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भारतीय मानक प्रारूप

आईसी इंजन के लिए पिस्टन के छल्ले के लिए विशिष्टता भाग 5 स्टेप्ड ऑयल स्क्रेपर रिंग्स 30 यूपी से 200 मिमी तक नाममात्र व्यास जेड-रिंग्स

Draft Indian Standard

SPECIFICATION FOR PISTON RINGS FOR IC ENGINES PART 5 STEPPED OIL SCRAPER RINGS FROM 30 UP TO 200 mm NOMINAL DIAMETER Z-RINGS

(First Revision)

ICS: 43.060.10

Last date for receipt of comments is 16/11/2022

Automotive Primemovers, Transmission Systems and Internal Combustion Engine Sectional Committee, TED 2

FOREWORD
(*Formal Clause to be added later*)

This standard is one of a series of Indian Standards on the Specification for piston rings for IC engines. Other standards in this series are:

IS 8422 (Part 1) : 1977	Specification for piston rings for IC engines: Part 1 plain compression rings from 30 up to 200 mm nominal diameter R – Rings
IS 8422 (Part 2) : 1977	Specification for piston rings for IC engines: Part 2 taper faced compression rings from 30 up to 200 mm nominal diameter M – Rings
IS 8422 (Part 3) : 1977	Specification for piston rings for IC engines: Part 3 keystone rings from 82 up to 200 mm nominal diameter T - Rings 15
IS 8422 (Part 4) : 1977	Specification for piston rings for IC engines: Part 4 napier oil scraper rings from 30 up to 200 mm nominal diameter N – Rings
IS 8422 (Part 6) : 1977	Specification for piston rings for IC engines: Part 6 slotted oil control rings from 50 up to 200 mm nominal diameter S – Rings
IS 8422 (Part 7) : 1977	Specification for piston rings for IC engines: Part 7 double bevelled slotted oil control rings from 50 up to 200 mm nominal diameter G – Rings
IS 8422 (Part 8) : 1977	Specification for piston rings for IC engines: Part 8 narrow land slotted oil control rings from 50 up to 200 mm nominal diameter D - Rings

This standard is one of the series of Indian Standards on piston ring dimensions, tangential force, etc. IS 5791: 2006 is a necessary adjunct to this standard which gives details of materials, surface finish, gap types and sizes, surface coatings, manufacturing processes, etc.

In this draft for first revision of this standard, the referencing standards have been updated. A separate clause for references has also been introduced for ease of interpretation. However, wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

In the preparation of this standard due consideration has been given to the prevalent sizes in the industry. It is recommended that for new designs, only the sizes given in this standard be used.

In the preparation of this standard assistance has been derived from 'Draft British Standard Specification of piston rings up to 200 mm diameter for internal combustion engines : Part 1 Single piece designs, dimensions, materials and designations', issued by the British Standards Institution.

The composition of the Committee responsible for the formulation of this standard is given at **Annex A (Will be added later).**

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 test or analysis, 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.

Draft Indian Standard

SPECIFICATION FOR PISTON RINGS FOR IC ENGINES PART 5 STEPPED OIL SCRAPER RINGS FROM 30 UP TO 200 mm NOMINAL DIAMETER Z-RINGS

1 SCOPE

Specifies the dimensions, tolerances, tangential loads and other details of Z-rings (stepped oil scraper rings) from 30 up to 200 mm nominal diameter for internal combustion engines.

