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Bench vices — Specification

EAST AFRICAN COMMUNITY

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0 Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 042, *Production and general engineering*.

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Bench vices — Specification

1 Scope

This Draft East African Standard specifies requirements for bench vices, also known as machinists' vices, for mounting on work tables, for general workshop use. This standard covers both fixed base bench vice, swivel base bench vice, quick release bench vice and combination bench vice.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 24153, *Random sampling and randomization procedures*

WD/TC 042/007:2025, *Handle for hand tool — Specification*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

bench vice

workshop device firmly fixed to the bench with the help of nuts and bolts which is used to hold the job/workpiece for filing, milling, and other machining processes that comprise of body and a movable jaw generally made up of cast iron or carbon steel.

3.2

fixed base bench vice

simple bench vice

bench vice with a fixed base that cannot be rotated ideal for general-purpose work, such as woodworking, metalworking, and electronics. The jaws of a fixed base bench vice are also fixed and cannot be rotated.

3.3

swivel base bench vice

rotating base vices

bench vice with two split bases, lower base fixed to the bench by bolts and nuts, and the upper base is free to rotate together with body and movable jaw at any angle from 0° to 360° using tightening lever fixed at the upper base, in order to allows the user to position the workpiece/job at any angle for easy access.

3.4

quick release bench vice

bench vice with a trigger which when pressed disengages the screw and the movable jaw, allowing the movable jaw to be set in any desired place quickly, mostly used in mass production workshops.

3.5

combination bench vice

bench vice with additional V-shaped jaw structure that is fixed below the main jaw used specifically to easily hold round-shaped jobs.

4 Types of bench vices

For the purpose of this standard, bench vices have been divided into the following two types:

