INTERNATIONAL STANDARD

ISO 13486-1

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Road vehicles — Hydraulic braking systems —

Part 1:
Double-flare pipes, tapped holes, male fittings and tube seats

Véhicules routiers — Dispositifs de freinage hydraulique —

Partie 1: Tuyauteries à double renflement, logements, raccords mâles et siège-guides rapportés

Reference number
ISO 13486-1:1999(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 13486-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 2, *Braking systems and equipment*.

ISO 13486 consists of the following parts, under the general title *Road vehicles — Hydraulic braking systems*:

— *Part 1: Double-flare pipes, tapped holes, male fittings and tube seats*

— *Part 2: Flare-to-flare connections*

Road vehicles — Hydraulic braking systems —

Part 1:
Double-flare pipes, tapped holes, male fittings and tube seats

1 Scope

This part of ISO 13486 specifies the essential dimensional and physical characteristics for double flares of metallic pipes (with and without surface protection), tapped holes, male fittings, and driving fit seats used in hydraulic braking systems for road vehicles.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 13486. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 13486 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 4038:1996, *Road vehicles — Hydraulic braking systems — Simple flare pipes, tapped holes, male fittings and hose end fittings*.

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests*.

3 Pipes

3.1 Pipe without flares

Double-walled, rolled pipes shall be in accordance with ISO 4038 and Table 1.

3.2 Double-flare pipes

Double-flare pipes shall meet the requirements of Figure 1 and Table 2.

3.3 Material requirements

The material shall meet the requirements of Table 3.

3.4 Condition

The inner and outer surfaces shall be free from oxidation. The outer surface shall be protected against corrosion and shall withstand the salt spray test according to ISO 9227 for at least 96 h.

Table 1 — Pipes

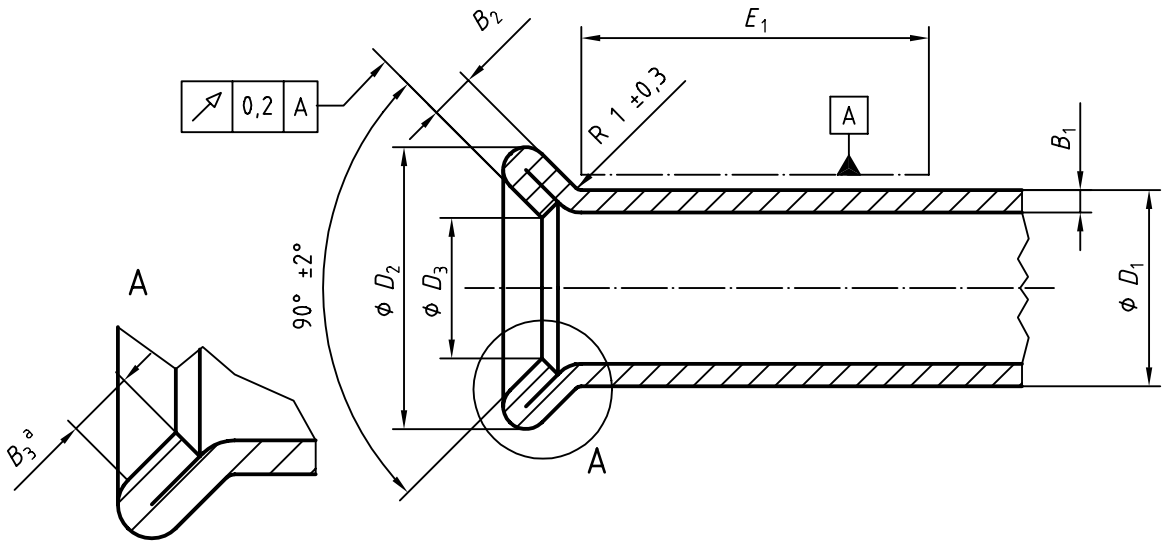
Dimensions and tolerances in millimetres

Outside diameter without surface protection [a], D_1	nom.	6,35
	tol.	± 0,07
Wall thickness, B_1	nom.	0,7
	tol.	± 0,07
Outside diameter, with surface protection, D_1	max.	6,57
Minimum burst pressure	MPa	85
Average mass per metre	kg/m	0,1

NOTE Pipes with additional plastic coatings may be used; however, these pipes shall be compatible with male fittings, tapped holes, and flares as specified in this part of ISO 13486.

[a] In this context, a "bare pipe" means a pipe without surface treatment (nevertheless pipes which have been manufactured from surface-treated sheet material are considered as bare pipes).