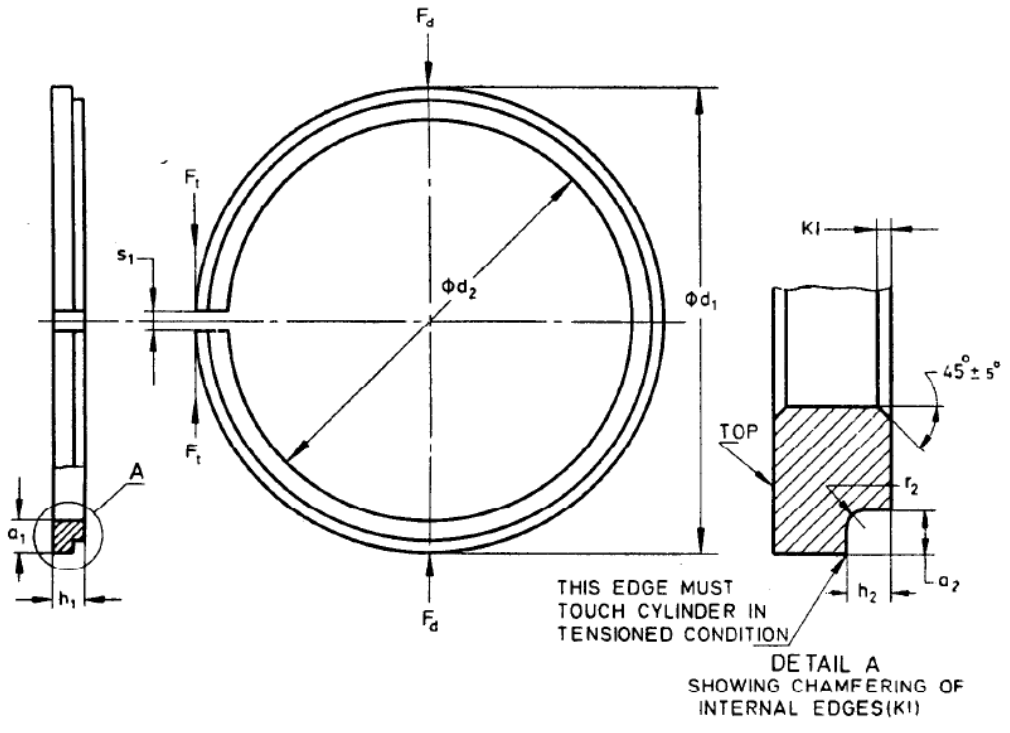
2 REFERENCES

The standards given below contain provisions 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 these standards.

IS No.	*Title*
5791: 2006	Internal combustion engines - Piston rings - Material specifications (*Third Revision*)

3 DIMENSIONS AND TOLERANCES

Shall be as given in Table 1 read with Fig. 1.



All dimensions in millimetres

.

FIG. 1 STEPPED OIL SCRAPER RING (Z-RING)

4 DESIGNATION

Shall Include:

a) Type of ring;
b) Nominal diameter d_1;
c) Axial width h_1;
d) Number of this standard;
e) Material symbol,
f) Manufacturing process; and
g) Type of coating.

Example:

Stepped oil scraper ring (Z-ring) of nominal diameter d_1=90 mm, axial width h_1 2.5 mm, made of alloyed cast iron (A3), internally bevelled (IF) and phosphated on all sides (P), shall be designated as :

Z-Ring 90 × 2.5 IS: 8422 (Part 5) A3 IF P

TABLE 1 DIMENSIONS AND LOADS OF Z-RINGS
(*Clause* 3 and Fig. 1)

(All dimensions in millimetres)