- a) fixed base bench vice/ simple bench vice

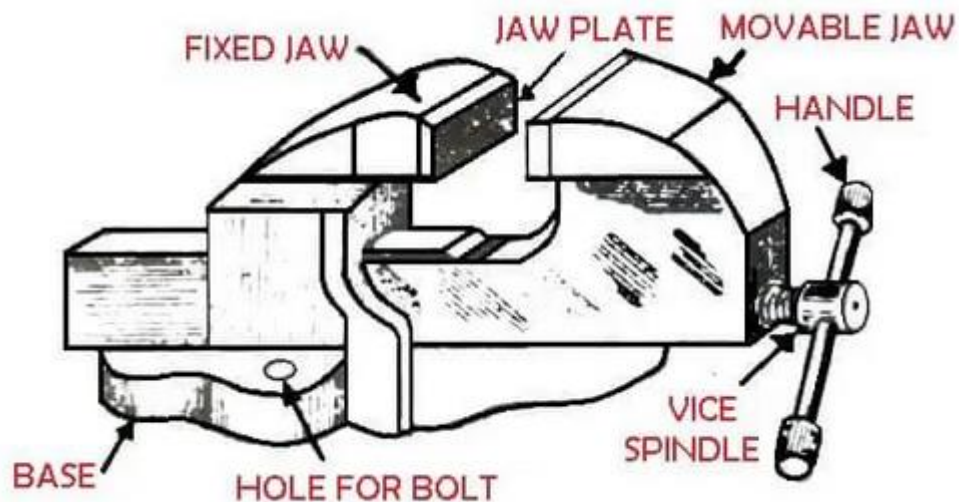


Figure 1: Fixed base bench vice/ simple bench vice

- b) swivel base bench vice



Figure 2: Swivel base bench vice

c) quick release bench vice

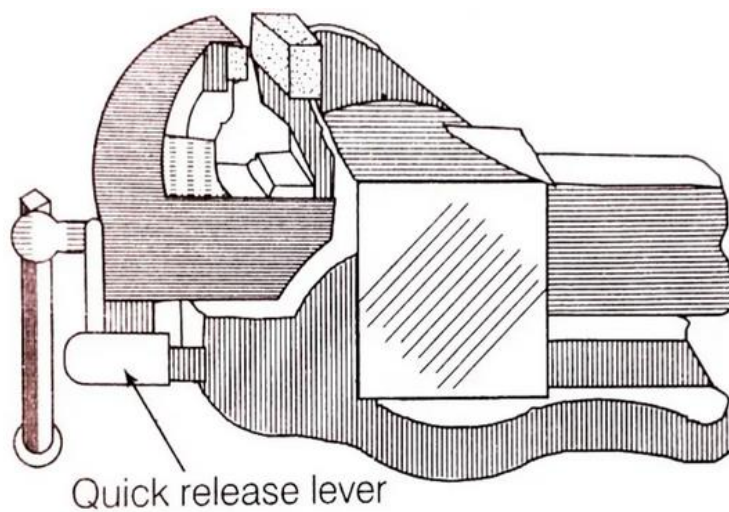


Figure 3: Quick release bench vice

d) combination bench vice

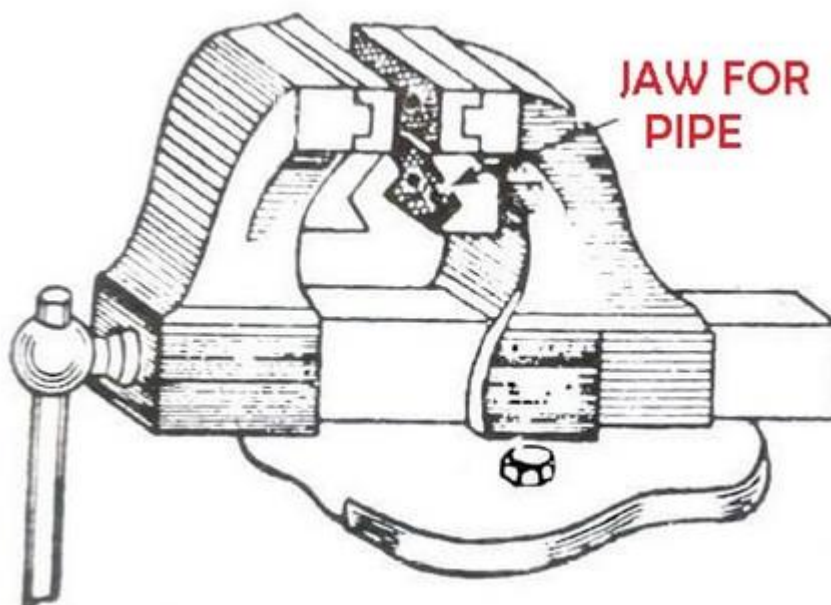


Figure 4: Combination bench vice

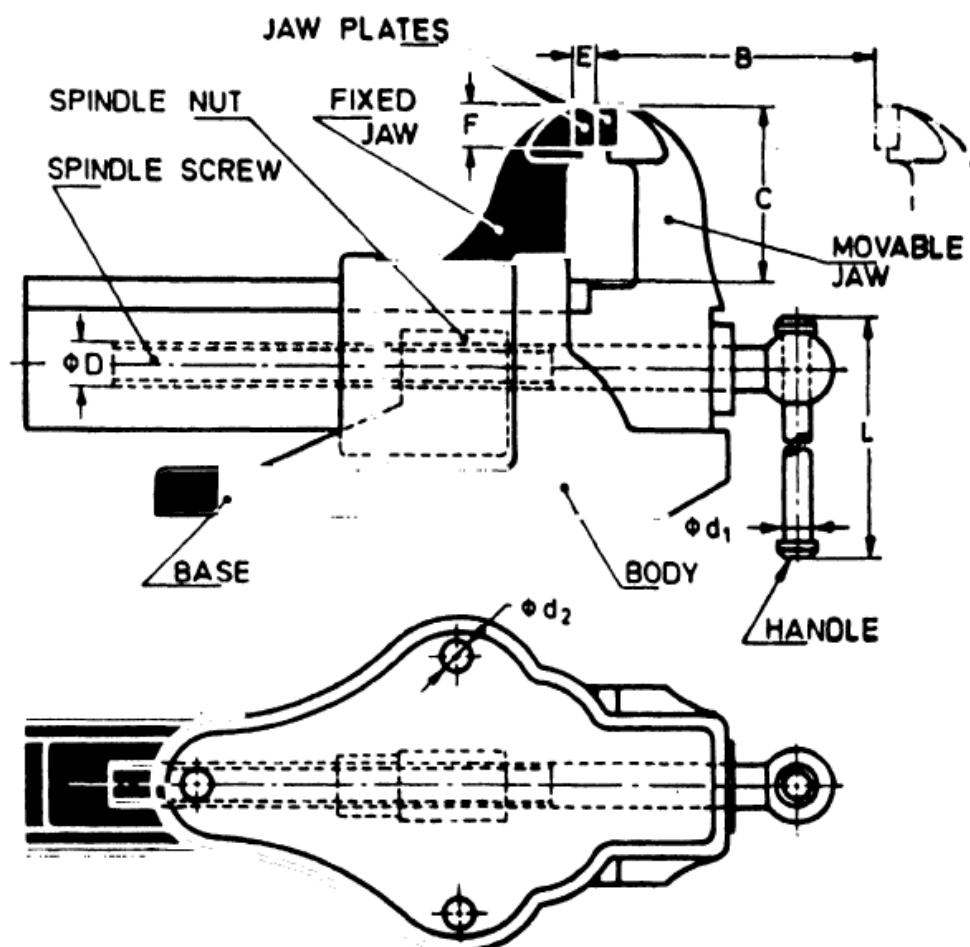
5 Dimensions

5.1 Dimensions for fixed base bench vices

Dimensions for fixed base bench vices shall be as given in Table 1.

