PGD 34 (20366) WC
August 2022

भारतीय मानक मसौदा

पाइप रिंच भाग 1 सामान्य प्रायोजन - विशिष्टि

(*IS 4003 (भाग 1) का दूसरा पुनरीक्षण*)

Draft Indian Standard

PIPE WRENCHES — SPECIFICATION
PART 1 GENERAL PURPOSE

(Second Revision of IS 4003 (Part 1))

Hand Tools Sectional Committee, PGD 34

FOREWORD
(Formal clause will be added later.)

This standard was first published in 1967 and subsequently revised in 1978. The Second revision has been taken up to keep pace with the latest technological developments and international practices.

In this revision, the following changes have been made:

a) Clause on references has been added;and
b) Material designations have been updated as per the latest Indian Standard;

Other part in this series:

Part 2 Pipe Wrenches — Specification Part 2 Heavy Duty

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values *(second revision)'*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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PIPE WRENCHES PART 1 GENERAL PURPOSE—SPECIFICATION

(Second Revision of IS 4003 – Part 1)

1 SCOPE

This draft standard Covers requirements for general-purpose pipe wrenches.

2 REFERENCES

The following standards contain provision which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
397 (Part 1) : 2013	Method for statistical quality control during production: Part 1 control charts for variables (*second revision*)
397 (Part 2) : 2003	Method for statistical quality control during production: Part 2 control charts for attributes (*third revision*)
1570 (Part 2) : 1979	Schedules for wrought steels: Part 2 carbon steels (Unalloyed Steels)
1570 (Part 4) : 1988	Schedules for wrought steels: Part 4 alloy steels (Alloy Constructional And Spring Steels) with specified chemical composition and mechanical properties (*first revision*)
1865 : 1991	Iron castings with spheroidal or nodular graphite - Specification (*third revision*)
2500 (Part 1) : 2000	Sampling procedures for inspection by attributes: Part 1 sampling schemes indexed by acceptance quality limit (AQL) for lot-by - lot inspection *(third revision*)
14329 : 1995	Malleable iron castings — Specification

3 TERMINOLOGY

3.1 Nominal Size — The overall length of the tool when the jaws are open to the maximum capacity (*see* 4).

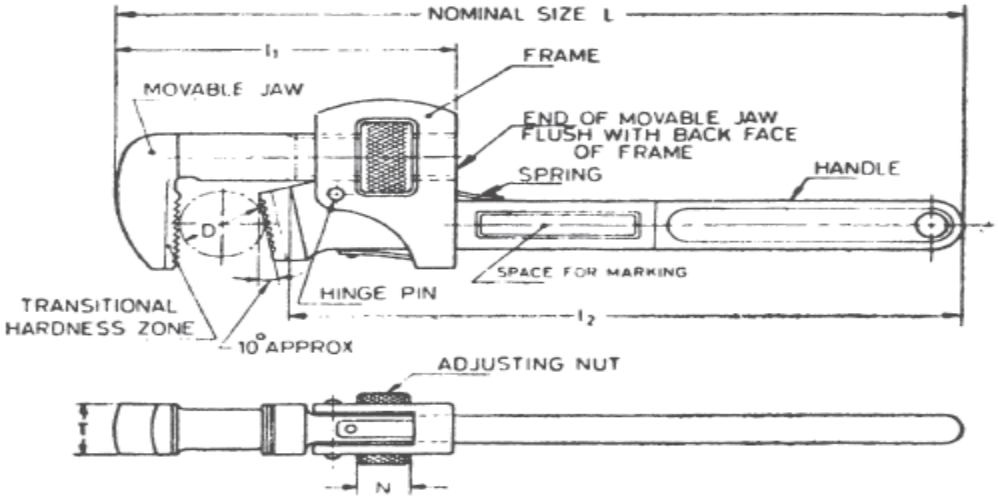
3.2 Maximum Capacity — The maximum diameter of pipe that shall be gripped with safety when the end of the movable jaw flushes with back face of the frame.

3.3 Greatest Angle Movement — The difference in angles between the jaws at their minimum and maximum possible angular positions.

4 DIMENSIONS

The dimensions of pipe wrenches (General Purpose) shall be as given in Table 1.

Table 1 Dimensions of pipe wrenches (General Purpose)
All dimensions are in millimeters



Nominal Size L	Minimum Capacity	Maximum Capacity D	Jaw Thickness T Min	Approximate Length of Movable Jaw l_1	Approximate Length of Handle l_2	Width off Nut N Min
200	6	20	15	85	160	12
250	6	26	17	110	200	13
300	9	32	19	125	240	16
350	13	38	21	140	285	17
450	25	52	24	165	370	18