Dimensions in millimetres



[a] Minimum sealing surface.

Figure 1 — Double-flare pipe

Table 2 — Double-flare pipe — Dimensions

Dimensions in millimetres

D_1	B_1 ± 0,07	B_2 ± 0,2	B_3 min.	D_2 ± 0,3	D_3 ± 0,35	E_1 min.
4,75	0,7	1,4	1	6,9	3,35	19
6	0,7	1,4	1	8,4	4,55	21
6,35	0,7	1,4	1	8,85	4,85	21
8	0,7	1,4	1,6	10,8	6,55	21
10	0,7	1,4	1,6	13,3	8,55	21

Table 3 — Material requirements

Material	Steel
Tensile strength [a], MPa	⩾ 290
Yield strength, MPa	⩾ 200
Percentage elongation at break [a]	⩾ 25
[a] For pipes which are to be bent.	

4 Type A male fittings and type AS tapped holes

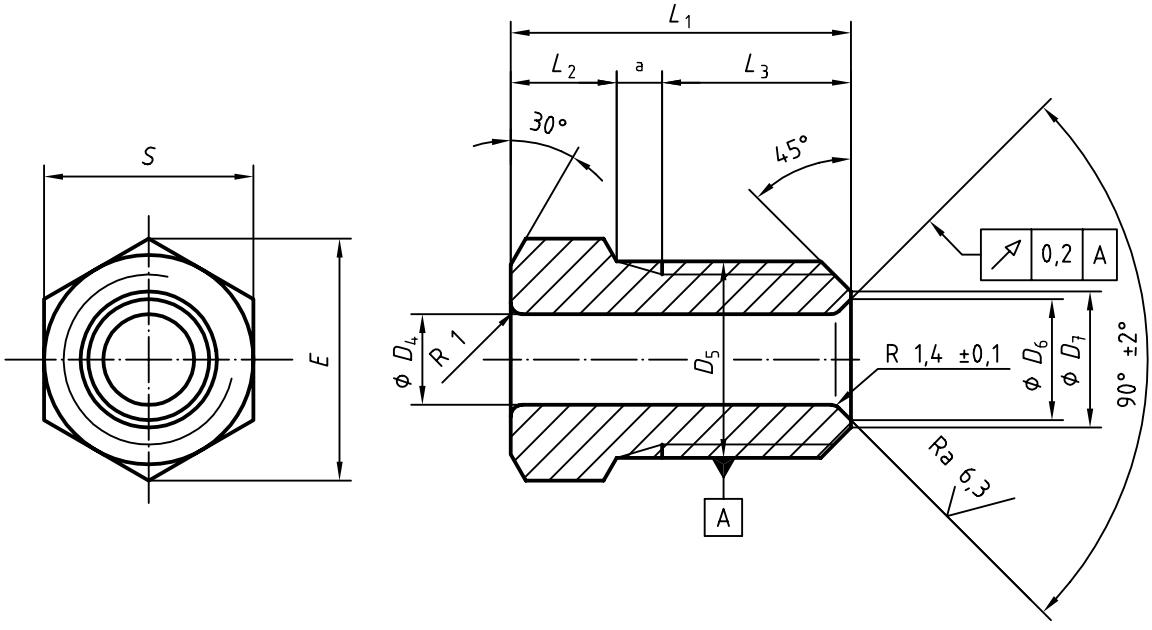
4.1 Type A male fittings

Type A male fittings shall meet the requirements of Figure 2 and Table 4.

The inner and outer surfaces shall be free from oxidation. The outer surface shall be protected against corrosion and shall withstand the salt spray test according to ISO 9227 for at least 96 h.

Dimensions in millimetres

Surface roughness values in micrometres



[a] Depending on manufacturing methods, an undercut is optional.

Figure 2 — Type A male fitting

Table 4 — Type A male fitting — Dimensions

Dimensions in millimetres

D_1 [a]	D_4 [b]	D_5	D_6	D_7	E	L_1	L_2	L_3	S	
	$^{+0,15}_{0}$	6g	$^{+0,1}_{0}$	± 0,2	≈	js14		min.	nom.	tol.
4,75	4,98	M10 × 1	6,8	7,8	11,5	16	5	9	10	$^{0}_{-0,22}$
6,35	6,59	M12 × 1	8,4	9,4	13,9	17	6	9	12	$^{0}_{-0,27}$
8	8,29	M14 × 1,5	10,4	11,4	16,2	20,5	6	11,5	14	
10	10,29	M16 × 1,5	12,4	13,4	19,6	22,5	8	11,5	17	

[a] Type A male fittings are not applicable to D_1 = 6 mm.