Table 1: Dimensions for fixed base bench vices

All dimensions in millimeters



Nominal size (Width of Jaw), A	<i>B</i> <i>Min</i>	<i>C</i>	<i>D</i>	<i>E</i> <i>Min</i>	<i>F</i> <i>Min</i>	<i>L</i>	<i>d</i> ₁	<i>d</i> ₂ ⁺
50	50	38	Tr 12 x 3*	10	15	150	8	7
65	65	45	Tr 12 x 3*	10	15	150	8	7
75	110	65	Tr 20 x 4*	10	18	225	12	12
100	140	75	Tr 22 x 5*	11	21	250	14	14.5
125	175	85	Tr 28 x 5*	12	24	300	16	24
150	210	90	Tr 30 x 6*	12	29	350	18	24

Note:

+ Clearance holes for bolts and screws as per course series.

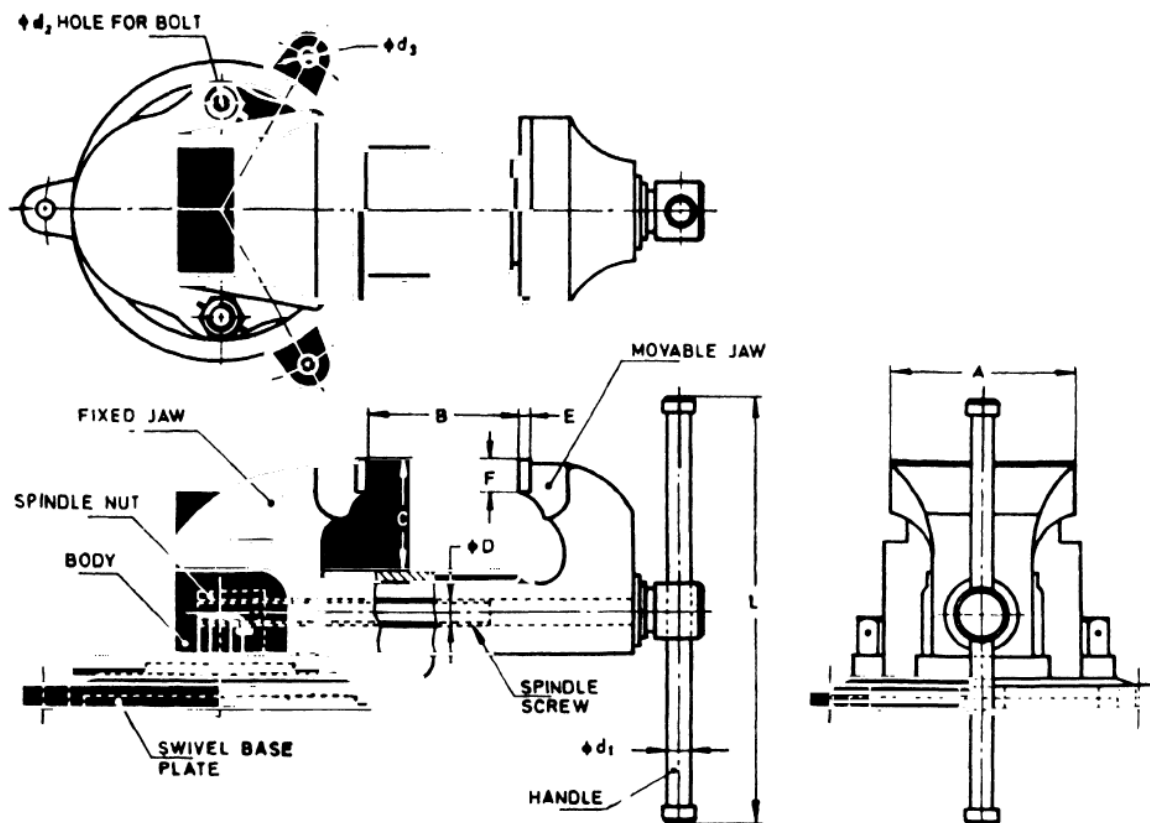
* Specification for ISO metric trapezoidal screw threads.

