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Mazdoor Kisan Shakti Sangathan

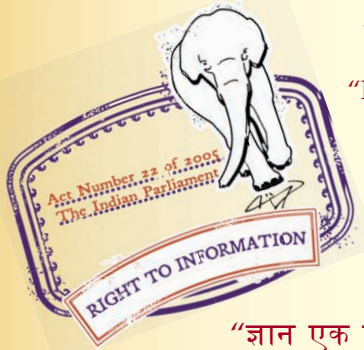
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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 3428 (2009): DIMENSIONS FOR RELIEF GROOVES [PGD 20: Engineering Standards]



“ज्ञान से एक नये भारत का निर्माण”

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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
मोचक खाँचो के आयाम
(दूसरा पुनरीक्षण)

Indian Standard
DIMENSIONS FOR RELIEF GROOVES
(*Second Revision*)

ICS 21.180

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FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by Engineering Standards Sectional Committee had been approved by the Production and General Engineering Division Council.

This standard was first published in 1966 containing five types of relief grooves as Type A to Type E. This standard was first revised in 1980 where considerable assistance had been derived from DIN 509-1966 'Relief grooves'. All the above type were omitted and two new types namely Type E (new) and Type F were specified.

In this revision, assistance has been derived from DIN 509-2006, where in addition to relief grooves Type E and Type F, two new types are added as Type G and Type H.

The relief grooves of the forms G and H are in conformity with the turning cutting plates with respect to their shape and dimension. Rhombic turning cutting plates for Type G and triangular turning cutting plates for Type H.

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 or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard
DIMENSIONS FOR RELIEF GROOVES
(Second Revision)

1 SCOPE

This standard specifies the relief grooves for turning parts and bore holes. It reduces the number of tools required.

2 REFERENCES

The standard listed below contains provisions which through reference in this text, constitute provision of this standard. At the time of publication, the edition 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 edition of the standard indicated below:

<i>IS No.</i>	<i>Title</i>
3073 : 1967	Assessment of surface roughness
3457 : 2009	Radii for rounding for general engineering purposes (<i>second revision</i>)
10719 : 1983	Method of indicating surface texture on technical drawings

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply.

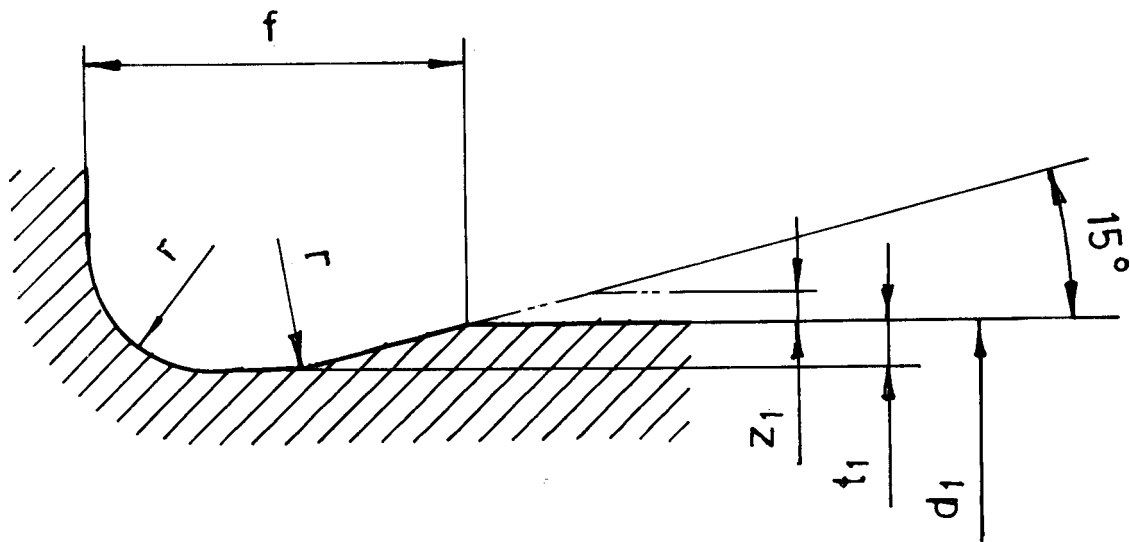
3.1 Relief Groove — Clearance groove of specified form and dimensions created by removing material at an inner corner of a rotationally symmetric work piece and which is necessary for subsequent machining and assembly with mating parts.