600	38	65	28	200	495	25
900	50	95	34	260	750	35
1200	65	130	60	330	1000	35

5 MATERIAL

Suitable materials meeting with the requirements laid down in **6** and **14.**

Component	Material
Handle and movable	40C8, 50C4, 55C4, 60C4, 65C6 of IS 1570 (Part 2) ,$31CrV_3$ Or 40Cr
Frame	Malleable cast iron conforming to IS 14329, SG Iron grade SG 500/7, 450/10 of IS 1865 or 20C8, 25C4 or 15C8 of IS 1570 (Part 2)
Spring	Steel to designation 50Cr4 of IS 1570 (Part 4) or any suitable grade from IS 1570 (Part 4)
Adjusting nut and hinge pin	Suitable carbon steel selected from IS 1570 (Part 2)

6 HARDNESS

Component	Hardness
Jaws	510 to 700 HV (50 to 60 HRC) when measured at any point within the triangular profile of any tooth or within one millimeter of the root of the tooth
Handle and shank of the movable jaw	400 HV (41 HRC) Max

The transitional hardness zone (*see* 4) shall not extend beyond a point defined as twice the height of the teeth measured back from the tooth root.

7 MANUFACTURE

7.1 Handle — The handle shall be a one-piece forging with integral teeth. The teeth shall be of a definite number, shape and size to enable the assembled tool to meet the test requirements without slipping and to grip positively during normal operation any appropriate diameter of pipe within the safe capacity as given in 4. The toothed portion of the handle shall be so positioned that the common plane of the crests of the teeth shall be inclined at an angle of 10° relative to a plane

perpendicular to the longitudinal axis of the handle (*see* 4). The crests of the teeth shall be parallel and square relative to the lateral axis of the handle.

7.2 Movable Jaw — The movable jaw shall be a one-piece forging with integral teeth. The teeth shall be of adequate number, shape and size to enable the assembled tool to meet the test requirements without slipping and to grip positively during operation any appropriate diameter of pipe within the safe capacity.

7.2.1 The shank of the movable jaw shall be threaded in order to engage the internal threads of the adjusting nut.

7.2.2 The toothed portion of the movable jaw shall be so positioned that the common plane of the crests of the teeth shall be square relative to the axis of the threaded shank. The crests of the teeth shall be parallel and shall be square relative to the lateral axis of the threaded shanks.

7.3 Adjusting Nut — The adjusting nut shall be suitably knurled or longitudinally serrated. The threads shall be of sufficiently robust form and pitch so that with the jaws set at any point of adjustment within the appropriate capacity *(see* 4), the wrench shall be capable of passing the tests given in **10**.

7.4 Frame — The frame shall be a one-piece casting or one steel piece. It shall be integral with the handle or be attached to the handle by means of a riveted pin. It shall allow easy adjustment of the movable jaw allowing easy and proper operation of the wrench both forward and backward.

7.5 Hinge Pin — When in position the hinge pin shall have heads formed at each end by riveting; alternatively, it shall be provided with equally effective securing means.

7.6 Spring — One or more spring shall be provided; the greatest angle movement shall not exceed 10°. The spring or springs provided in the wrench assembly shell properly balance the movable jaw so that action, both forward and backward, is provided. The spring or springs shall be secured to the frame by riveting or any other suitable means.

8 WORKMANSHIP AND FINISH

8.1 The wrenches shall be free from flaws, cracks, rust, burrs and other injurious defects. The movable jaw shall be properly finished.

8.2 All unmachined surfaces shall either be painted or suitably treated with rust preventives. The machined surfaces shall be protected by any rust-preventive treatment.

9 OPERATION

The motion between the various parts of the wrench shall permit the teeth to grip and hold the pipe for successive turns without the necessity of altering the adjusting nut. The wrench shall release freely when the direction of pressure on the handle is reversed.

10 TESTS

10.1 Static Load Test — A cylindrical steel test bar shall be rigidly mounted in a test as illustrated diagrammatically in Fig. 2. The test bar shall be of diameter as given in Table 2 and shall have hardness within the range 300 to 380 HV at any point on its circumferential surface.

The wrench shall be mounted in the rig with the teeth in normal working engagement with the test bar (*see* Fig. 2) and a load shall be supplied sufficient to result in a proof torque at point 'P' as given in Table 2. On the completion of test there shall be no permanent deformation or cracking of any portion of the wrench. The threads on the adjusting nut and movable jaw and the adjusting nut itself shall also not show any sign of permanent deformation.

10.2 Static-Shock Load Test — The wrench shall be in position as described in **10.1** with static load reduced by 25 percent; with this load in operation the shock load as given in Table 2 shall be applied at the point 'P'. Following this test, the wrench shall release freely when the direction of force on the handle is reversed. The teeth shall then grip and release freely without recourse to alteration of the adjusting nut. On removal from the test fig, the wrench shall be capable of normal finger and thumb adjustment over the whole length of the transverse. The component parts shall not have suffered any permanent set on the completion of the test.