5.2 Dimensions for swivel base bench vices

Dimensions for swivel base bench vices shall be as given in Table 2.

Table 2: Dimensions for fixed base bench vices

All dimensions in millimeters



Nominal size of (Width Jaw), A	B Min	C	D	E Min	F Min	L	d_1	d_2^+ and d_3
75	80	65	Tr 20 x 4*	10	18	225	12	12
100	120	75	Tr 22 x 5*	11	21	250	14	14.5
125	150	85	Tr 28 x 5*	12	24	300	16	24
150	190	90	Tr 30 x 6*	12	29	350	18	24

Note:

+ Clearance holes for bolts and screws as per course series.

* Specification for ISO metric trapezoidal screw threads.

5.3 Tolerance

Dimensions for width of jaw shall have a tolerance of $\pm 2\%$. Other critical dimensions (B, C, E, F, L, d_1 , d_2) shall have a tolerance of $\pm 3\%$ or ± 1 mm, whichever is greater applied to nominal values.

6 Materials

The materials for various components of bench vices shall be such as to meet the requirements of clause 8 and 13. The recommended materials for various components are shown in Table 3.

Table 3: Recommended materials for various components of bench vices

S/No.	Component	Material
1	Body, Movable jaw and Swivel baseplate	Grey cast iron, steel casting or steel flats
2	Jaw plates	Tool steel
3	Screw spindle and handle	Steel
4	Spindle nut	Grey cast iron

7 Mass

Mass shall be as given in Table 4.

Table 4: Mass of bench vices

Nominal size	Minimum mass of fixed base vice, kg		Minimum mass of swivel base vice, kg	
	Cast	Fabricated	Cast	Fabricated
50	3	-	-	-
60	4.5	-	-	-
75	7	3	9	4
100	15	6	18	8
125	20	10.5	26	13
150	25	15.5	32	18

8 Hardness

8.1 The hardness of the jaw plates shall be 445 to 596 HV (45 – 55 HRC).

8.2 The hardness of the screw spindle threads shall be not less than 300 HV (30 HRC).

9 Manufacture

9.1 Body

The fixed jaw and the base of the vice shall be soundly cast/ fabricated to shape in one piece and the base shall have a flange or lugs to provide for at least three holes for mounting. The central mounting hole shall be on a line perpendicular to the fixed jaw and the other two holes parallel to the jaw equidistant from the central mounting hole. The holes in the jaw shall be accurately drilled and tapped.

9.2 Movable jaw

The movable jaw shall be soundly cast/ fabricated to shape and shall be so designed that the vice is statically balanced, that is, it should be possible for a worker to perform satisfactorily light jobs even when the vice is not fixed with bolts. The holes in the jaw shall be accurately drilled, countersunk and tapped to ensure a flush fixing of screws.