4 DIMENSIONS**4.1 Relief Groove Type E**

Type E (*see* Fig. 1 and Table 1) relief groove are suitable where the planar surface is not subjected to high fatigue loads and where the cylindrical surface will be subsequently machined, if necessary. They are also suitable where mating parts have a relatively large counterbore or will not be in contact with the planar surface.

4.2 Relief Groove Type F

A relief groove Type F (*see* Fig. 2 and Table 1) is



d_1 = workpiece diameter	t_1 = depth of cut
f = breadth of relief groove	z_1 = machining allowance
r = radius of relief groove	

FIG. 1 RELIEF GROOVE FOR CYLINDRICAL SURFACE TO BE MACHINED FURTHER

applied for work pieces, whose surfaces which are at right angle to one another are machined further, if necessary.

4.3 Relief Groove Type G

The relief groove of Type G (see Fig. 3 and Table 1) is applied for work pieces with less load, for which as far as possible a smaller transition of the surfaces which are at right angles to one another, is required.

4.4 Relief Groove Type H

A relief groove of Type H (see Fig. 4 and Table 1) is applied for work pieces whose surfaces which are at right angles to one another are machined further, if necessary.

5 TYPE OF SURFACE

Roughness characteristic quantities, Ra 3.2; Rz1 max 25

Other roughness quantities depending on the component function and as per agreement.

NOTE — In practice the test is possible only through visual inspection.

6 DESIGNATION

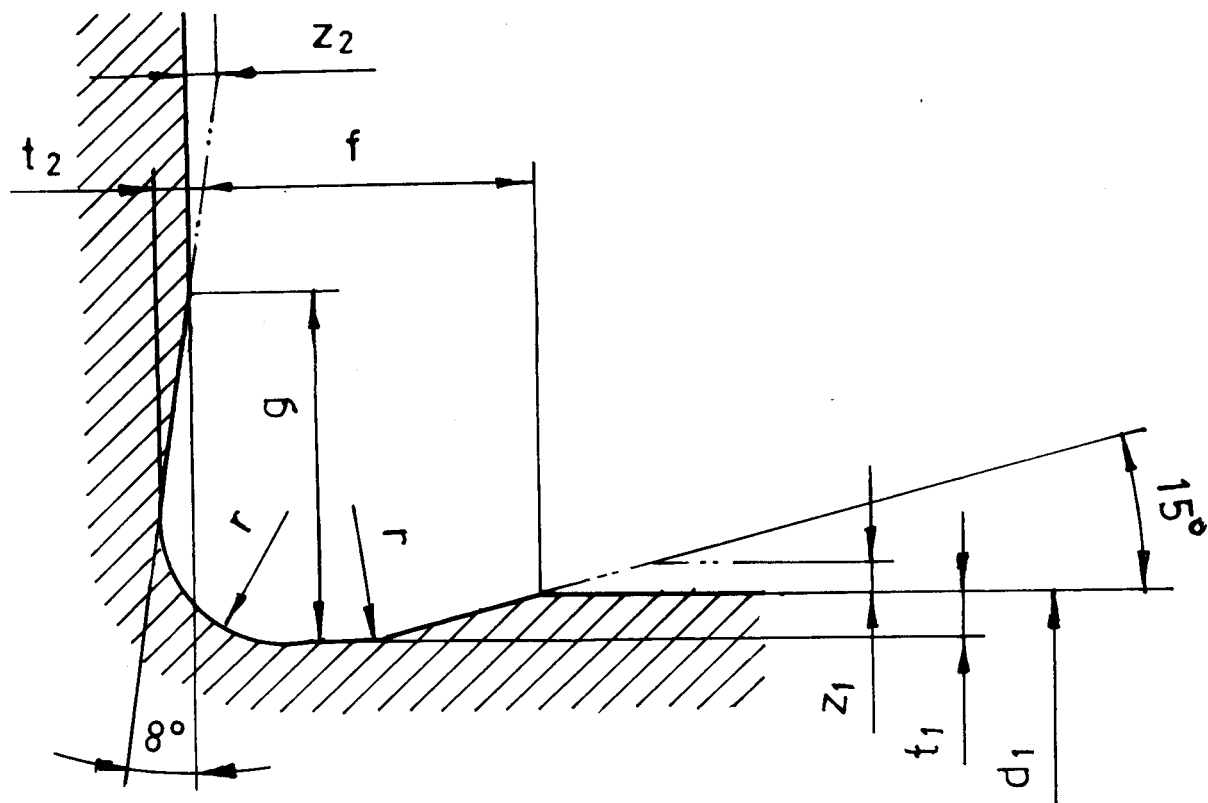
The designation of a relief groove is a combination of the word ‘Relief groove’, the standard number IS 3428, a hyphen; the shape and size of the relief groove (radius r , depth of cut t , separated by the symbol ‘x’). If necessary, the hyphen followed by the specification of surface quality (surface finish).

