± IT 6 in general.

3.2 The tolerance on the dimensions without specified tolerance shall be of grade 'medium' as given in IS : 2102 (Part 1)-1980 'General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (*second revision*)'.

3.3 Permissible deviation corresponding to ± IT 6 for diameter *D* shall be as given in Table 4 for the metric and Morse tapers.

Amendments issued (*to be filled up by the user departments*) :

No.	Date of Issue	No.	Date of Issue
1		3	
2		4	

UDC 621·9—434·5 : 621·753·1+006·78

4. Method of Measuring for Self-holding Tapers — The diameter at any point *C* (*see* Fig. 1) is measured at the small end of the taper. With the help of this diameter and the basic ratio of taper, the diameter at point *D* at a distance *CD* is calculated. The measured diameter at *D* shall not deviate from the calculated value of diameter at *D* by more than the values given in Table 1.

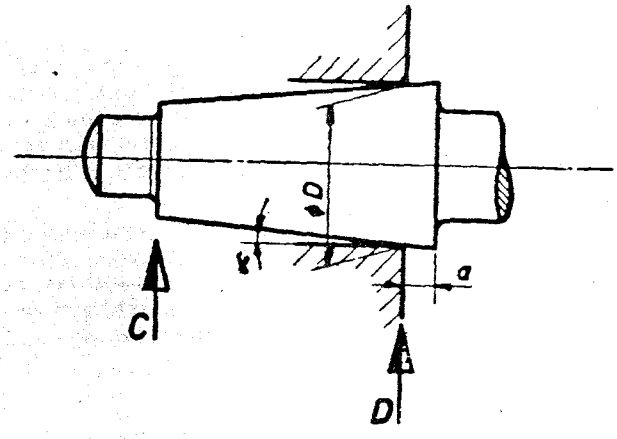

FIG. 1 TAPERS

TABLE 1 OTHER TAPERS

(Clauses 1.4 *and* 4 *)*

Taper on Diameter	α	Application
1 : 0·289	60°	Protective counter sunk for centre holes, rough counter sunk screws with square flat end
1 : 0·5	45°	Valve cones, shoulders on piston rods, tip of lathe centres, counter sunk screws or with hose or square flat ends, lock nuts for pipe lines, counter sunk rivets
1 : 0·596	40°	Self-tapping screws
1 : 0·866	30°	Conical seals for various pipe joints, vee-slots, centre bores, tip of lathe centres, counter sunk screws and round head rivets
1 : 1·207	22°30′	Counter sunk plain and round heat rivets
1 : 1·374	20°	Collet chucks
1 : 1·866	15°	Rough conical counter sunk screws, centring cones on cutter supports for wood working machinery
1 : 3·429	8°17′50″	Steep angle tapers on milling spindle heads and milling cutters
1 : 5	5°42′38″	Readily removable machine parts, pivot journals, friction clutches, bores in pulleys, locking devices, for abrassive discs, cones for stop valves, hose connections for pneumatic tools
1 : 10	2°51′45″	Machine parts in torsion, taper shaft ends, adjustable bearing bushes, rivet hole reamers, nozzles, injection syringes
1 : 30	57′17″	Small reamers and drills
1 : 50	34′25″	Taper pins, conical pipe threads

TABLE 2 SELF HOLDING TAPERS (EXTERNAL)

(*Clause* 2.1)

All dimensions in millimetres.

Designation of Taper	Taper on Diameter	α	e	D	Application
Metric 4	1 : 20-0·05	1°25′56″	2·0	4·000	Tool shanks and taper nose spindles for machine tools, metric taper fine threads
Metric 6	1 : 20-0·05	1°25′56″	3·0	6·000	
Morse 0	1 : 19·212-0·052 05	1°29′27″	3·0	9·045	Tool shanks and taper nose spindles for machine tools
Morse 1	1 : 20·047-0·049 88	1°25′43″	3·5	12·065	
Morse 2	1 : 20·020-0·049 95	1°25′50″	5·0	17·780	
Morse 3	1 : 19·922-0·050 20	1°26′16″	5·0	23·825	
Morse 4	1 : 19·254-0·051 94	1°29′15″	6·5	31·267	
Morse 5	1 : 19·002-0·052 63	1°30′26″	6·5	44·399	
Morse 6	1 : 19·180-0·052 14	1°29′36″	8·0	63·348	
Metric 80	1 : 20-0·05	1°25′56″	8·0	80·000	Tool shanks and taper nose spindles for machine tools, Metric taper fine threads.
Metric 100	1 : 20-0·05	1°25′56″	10·0	100·000	
Metric 120	1 : 20-0·05	1°25′56″	12·0	120·000	
Metric 160	1 : 20-0·05	1°25′56″	16·0	160·000	
Metric 200	1 : 20-0·05	1°25′56″	20·0	200·000	

TABLE 3 SELF-HOLDING TAPERS (INTERNAL)

(*Clause* 2.1)

Designation of Taper	Taper on Diameter	α	$\frac{D}{A/3}$
Metric 4	1 : 20-0·05	1°25′56″	2·2
Metric 6	1 : 20-0·05	1°25′56″	3·2
Morse 0	1 : 19·212-0·052 05	1°29′27″	3·9
Morse 1	1 : 20·047-0·049 88	1°25′43″	5·2
Morse 2	1 : 20·020-0·049 95	1°25′50″	6·3
Morse 3	1 : 19·922-0·050 20	1°26′16″	7·9
Morse 4	1 : 19·254-0·051 94	1°29′15″	11·9
Morse 5	1 : 19·002-0·052 63	1°30′26″	15·9
Morse 6	1 : 19·180-0·052 14	1°29′36″	19·0
Metric 80	1 : 20-0·05	1°25′56″	26·0
Metric 100	1 : 20-0·05	1°25′56″	32·0
Metric 120	1 : 20-0·05	1°25′56″	38·0
Metric 160	1 : 20-0·05	1°25′56″	50·0
Metric 200	1 : 20-0·05	1°25′56″	62·0

TABLE 4 PERMISSIBLE DEVIATIONS

(*Clause* 3.3)

Designation of Taper	Permissible Deviation in Microns
Metric 4	± 8
Metric 6	± 8
Morse 0	± 9
Morse 1	± 11
Morse 2	± 11
Morse 3	± 13
Morse 4	± 16
Morse 5	± 16
Morse 6	± 19
Metric 80	± 19
Metric 100	± 22
Metric 120	± 22
Metric 160	± 25
Metric 200	± 29

APPENDIX A

(*Clause* 1.4)

COMPARATIVE STUDY OF IPSS : 1-02-035-86 'TAPERS — DIMENSIONS AND TOLERANCES' *AND* IS : 1715-1973 'DIMENSIONS FOR SELF-HOLDING TAPERS (*First Revision*)'

Requirements		Clause Reference in IPSS	Clause Reference in ISS
Requirements which are identical between IPSS and ISS	Dimension	2.1 Table 2 Table 3	2.1 and 2.3 Table 1 Table 3
	Tolerance	3.2 3.3 Table 4	3.1 3.2 Table 4
	Method of measuring tapers	4	A-2
Requirements selected for steel plant use out of several choice given in ISS	—	—	—
Supplementary requirements not contradicting ISS	Scope	1	—
	Dimension	2.2 and 2.3	—
	Tolerance	3.1	—
Deviations from ISS	—	—	—

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