9.3 Swivel base plate

The swivel base plate shall be of sound casting or fabricated separately and shall have a flange or lugs to provide for at least three holes for mountings located equidistant from each other. The vice when mounted on this plate, shall swivel through 360° and shall have a positive locking arrangement to secure the vice in any angular position.

9.4 Jaw plates

The jaw plates shall be soundly made to shape and securely fastened to the jaws by means of countersunk screws. The jaw plates shall be properly serrated to give proper and adequate grip.

9.5 Screw spindle

The screw spindle shall have trapezoidal threads which shall be properly and accurately cut. It shall be so designed that it does not come out of the nut at the maximum opening position of the jaws.

9.6 Spindle nut

The spindle nut shall have a length of at least 2.5 times the nominal diameter of the screw spindle. The threads in the spindle nut shall be properly and accurately cut.

9.7 Handle

The handle shall be straight and shall slide freely in the hole provided at the end of the screw spindle. It shall not slide out of the hole during use. The sharp corners shall be suitably rounded off. The handle shall be according to WD/TC 042/007:2025.

10 Workmanship and finish

10.1 The castings or fabricated components shall be sound, free from sand-holes, pits, blowholes, scabs and other imperfections. The un-machined portion shall be dressed smooth. All components shall be free from cracks, rust, seams, flaws and other defects. The screw spindle shall move freely in the spindle nut without any undue play or stiffness. The backlash while tightening or opening the vice jaws shall not exceed one-eighth ($1/8$) of the pitch of the screw.

10.2 If desired by the purchaser, the combination bench vice having pipe gripping jaws and anvil as shown in figure 5 may be supplied. The face and anvil shall be machined or ground and hardened. The variation on the surface shall not exceed 1mm. Hardness measured at six points about 25mm apart on the face of the anvil, shall not be less than 370 HV (38 HRC).

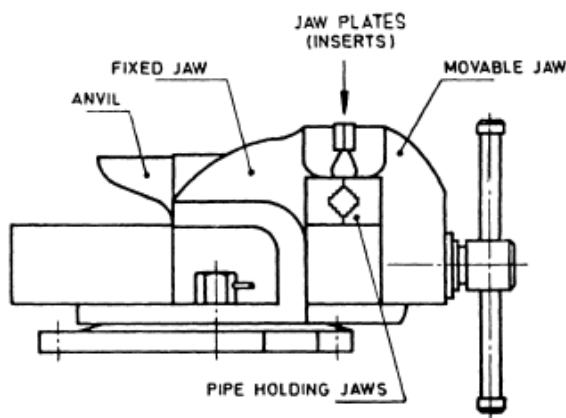


Figure 5: Combination vice

10.3 If so desired by the purchaser, the bench vices shall be fitted with quick-release mechanism.

11 Designation

The bench vices shall be designed by its commonly used name, type of vice (that is FB for fixed base and SB for swivel base vice), nominal size and relevant standard.

Example:

- a) A fixed base bench vice of nominal size 75 shall be designated as follows:

Bench Vice FB 75 EAS 1295

b) A swivel base bench vice of nominal size 75 shall be designated as follows:

Swivel Vice SB 75 EAS 1295

12 Sampling

12.1 The sample shall be selected at random from the lot according to ISO 24153. The samples from each lot shall be tested for ascertaining the conformity of the lot to the requirements of the relevant product specification.

12.2 Bench vices shall be sampled for testing in accordance to Table 5.

Table 5: Scale of sampling and permissible number of defectives

Lot size, <i>N</i>	For visual and dimensional tests		For other tests	
	Sample size, <i>n</i>	Permissible number of defectives	Sample size, <i>n</i>	Permissible number of defectives
Up to 10	1	0	1	0
11 to 25	2	0	2	0
26 to 50	3	0	2	0
51 to 100	5	0	2	0
101 to 300	13	1	3	0
301 to 500	32	3	5	0
501 to 1000	50	5	8	1
1001 to above	80	7	13	1

13 Test methods

13.1 Clamping test

A turning moment as given in Table 6 shall be applied to the screw spindle when the jaws are in closed position.