Example for the designation of a relief groove of Type E, with radius $r = 0.8$ mm and a depth of cut $t_1 = 0.3$ mm.

Relief groove IS 3428 — E 0.8 × 0.3

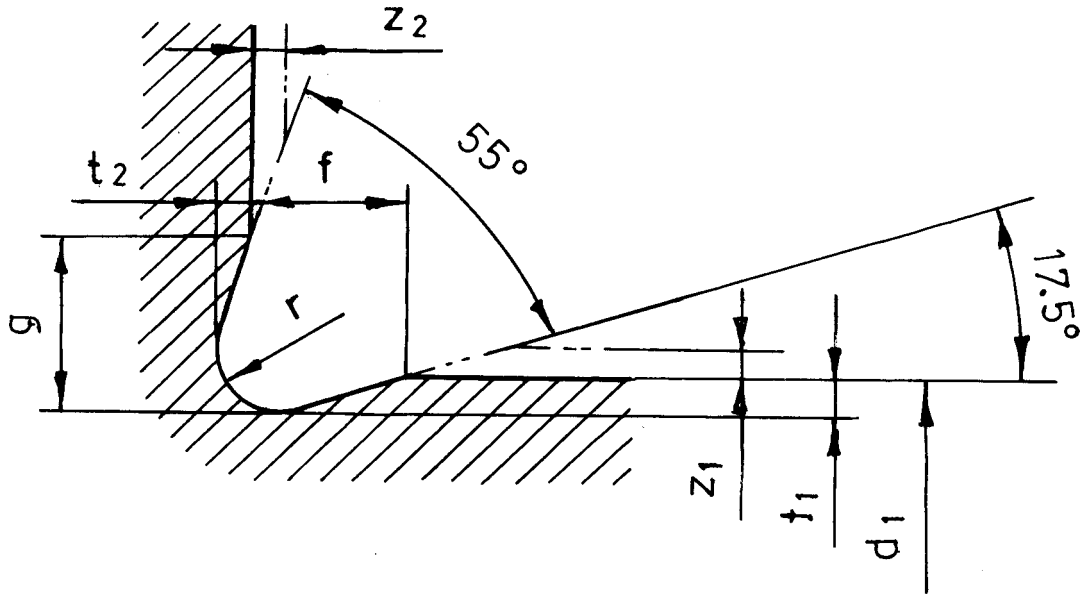
Alternate example for the designation for a ‘Relief groove’ of Type E, with Radius $r = 0.8$ mm and a depth of cut $t_1 = 0.3$ mm, material abrasive (Material Roughness Quantities according to IS 3073) as well as the roughness characteristic quantities Ra 1.6 μ m and Rz1max 16 μ m.

Relief groove IS 3428 — E 0.8 × 0.3 — Material Roughness Quantities Ra 1.6; Rz1max 16



