

Specification for

Spring retaining rings for aerospace application: carbon steel circlips (metric series)

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Foreword

This British Standard specifies a range of internal and external retaining rings (circlips) and related grooves for aerospace applications and is based on BS 3673-4. It replaces the metric series specified in BS SP 96.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date of issue	Comments

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1 Scope

This British Standard specifies the requirements for internal and external metric series circlips manufactured from carbon steel, for aerospace applications.

Requirements for material, heat treatment, hardness and manufacture are stated, together with dimensions and tolerances. The requirements for the finish and testing of the circlips are also given.

2 References

This standard makes reference to the following standards publications.

British Standards

BS 427, *Method of Vickers hardness test — Part 1: Testing of metals — Part 2: Verification of the testing machine.*

BS 891, *Method for Rockwell hardness test — Part 1: Testing of metals — Part 2: Verification of testing machine.*

BS 1449, *Steel plate, sheet and strip — Part 1: Carbon steel plate, sheet and strip.*

BS 3673, *Spring retaining rings — Part 4: Carbon steel circlips — metric series.*

BS 4500, *ISO limits and fits.*

BS 6001, *Sampling procedures and tables for inspection by attributes.*

BS S 513, *Spring steel strip.*

BS SP 96, *Specification for internal retaining rings.*

Ministry of Defence standards

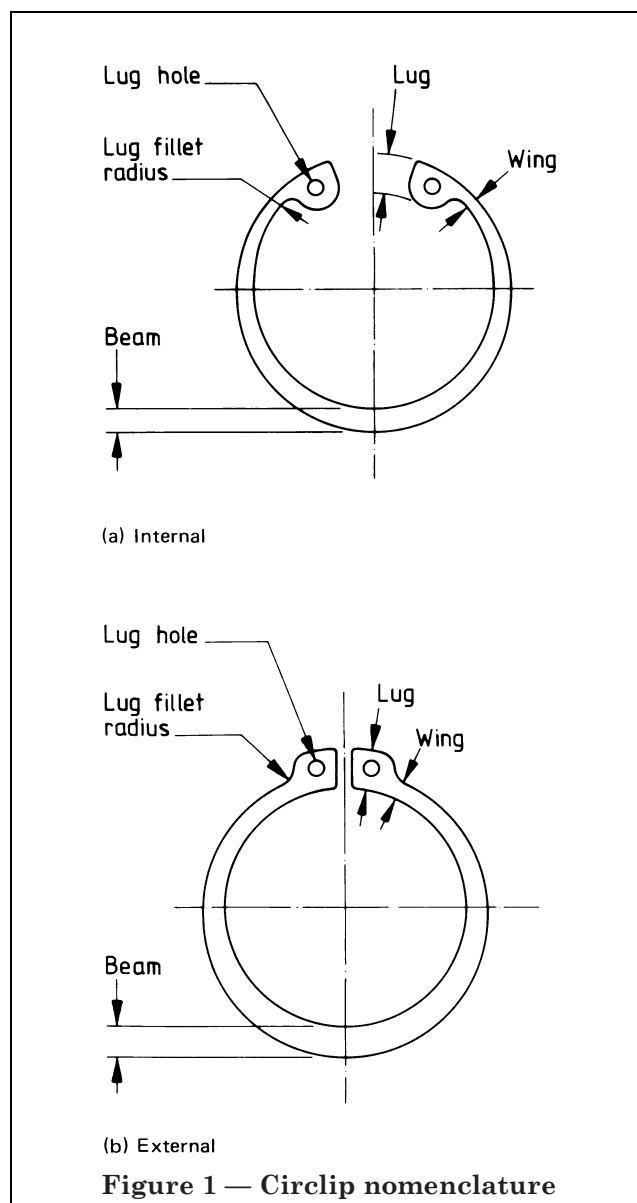
BS 6001, *Sampling procedures and tables for inspection by attributes.*

BS S 513, *Spring steel strip.*

BS SP 96, *Specification for internal retaining rings.*

3 Definitions and nomenclature

For the purposes of this British Standard the nomenclature used in Figure 1 applies together with the following definitions.