Nominal Dia-meter d_1	Inside Dia-meter d_2	Radial Wall Thickness		Axial Width of Ring $h_1{}^{-0.010}_{-0.025}$			Closed Gap s_1	Axial Width of Step h_2±0.1 for h_1 Shown in Column			Radial Depth of Step a_2	Radius r_2	Chamfering of Inside Edges (KI)	Tangential Load F_d* in N ±25% for h1 Shown in Column		
		a_1	Tol	1	2	3		1	2	3				1	2	3
30 32 34	27.5 29.3 31.1	1.25 1.35 1.45	+0.10 -0.15 with a maximum variation of 0.15 in a ring	2	2.5	—	$0.15^{+0.20}_{0}$	0.6	0.7	—	0.4 ± 0.1	0.25 Max	0.3 Max	8.9 9.9 10.9	11.1 12.7 13.8	—
35 36 38	32.1 33 34.8	1.45 1.5 1.6												10.3 10 9 11.5	13.1 13.5 14.8	
40 42 44	36.6 38.5 40.3	1 7 1.75 1.85									0.5 ± 0.1			12.7 12.5 13.5	16.0 15.8 17.2	
45 46 48	41.2 42.1 44.0	1 9 1.95 2.0					$0.20^{+0.20}_{0}$				0.6 ± 0.1			13.8 14.4 14.2	17.4 18.2 18.0	
														Tangential Load F_t* in N±25% for h_1 Shown in Column		
														1	2	3
50 52 53	45.8 47.6 48.5	2.1 2.2 2 25	+0.10 0.20 with a maximum variation of 0.15 in a ring	2	2.5	—	$0.20^{+0.20}_{0}$	0.6	0.7	—	0.7 ± 0.1	0.25 Max	0.3 Max	7.4 7.9 8.2	9.4 10.0 10.2	—
54 55 56 58	49.4 50.4 51.3 53.1	2.3 2.3 2.35 2.45												8.3 8.0 8.3 8.8	10.5 10.1 10.4 11-0	
60 62 63 64	54.9 56.8 57.7 58.6	2.55 2.6 2.65 2.7					$0.25^{+0.20}_{0}$			0.9	0.8 ± 0.1			9.2 9.1 9.3 9.6	11.7 11.5 11.8 12.1	— 13.7 14.1 14.5
65 66 67	59.5 60.4 61.4	2.75 2.8 2 8												9.8 10.0 9.7	12.4 12.6 12.2	14.8 15.2 14.7
68 70 72 74	62.3 64.1 65.9 67.8	2.85 2.95 3.05 3.1												9.9 10.4 10.9 10.9	12.6 13.2 13.8 13.8	15.0 15.8 165 16.5
75 76 78	68.7 69.6 71.4	3.15 3.2 3.3		2.5	3	—	$0.30^{+0.20}_{0}$	0.7	0.9	—	0.9 ± 0.1			14.0 14.3 148	16.7 17.1 17.7	—

80 82 84	733 75.1 76.9	335 3.45 3.55	+0.10 - 0.25 with a maximum variation of 0.18 in a ring	2.5	3	—	$0.30^{+0.20}_{0}$	0.7	0.9	—	1 ± 0.1	0.25 Max	0.45 Max	14.7 15.2 15.8	17.6 18.2 19.1	—
85 86 88	77.8 78.8 80.6	3.6 3.6 3.7												16.2 15.8 16.4	19.4 18.9 19.7	
90 92 94	82.4 842 861	3.8 3 9 395				3.5	$0.40^{+0.25}_{0}$			1.2	1.1 ± 0.1			16.9 17.6 17.4	20.3 21.0 20.8	23.6 24.4 24.4
95 96 98	87.0 87.9 897	4 4 05 414												17.7 18.0 18.5	21.3 21.6 22.3	24.8 25 3 26.0
100 102 104	91.6 93.4 95 4	42 43 4 3									1.2 ± 0.1			18.4 19.0 18.2	22.1 22.8 21.8	25.8 26.5 25.4
105 106 108	96.1 97.0 990	4.45 4.5 4.5												19.9 20.2 19.3	23.8 24.2 23.1	27.8 28.2 27.0
110 112 114	1008 102.6 1046	4.6 4.7 4.7		3	3.5	—		0.9	1.2	—	1.3 ± 0.1			23.6 24.3 23.3	27.6 28.4 27.2	—
115 116 118	1054 1064 1082	4.8 4 8 4 9												24.4 24.0 24.5	28.6 28.0 28.6	
120 122 124	1100 112.0 114.0	5 5 5									1.4 ± 0.1			25.2 24.1 23.3	29.2 28.2 27.2	
125 126 128	114.6 115 6 117.6	5.2 52 52				4	$0.50^{+0.25}_{0}$			1.3			0.55 Max	25.9 25.5 24.5	30.2 29.6 28.6	34.7 34.2 32.9
130 132 134	1192 1212 1232	5.4 5.4 5 4									1.5 ± 0.1			26.5 25.6 24.7	30.9 29.8 28.9	35.6 34.5 33.3
135 136 138	124.0 125.0 127.0	5 5 5.5 5.5												25.8 25.3 24.5	30.1 29.6 28.6	34.7 34.1 32.9
140 142 144	1286 1306 1326	5.7 5 7 5.7		3.5	4	—		1.2	1.3	—	1.6 ± 0.1			30.8 29.8 28.8	35.5 34.4 33.3	—
145 146 148	133.2 1342 1362	5 9 5.9 5.9												31.7 31.2 30.2	36.5 35.9 34.8	