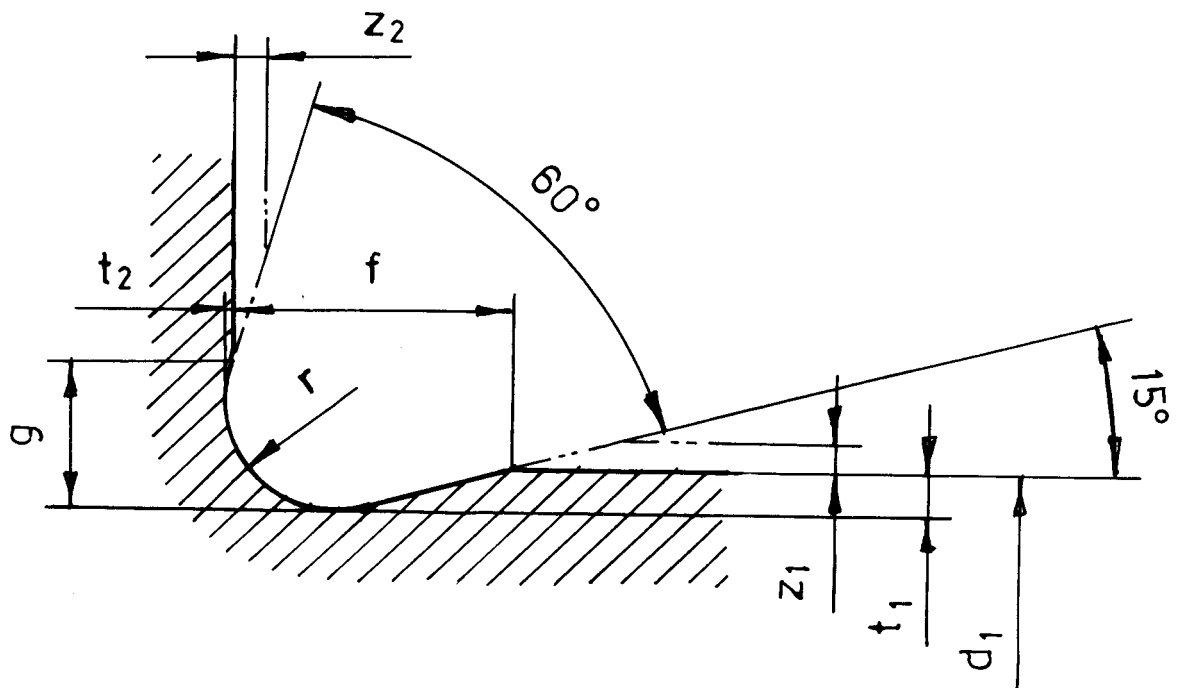
- d_1 = diameter of the work piece
- f, g = breadth of the relief groove
- r = radius of the relief groove
- t_1, t_2 = depth of cut
- z_1, z_2 = machining allowance

FIG. 2 RELIEF GROOVE FOR THE PLANE AND THE CYLINDRICAL SURFACE FOR FURTHER MACHINING



- | | |
|---------------------------------------|----------------------------------|
| d_1 = diameter of the work piece | t_1, t_2 = depth of cut |
| f, g = breadth of the relief groove | z_1, z_2 = machining allowance |
| r = radius of the relief groove | |

FIG. 3 RELIEF GROOVE FOR SMALL TRANSITION



- | | |
|---------------------------------------|----------------------------------|
| d_1 = diameter of the work piece | t_1, t_2 = depth of cut |
| f, g = breadth of the relief groove | z_1, z_2 = machining allowance |
| r = radius of the relief groove | |

FIG. 4 RELIEF GROOVE FOR LARGER RADIUS TRANSITION

Table 1 Dimensions for Relief Grooves
(Clauses 4.1 to 4.4)

All dimensions in millimetres.

Form	$r^{1)}$ ± 0.1		t_1 $+0.1$ 0	t_2 $+0.05$ 0	f $+0.2$ 0	g	Recommended Co-relation to Diameter $d_1^{2)}$ for Workpieces	
	Series 1	Series 2					For Normal Duty Conditions ³⁾	With Increased Fatigue Resistance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
E		R 0.2	0.1	—	1	—	Above 1.6 to 3	—
	R 0.4		0.2	—	2	—	Above 3 to 18	—
		R 0.6	0.2	—	2	—	Above 10 to 18	—
		R 0.6	0.3	—	2.5	—	Above 18 to 80	—
	R 0.8		0.3	—	2.5	—	Above 18 to 80	—
		R 1	0.2	—	2.5	—	—	Above 18 to 50
		R 1	0.4	—	4	—	Above 80	—
	R 1.2		0.2	—	2.5	—	—	Above 18 to 50
	R 1.2		0.4	—	4	—	Above 80	—
	R 1.6		0.3	—	4	—	—	Above 50 to 80
R 2.5		0.4	—	5	—	—	Above 80 to 125	
R 4		0.5	—	7	—	—	Above 125	
F		R 0.2	0.1	0.1	1	(0.9)	Above 1.6 to 3	—
	R 0.4		0.2	0.1	2	(1.1)	Above 3 to 18	—
		R 0.6	0.2	0.1	2	(1.4)	Above 10 to 18	—
		R 0.6	0.3	0.2	2.5	(2.1)	Above 18 to 80	—
	R 0.8		0.3	0.2	2.5	(2.3)	Above 18 to 80	—
		R 1	0.2	0.1	2.5	(1.8)	—	Above 18 to 50
		R 1	0.4	0.3	4	(3.2)	Above 80	—
	R 1.2		0.2	0.1	2.5	(2)	—	Above 18 to 50
	R 1.2		0.4	0.3	4	(3.4)	Above 80	—
	R 1.6		0.3	0.2	4	(3.1)	—	Above 50 to 80
R 2.5		0.4	0.3	5	(4.8)	—	Above 80 to 125	
R 4		0.5	0.3	7	(6.4)	—	Above 125	
G	R 0.4		0.2	0.2	(0.9)	(1.1)	Above 3 to 18	—
H	R 0.8		0.3	0.05	(2.0)	(1.1)	Above 18 to 80	—
	R 1.2		0.3	0.05	(2.4)	(1.5)	—	Above 18 to 50