[b] Depending on the thickness of the surface protection of the pipe, diameter D_4 may be adapted according to the agreement between manufacturer and user.

4.2 Type AS tapped holes

Type AS tapped holes shall meet the requirements of Figures 3 and 4, and Table 5.

Dimensions in millimetres
Surface roughness values in micrometres

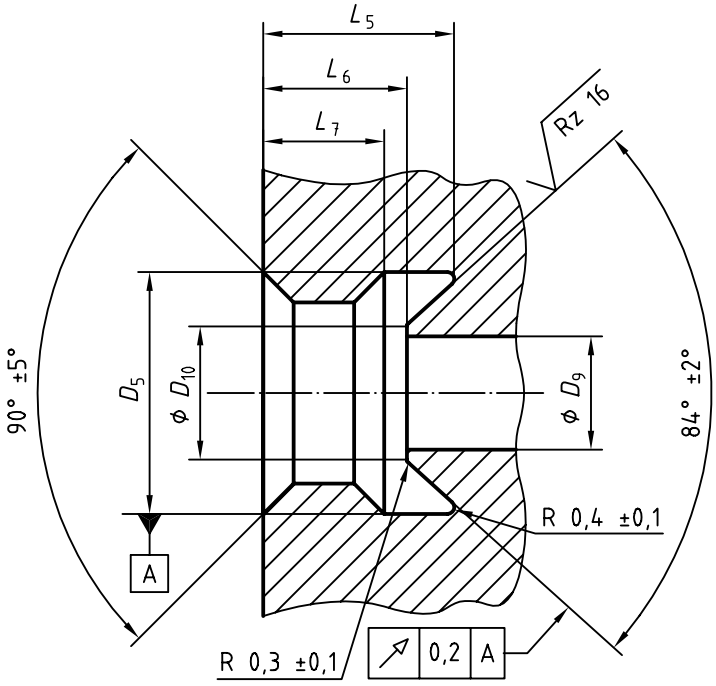
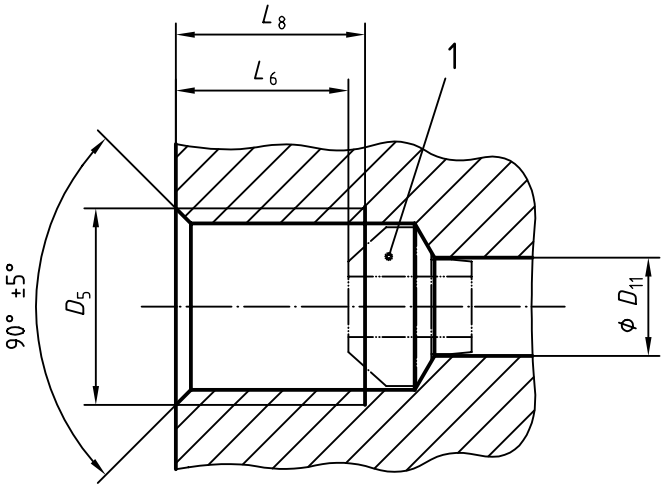


Figure 3 — Type AS 1 tapped hole

Dimensions in millimetres



Key

1 Tube seat (see clause 6)

Figure 4 — Type AS 2 tapped hole

Table 5 — Type AS tapped hole — Dimensions

Dimensions in millimetres

D_1 [a, b]	D_5 6H	D_9	D_{10} ± 0,3	D_{11} +0,15 +0,05	L_5	L_6 ± 0,5	L_7 min.	L_8 min.
4,75	M10 × 1	3,2	3,8	5	9,5	7,5	6	8,5
6,35	M12 × 1	4,5	5,3	6,4	9,5	7,5	6	8,5
8	M14 × 1,5	5,5	6,8	7,6	11,5	9,5	8	10,5
10	M16 × 1,5	7,5	8,8	9,5	11,5	9,5	8	10,5

a For indication only.

b Type AS tapped holes are not applicable to D_1 = 6 mm.