Table 6: Turning moment values for clamping test

Nominal size of the vice, mm	50	65	75	100	125	150
Turning moment, Nm	80	90	100	120	140	170

The bench vices shall not show any deformation or damage at the end of the test.

13.2 Slackness test

The vice shall be fixed on the table and the jaw shall be opened to the extent indicated in Table 7.

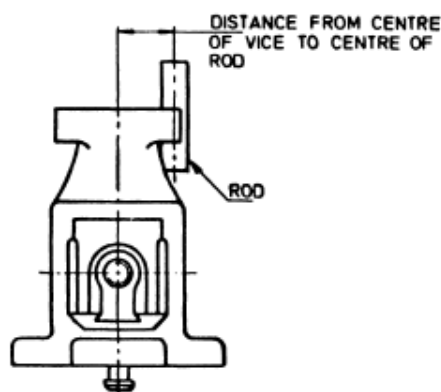
Table 7: Opening of jaw values for slackness test

Nominal Size of the Vice, mm	50	65	75	100	125	150
Opening of Jaw, mm	30	40	50	65	75	100

A load of 150 N (15kgf) shall be applied to the outermost end of movable jaw upwards or downwards, and to the left or to the right, the maximum displacement of the movable jaw shall not exceed 0.8 mm.

13.3 Eccentric clamping test

A mild steel rod of 50 mm diameter shall be clamped lightly in the position as shown in figure 6, and the position of the other end of the jaw determined. When a turning moment as specified in Table 8 is applied to the screw spindle, the displacement of the other end of the jaw shall not exceed the values specified in Table 8.

**Figure 6: Eccentric clamping test****Table 8: Maximum displacement of the jaw for eccentric clamping test**

Nominal size of the vice	Distance from the centre of the vice to the centre of rod	Turning moment to be applied to the screw spindle	Maximum permissible displacement of the jaw	
			In horizontal plane	In vertical plane
50	23	80	1.0	0.7
65	30	90	1.0	0.7
75	35	100	1.0	0.7
100	48	120	1.1	0.7
125	60	140	1.3	0.7
150	73	170	1.5	0.7

13.4 Performance test

13.4.1 Bench vices of 50 to 100 mm

A mild steel bar of 12 mm diameter and approximately 150 mm long shall be gripped vertically in the jaws and given ten blows with a 1 kg hammer at right angle to the jaws, five on each side. The firmly held bar shall then be struck in a direction parallel to the jaw plates sufficient to move it in the vice. The jaw plates and the complete vice shall show no sign of damage, or distortion during or on completion of the test.

13.4.2 Bench vices of 125 to 150 mm

A mild steel bar of 25 mm diameter and approximately 150 mm long shall be gripped vertically in the jaws at a distance of about 50 mm from one end of the jaws and given ten blows with a 1 kg hammer at right angles to the jaws, five on each side. The test shall be repeated after shifting the position of the mild steel bar further about 50 mm. The jaw plates and the vice shall show no sign of damage or distortion during or on completion of the test.

13.5 Hardness test

Use the method described in the relevant section of ISO 6508-1 to determine the hardness on the relevant Rockwell scale. Take at least three readings in the center of the width of the cleaned surface of the jaw and calculate the average of the readings.

14 Preservative treatment

The vices shall be painted on all non-working surfaces including the underside of the base. The working surface shall be covered with a rustproofing material.

15 Packaging and marking

15.1 The bench vices shall be packed as agreed to between purchaser and the manufacturer.

15.2 The bench vices shall be marked with the following information;

- a) manufacturer's name or initials or registered trade-mark, and
- b) nominal size
- c) country of origin

15.3 Each bench vice shall be supplied with user manual or an instruction handbook detailing the operations and safety precautions including the maximum rated capacity safe for operation without sudden failures that may cause an injury to operator.

Bibliography

[1] IS 2586:1986 (Reaffirmed 2002), *Specification for bench vices*

[2] IS 2587:1975 (Reaffirmed 2002), *Specification for pipe vices*