¹⁾ Relief grooves with radii of the series 1 are preferable.

²⁾ The allocation to diameter range is not applicable for short offsets and thin walled parts. For manufacturing reasons, it would be sensible to effect several relief grooves on a single work piece with different diameters, in the same shape and size.

³⁾ Type G only for work pieces with less load .

7 MACHINING ALLOWANCE

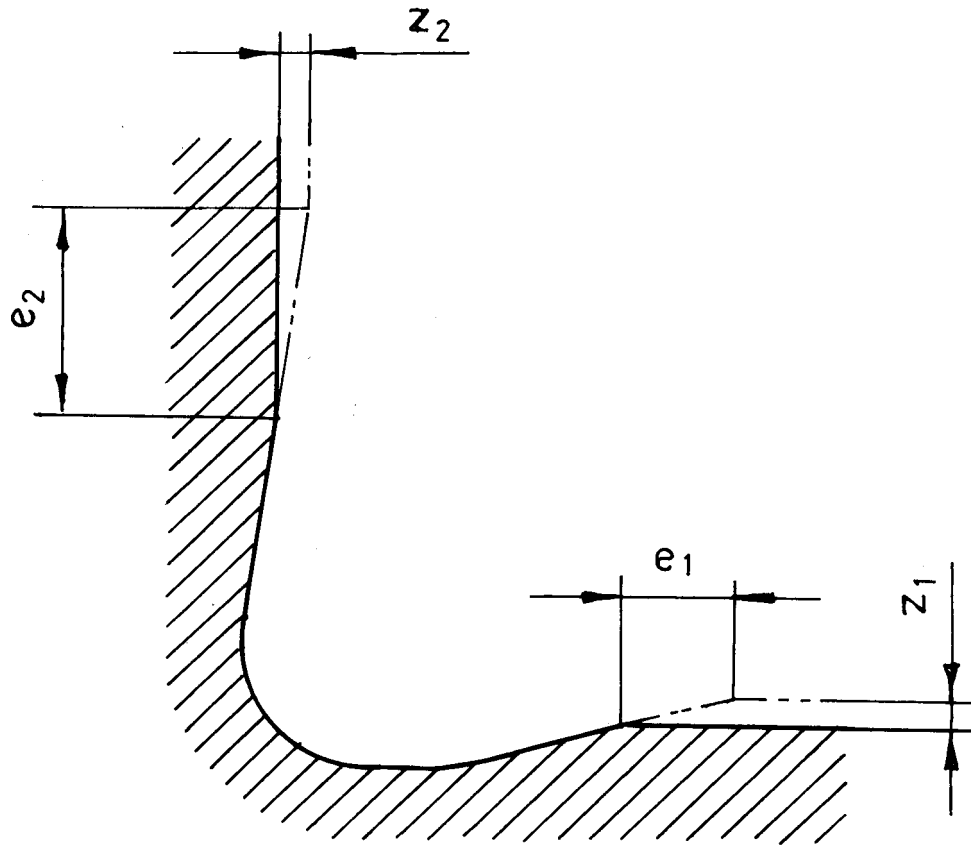
The machining allowance z_1 and z_2 given in Table 2 displaces the blend of the relief grooves into the machined surfaces by the amount e_2 and e_1 , respectively as given in Fig. 5. This amount depends on the magnitude of z_1 and z_2 and the relevant entry and runout angles of the relief grooves.

8 COUNTERSUNK FOR MATING PART

See Table 3.

9 METHOD OF REPRESENTATION IN DRAWINGS

In drawings, the relief grooves are preferably simplified by a broad full line with appropriate designation as illustrated in the following examples (see Fig. 7 and Fig. 8). For complete information (see Fig. 9 and Fig. 10).