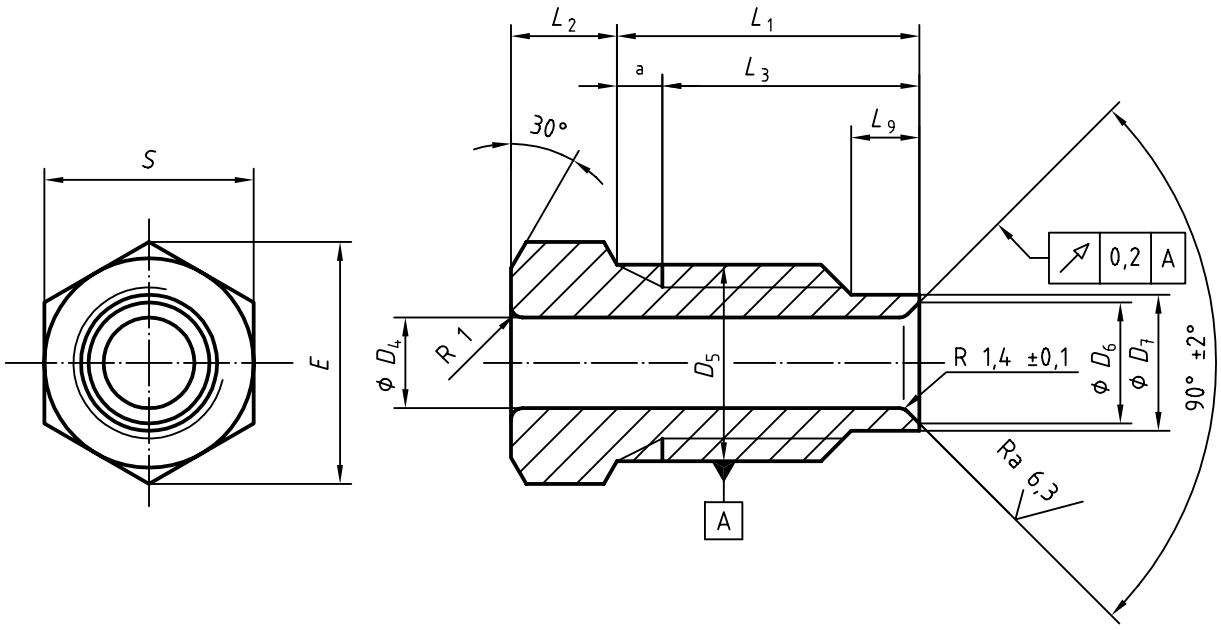
5 Type B male fittings and type BS tapped holes

5.1 Type B male fittings

Type B male fittings shall meet the requirements of Figure 5 and Table 6.

The inner and outer surfaces shall be free from oxidation. The outer surface shall be protected against corrosion and shall withstand the salt spray test according to ISO 9227 for at least 96 h.

Dimensions in millimetres
Surface roughness values in micrometres



a Depending on manufacturing methods, an undercut is optional.

Figure 5 — Type B male fitting

Table 6 — Type B male fitting — Dimensions

Dimensions in millimetres

D_1 [a]	D_4 [b]	D_5	D_6	D_7	E	L_1	L_2	L_3	L_9	S	
	$^{+0,15}_{0}$	6g	$^{+0,1}_{0}$	± 0,2	≈	± 0,2		min.	$^{+0,5}_{0}$	nom.	tol.
4,75	4,98	M10 × 1	6,5	8,3	11,5	13	5	11	3	10	$^{0}_{-0,22}$
6	6,24	M12 × 1	8	10,3	13,9	15	5	11	3	12	$^{0}_{-0,27}$
6,35	6,59	M12 × 1	8,1	10,3	13,9	12	6	11	3	12	$^{0}_{-0,27}$

a Type B male fittings are not applicable to D_1 = 8 mm and 10 mm.

b Depending on the thickness of the surface protection of the pipe, diameter D_4 may be adapted according to the agreement between manufacturer and user.

5.2 Type BS tapped holes

Type BS tapped holes shall meet the requirements of Figures 6 and 7, and Table 7.