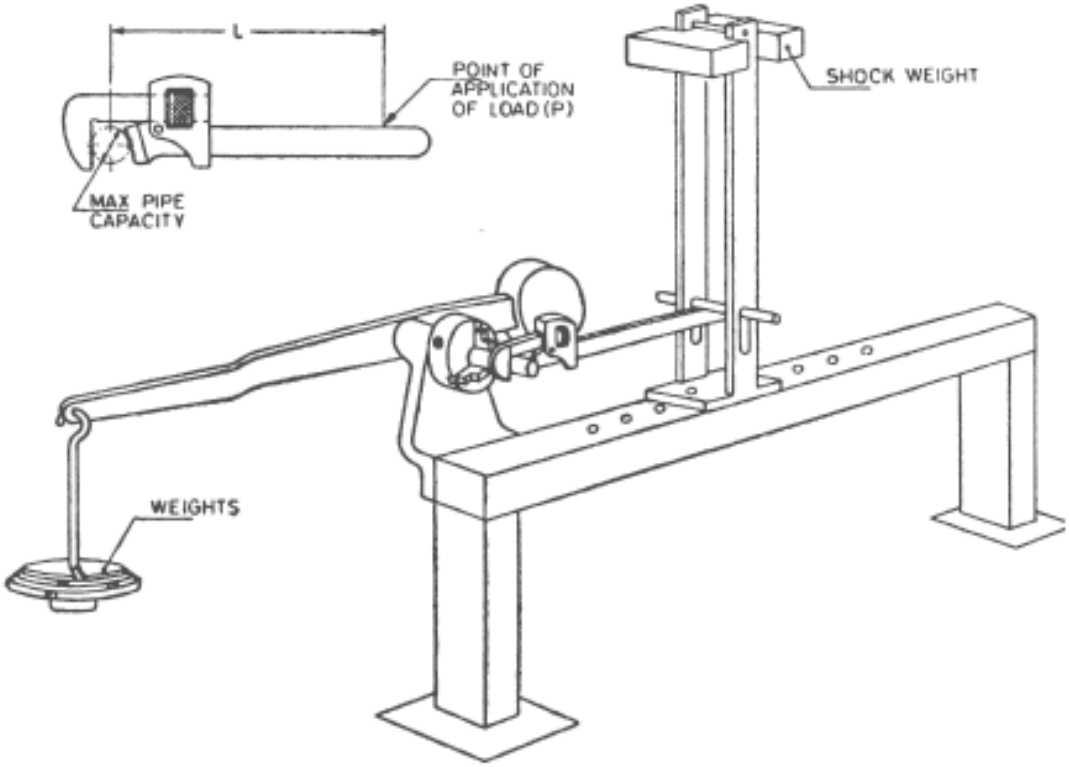


FIG 2 DIAGRAMMATIC ARRANGEMENT OF TEST RIG

Table 2 Test Loads for Pipe Wrenches
(Clause 10.1 *and* 10.2*)*

Nominal Size	Diameter of Test Bar	Proof Torque	Load Position	Shock Load Dropped Through 600 mm at Point 'P'
mm	mm	Nm	L	kg
200	16	180	150	13
250	20	330	200	13
300	25	500	225	13
350	30	650	262	18
450	40	1000	362	18

600	52	1450	500	22
900	75	2350	762	27
1200	100	3250	1025	27

11 SAMPLING

11.1 Lot — In any consignment the wrenches of the same size and manufactured from the same raw material under similar conditions, shall be grouped together to constitute a lot.

11.2 In order to ensure the quality of reliability of the assembly, it is necessary that all its components conform rigidly to the specification requirements. It is recommended that methods given in IS 397 (Part I) ' and IS 397 (Part 2) shall be followed during production. Adequate record of testing and inspection carried out during, process shall be maintained and be produced for the scrutiny of the purchaser. In case the purchaser is satisfied with the quality control procedure, the conformity of the lot may be ascertained by the procedure given in 11.3, otherwise the procedure given in 11.4 may be followed.

11.3 For characteristics such as dimensions, workmanship and finish, manufacture and operation the single sampling plan with inspection level II and AQL of 4 percent as given in Tables 1 and 2 of IS 2500 (Part I) 'Sampling inspection tables: Part I inspection by attributes and by count of defects (first revision) shall be followed.

11.3.1 For hardness and tests, the sampling plan corresponding to inspection level I and AOL of 1 percent as given in Tables 1 and 2 of IS: 2500 (Part I) shall be followed.

11.4 For dimensions, workmanship, finish, manufacture and operation, the sampling plan with inspection level IV and AQL of 1 percent as given in Tables 1 and 2 of IS : 2500 (Part I) shall be followed.

11.4.1 For hardness and tests, the sampling plan with inspection level II and AQL of 1 percent as given in Tables 1 and 2 of IS 2500 (Part I) shall be followed.

12 DESIGNATION

A general-purpose pipe wrench of 200 mm nominal size shall be designated as follows:

Pipe Wrench G 200 IS 4003 (Part 1)

13 MARKING

13.1 Pipe wrenches shall be marked with the nominal size, manufacturer's name and/or trade-mark.

13.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

14 PACKING

Each pipe wrench shall be wrapped in grease or waxed paper and then suitably packed in cardboard carton bearing the designation and size of the wrench and the manufacturer's name initials and/or trade-mark.