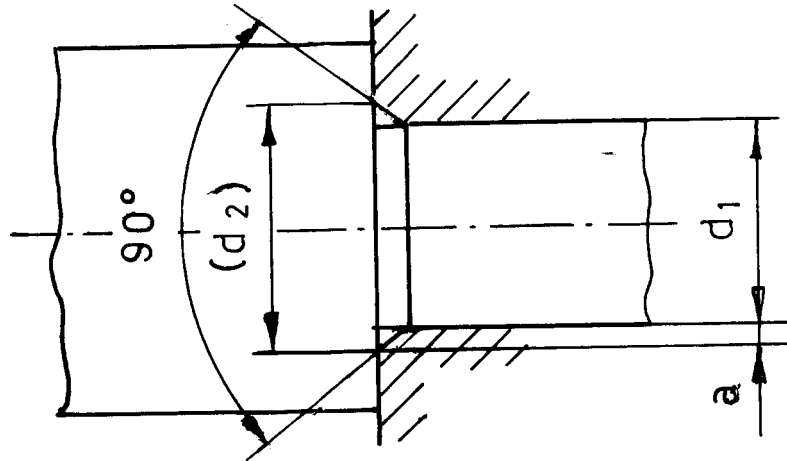
e_1, e_2 = breadth of the machining transition
 z_1, z_2 = machining allowance

FIG. 5 MACHINING ALLOWANCE (NOTATION)

Table 2 Allocation of Dimensions of Relief Groove and Machining Allowance
 (Clause 7)

All dimensions in millimetres.

Sl No.	z_1, z_2	Type E e_1	Type F		Type G e_1 and e_2	Type H e_1 and e_2
			e_1	e_2		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	0.1	0.37	0.37	0.71	0.32	0.37
ii)	0.15	0.56	0.56	1.07	0.48	0.56
iii)	0.2	0.75	0.75	1.42	0.63	0.75
iv)	0.25	0.93	0.93	1.78	0.79	0.93
v)	0.3	1.12	1.12	2.14	0.95	1.12
vi)	0.4	1.49	1.49	2.85	1.27	1.49
vii)	0.5	1.87	1.87	3.56	1.59	1.87
viii)	0.6	2.24	2.24	4.27	1.9	2.24
ix)	0.7	2.61	2.61	4.98	2.22	2.61
x)	0.8	2.99	2.99	5.69	2.54	2.99
xi)	0.9	3.36	3.36	6.40	2.85	3.36
xii)	1.0	3.73	3.73	7.12	3.17	3.73



a = dimension for countersunk
 d_1 = diameter of workpiece
 $d_2 = d_1 + 2a$

FIG. 6 COUNTERSUNK FOR MATING PART

Table 3 Dimension of Countersunk, a
(Clause 8)

All dimension in millimetres.

SI No.	Groove Size	Countersunk, a			
		Type E	Type F	Type G	Type H
(1)	$r \times t_1$ (2)	(3)	(4)	(5)	(6)
i)	0.2 × 0.1	0.2	0	—	—
ii)	0.4 × 0.2	0.3	0	0	—
iii)	0.6 × 0.2	0.5	0.15	—	—
iv)	0.6 × 0.3	0.4	0	—	—
v)	0.8 × 0.3	0.6	0.05	—	0.35
vi)	1.0 × 0.2	0.9	0.45	—	—
vii)	1.0 × 0.4	0.7	0	—	—
viii)	1.2 × 0.2	1.1	0.6	—	—
ix)	1.2 × 0.3	—	—	—	0.65
x)	1.2 × 0.4	0.9	0.1	—	—
xi)	1.6 × 0.3	1.4	0.6	—	—
xii)	2.5 × 0.4	2.2	1.0	—	—
xiii)	4.0 × 0.5	3.6	2.1	—	—