Dimensions in millimetres
Surface roughness values in micrometres

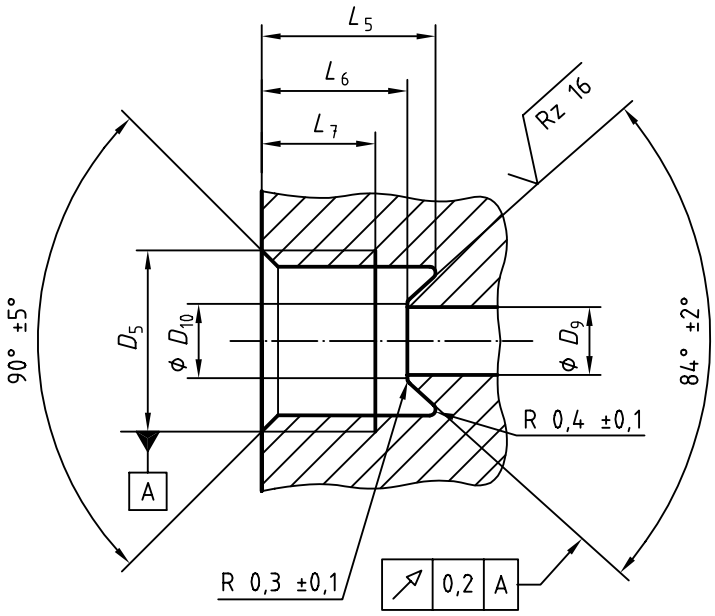
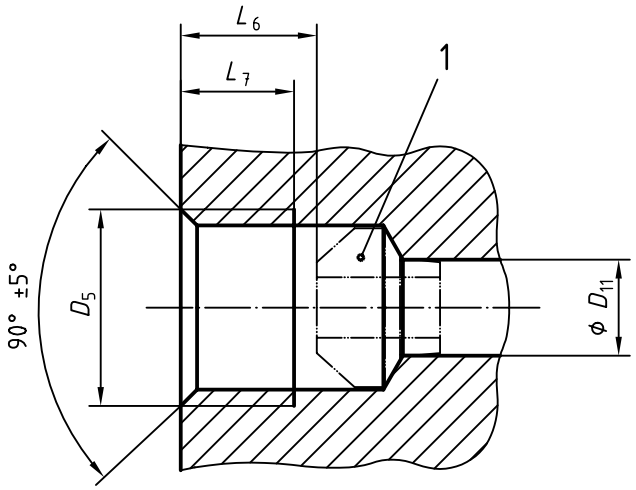


Figure 6 — Type BS 1 tapped hole



Key

1 Tube seat (see clause 6)

Figure 7 — Type BS 2 tapped hole

Table 7 — Type BS tapped hole — Dimensions

Dimensions in millimetres

D_1 [a]	D_5 6H	D_9 $^{0}_{-0,4}$	D_{10} ± 0,3	D_{11} $^{+0,15}_{+0,05}$	L_5 [b]	L_6 ± 0,2	L_7 min.
4,75	M10 × 1	3,3	3,8	5	11,5	9,5	7,5
6 [c]	M12 × 1	4,1	5	6,4	11,5	9,5	7,5
6,35	M12 × 1	4,5	5,3	6,4	11,5	9,5	7,5

[a] Tapped holes type BS are not applicable to D_1 = 8 mm and 10 mm.

[b] For indication only.

[c] Type BS1 only.

6 Tube seats

Tube seats shall meet the requirements of Figure 8 and Table 8.

Dimensions in millimetres
Surface roughness values in micrometres

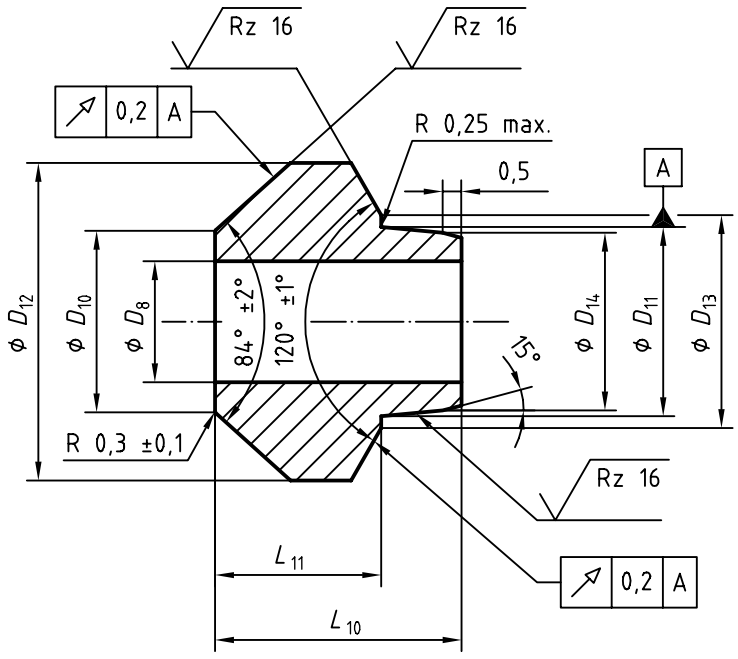


Figure 8 — Tube seat

Table 8 — Tube seat — Dimensions

Dimensions in millimetres

D_1	D_8	D_{10} ± 0,3	D_{11} ± 0,05	D_{12} ± 0,2	D_{13}	D_{14} ± 0,05	L_{10} ± 0,2	L_{11} ± 0,1
4,75	3,2 ± 0,1	3,8	5,2	7,5	6,2	5	7,5	3,2
6,35	4,5 ± 0,2	5,3	6,6	9,5	7,7	6,4	8	4,5
8	5,5 ± 0,2	6,8	7,8	11,8	9,2	7,6	8,8	5,5
10	7,5 ± 0,2	8,8	9,7	13,5	10,5	9,5	10	7,5