Nominal Dia-meter d_1	Inside Dia-meter d_2	Radial Wall Thickness		Axial Width of Ring $h_1{}^{-0.010}_{-0.025}$			Closed Gap s_1	Axial Width of Step h_2±0.1 for h_1 Shown in Column			Radial Depth of Step a_2	Radius r_2	Chamfering of Inside Edges (KI)	Tangential Load F_d* in N ±25% for h1 Shown in Column		
		a_1	Tol	1	2	3		1	2	3				1	2	3
150	138.0	6.0	+0.10 - 0.25 with a maximum variation of 0.18 in a ring	3.5	4	—	$0.60^{+0.25}_{0}$	1.2	1.3	—	1.7 ± 0.15	0.25 Max	0.55 Max	30.7	35.4	—
152	140.0	6.0												29.8	34.4	
154	1420	6.0												28.9	33.3	
155	142.6	6.2												31.6	36.4	
156	1436	6.2												31.1	35.8	
158	1456	6.2												30.2	34.7	
160	147.2	6.4									1.8 ± 0.2			32.2	37.2	
162	149.2	6.4												31.3	36.1	
164	151.2	6.4												30.4	35.0	
165	152.0	6.5												31.6	36.3	
166	153.0	6.5												31-0	35.8	
168	155.0	6.5												30.2	34.8	
170	156.6	6.7									1.9 ± 0.2			32.1	37.2	
172	158.6	6.7												31.3	36.1	
174	160.6	6.7												30.4	35.0	
175	161.2	6 9	+0.15 - 0.30 with a maximum variation of 0.23 in a ring			4.5	$0.70^{+0.25}_{0}$			1.45		0.5 Max	0.8 Max	32.9	38.0	43.1
176	162.2	6 9												32.5	37.5	425
178	164.2	6.9												31-7	36.5	41.4
180	165.8	7 1												33.7	38.9	44.1
182	167.8	7.1												32.9	37.9	42.9
184	169.8	7.1												32.0	37.0	42 0
185	170.6	7 2									2 ± 0.2			32.8	37 9	43.0
186	171.6	7.2												32.4	37.4	42.3
188	173.6	7 2												31.7	36.5	41.4
190	175.2	7.4												33 7	38.8	44.0
192	177.2	7.4												32.8	37.8	42.8
194	179.2	7.4												32.0	37.0	42.0
195	180.0	7.5												33.0	38.0	43.1
196	181.0	7.5												32.6	37.7	42.8
198	183.0	7.5												31.9	36.7	41.5
200	184.6	7.7												33.8	38.9	44.1

NOTE — Tangential force F_t and diametral load F_d values in col 1, 2 and 3 correspond to the values of he given in col 1, 2 and 3 respectively.
*Tangential and diametral load values are applicable for material A1 only (*see* IS: 5791-1977 Technical supply conditions for piston rings for IC engines (*first revision*)]. For other materials load factors given in IS: 5791-1977 shall be used.

5 GENERAL REQUIREMENTS

Shall be as given in IS: 5791-1977.

6 MARKING

The rings which are to be fitted in a particular direction shall be marked with the word ‘TOP’ on the top sides of the rings. For other markings reference should be made to IS: 5791- 1977.

6.1 BIS Certification Marking

Each piston rings for I.C engines may also be marked with the Standard Mark.

6.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

AUTOMOTIVE PRIMEMOVERS, TRANSMISSION SYSTEMS AND INTERNAL COMBUSTION ENGINE SECTIONAL COMMITTEE, TED 02

Will be added later