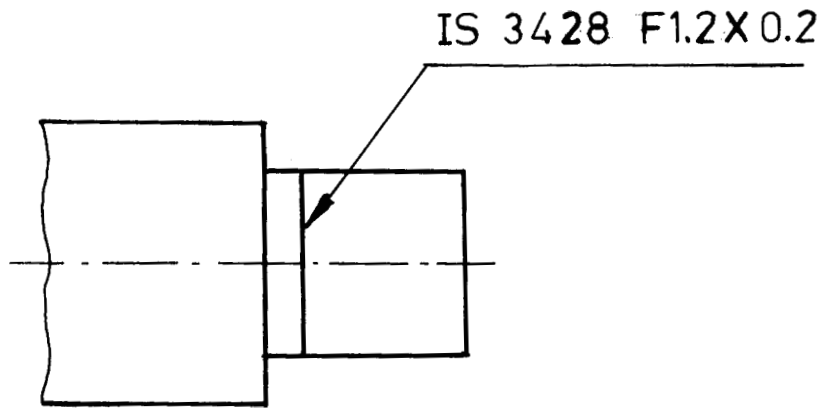


FIG. 7 SIMPLIFIED REPRESENTATION FOR RELIEF GROOVE F 1.2. × 0.2

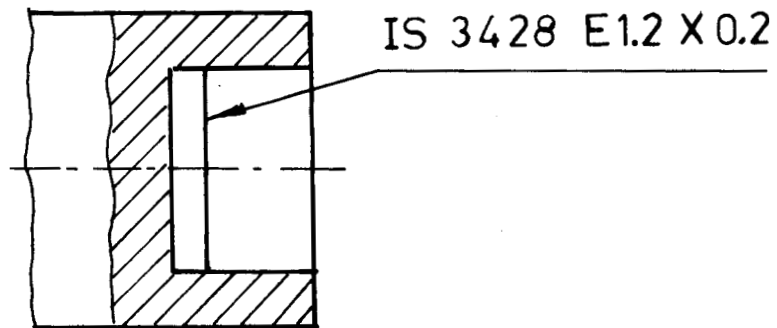
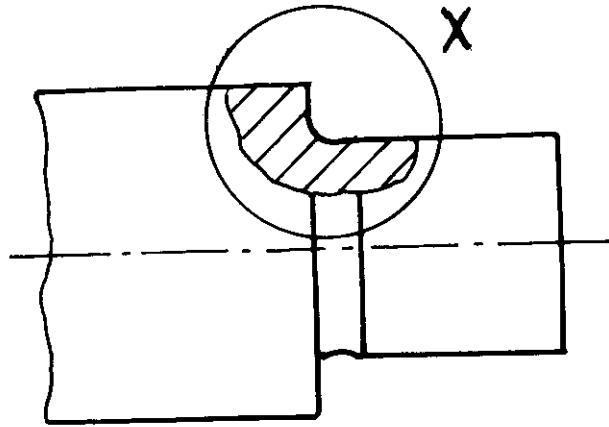
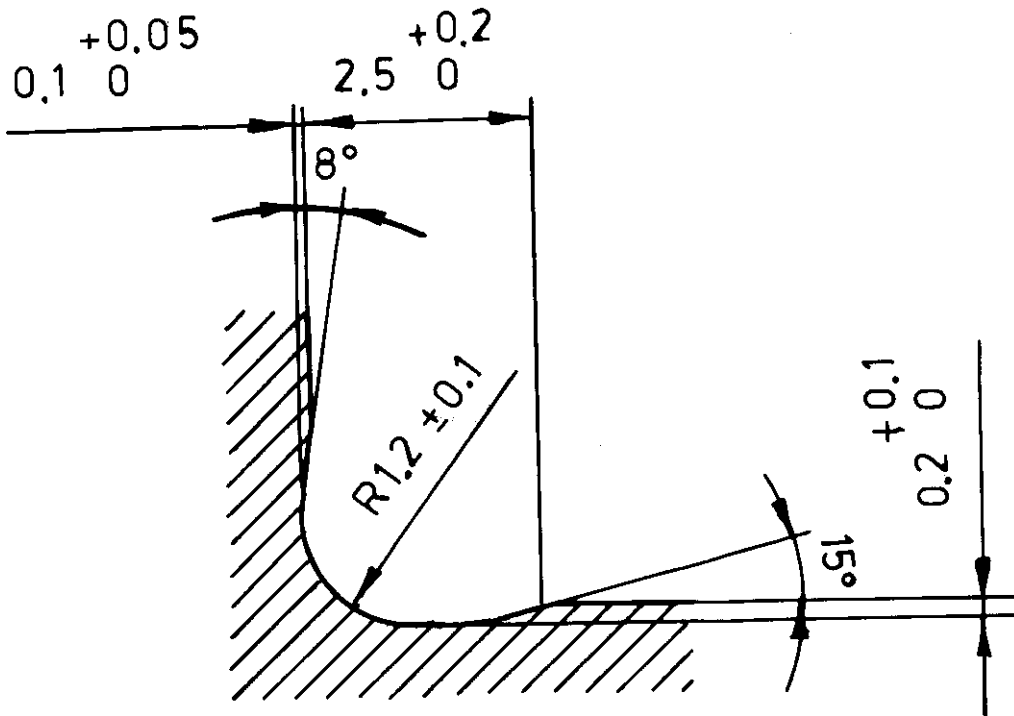