7 Marking

7.1 Male fittings of types A and B shall be marked in accordance with 7.2 or 7.3.

7.2 Fittings manufactured by forging shall be marked with three dents in accordance with Figure 9 and Table 9.

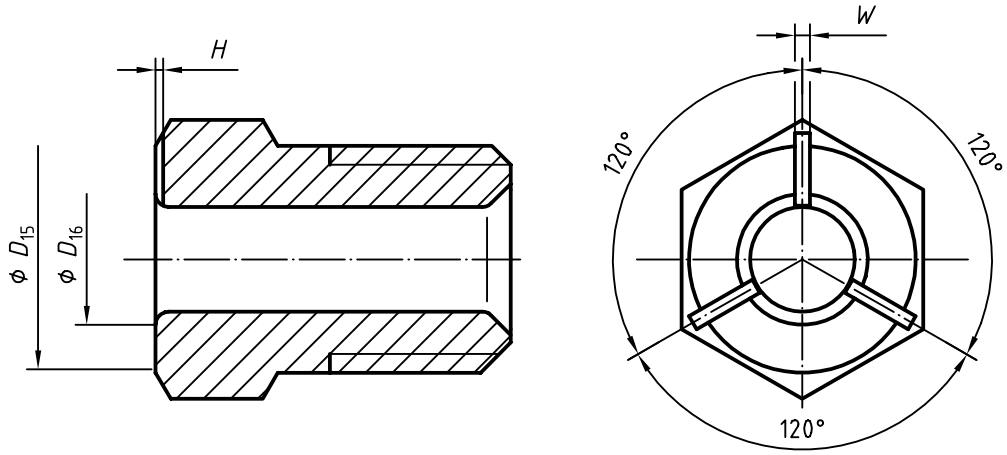


Figure 9 — Marking on fittings manufactured by forging

Table 9 — Marking on fittings manufactured by forging — Dimensions

Dimensions in millimetres

D_1	W +0,5 0	H +0,2 0	D_{15} max.	D_{16} min.
4,75	0,5	0,3	10	7
6			12	9
6,35				
8			14	10,5
10			17	12,5

7.3 Fittings manufactured on turning lathes shall be step marked according to Figure 10 and Table 10.

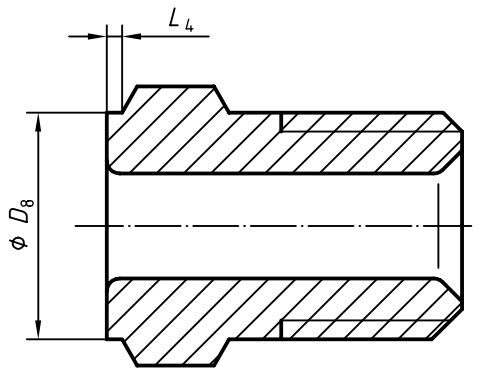


Figure 10 — Marking on fittings manufactured on turning lathes

Table 10 — Marking on fittings manufactured on turning lathes — Dimensions

Dimensions in millimetres

D_1	D_8	L_4 $^{0}_{-0,2}$
4,75	9	0,7
6	11	
6,35		
8	13	
10	16	

8 Identification statement

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 13486:

"Dimensions and designs for double flare pipes, tapped holes, male fittings and tube seats are in accordance with ISO 13486-1:1999, *Road vehicles — Hydraulic braking systems — Part 1: Double flare pipes, tapped holes, male fittings and tube seats*."

Bibliography

[1] ISO 1302:1992, *Technical drawings — Method of indicating surface texture*.

[2] ISO 3996:1995, *Road vehicles — Brake hose assemblies for hydraulic braking systems used with a non-petroleum base hydraulic fluid*.

[3] ISO 6120:1995, *Road vehicles — Brake hose assemblies for hydraulic braking systems used with petroleum base hydraulic fluid*.

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