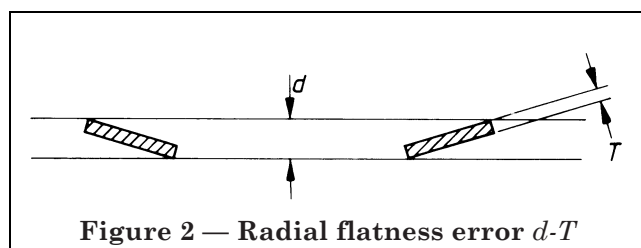


3.1 nominal size of a circlip

the nominal diameter of shaft or bore for which the circlip is designed

3.2 radial flatness error (dish)

the minimum distance separating two parallel planes which just contain the sectional profile of a circlip, the free ends of which are positioned in a common plane in order to discount any spiral effect which may be present (see Figure 2)

Figure 2 — Radial flatness error $d-T$

3.3

spiral flatness error (helix)

the minimum distance separating two parallel planes, perpendicular to the axis of the circlip, which just contain the circlip, the free ends being mutually displaced by the helix in the circlip (see Figure 3)

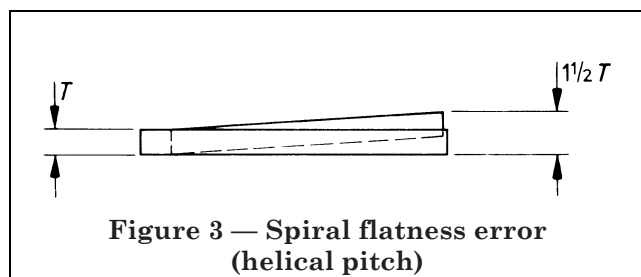


Figure 3 — Spiral flatness error (helical pitch)

3.4

edge margin

the distance from the end of the shaft or bore to the nearest groove wall

3.5

beam

the maximum radial depth of the circlip section with the exception of the lugs

4 Material

Circlips manufactured from cold rolled strips shall be manufactured from strip complying with the requirements of grade 70 or grade 80 range of BS 1449-1 or BS S 513.

Circlips not manufactured from strip should utilize similar material which will ensure that the circlips are capable of complying with the test requirements of clause 9.

5 Form, dimensions and tolerances

5.1 General. The form, dimensions and tolerances of internal and external circlips shall be as given in Table 2 and Table 3 and in accordance with 5.2 to 5.7 (see also clause 10).

5.2 Holes (or slots). Each end of each circlip shall have a hole (or, in the case of external circlips, a hole or a slot) in order to facilitate assembly by use of circlip pliers.

The holes (or slots) shall be so positioned that, when the circlip is fitted in a groove of appropriate dimensions, the hole (or slot) shall be clear of the external diameter of the shaft or, in the case of internal circlips, clear of the internal diameter of the bore.

The diameter of the holes (or width of slots) shall be as given in Table 2 and Table 3 and sufficient material shall be retained around each hole (or on either side of each slot) to ensure that no permanent distortion of the circlip ends shall result when circlip pliers are applied during assembly of the circlip under normal conditions.

5.3 Lugs. Circlips up to and including 150 mm designating size shall have integrally formed lugs. The profile of the lug may vary at the discretion of the manufacturer provided that the following conditions are met.

- External circlips.* When passed over a shaft of the maximum diameter as given in Table 2, the circlip shall be capable of passing through the clearance diameter C_1 .
- Internal circlips.* When passed through a bore of the minimum diameter as given in Table 3, the circlip shall be capable of passing over the clearance diameter C_1 .

5.4 Lug fillet. A fillet of minimum radius equal to the maximum thickness T of the circlip shall be formed adjacent to each lug. The fillet shall blend smoothly with the lug profile and with the wing depth. At no point around the contour shall the fillet undercut either the lug profile or the wing (see Figure 1).

5.5 Tolerance on radial flatness. Departures from radial flatness (see 3.2) shall be not greater than the values stated in 10.4.2.

5.6 Tolerance for helix. Departures from spiral flatness (see 3.3) shall be not greater than the values stated in 10.4.3.

5.7 Tolerance on thickness. Thickness tolerances shall be inclusive of the thickness of the finish applied.

6 Heat treatment and hardness

Circlips shall be austempered or hardened and tempered in accordance with the hardness ranges given in Table 1.