FIG. 8 SIMPLIFIED REPRESENTATION FOR RELIEF GROOVE E 1.2 × 0.2

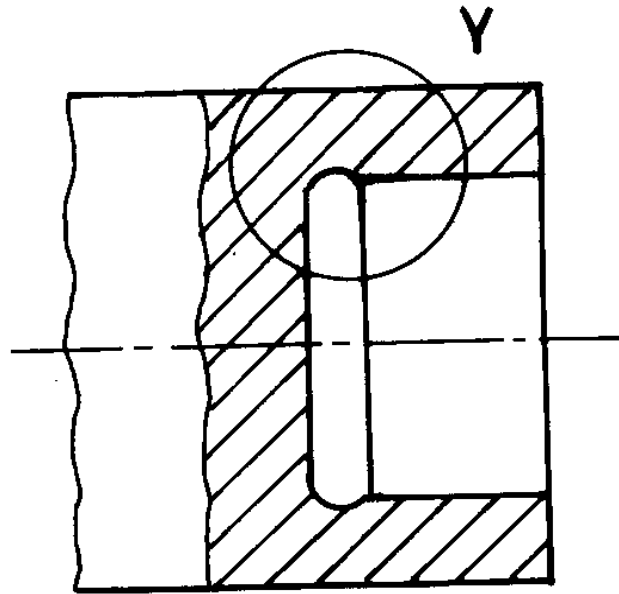


X (5:1)



NOTE — Surface roughness as 5 or if required as per IS 10719.

FIG. 9 COMPLETE DETAILS FOR RELIEF GROOVE F 1.2 × 0.2



Y (5:1)

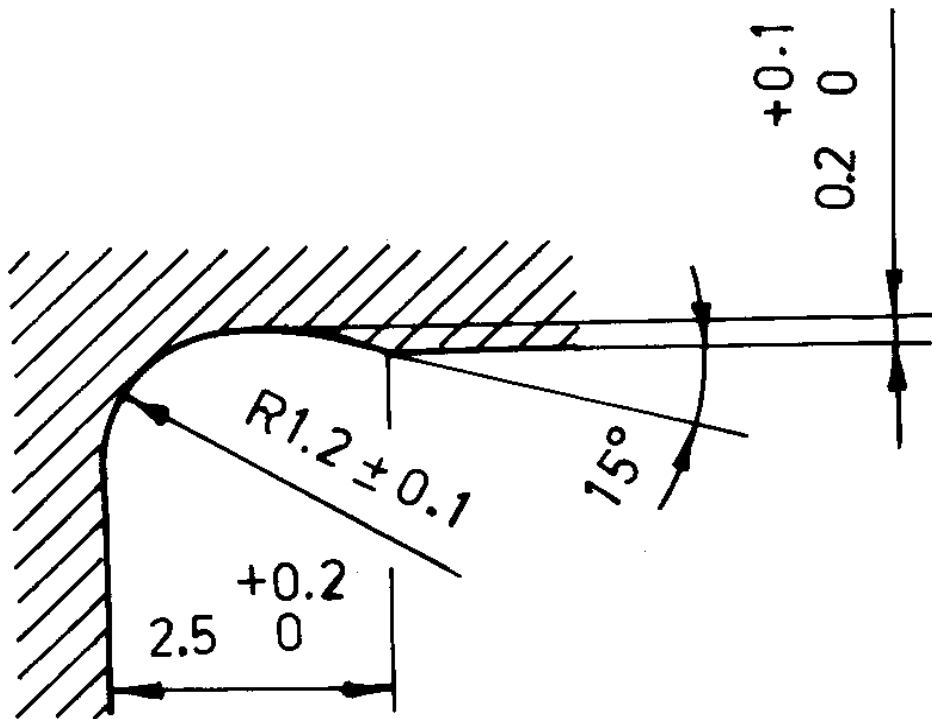


FIG. 10 COMPLETE DETAILS FOR RELIEF GROOVE E 1.2 × 0.2

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This Indian Standard has been developed from Doc No. : PGD 20 (1020).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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