

Specification for

Rotary shaft lip type seals —

Part 4: Performance test procedures

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Committees responsible for this British Standard

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- British Compressed Air Society
- British Fluid Power Association
- British Hydromechanics Research Association
- British Industrial Truck Association
- British Rubber Manufacturers Association Ltd.
- Ministry of Defence
- Society of British Aerospace Companies Ltd.
- Society of Motor Manufacturers and Traders Ltd.

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Foreword

This Part of BS 7780 has been prepared under the direction of the Engineering Sector Board and supersedes BS 1399 *Specification for rotary shaft lip seals*, Part 2:1970 *Methods of performance rating*, which has been withdrawn. The standard is one of a series which specify rotary shaft lip type seals. It is the fourth Part of a new standard which represents a complete revision and renumbering of BS 1399. This fourth Part adopts the dynamic performance requirements specified in ISO 6194-4:1988 *Rotary shaft lip type seals — Part 4: Performance test procedures*, published by the International Organization for Standardization (ISO). Quality control requirements, formerly included in BS 1399-2:1970, and requirements for low temperature operation are also included.

Other Parts of the new standard are:

- *Part 1: Nominal dimensions and tolerances* (implementing ISO 6194-1:1982);
- *Part 2: Vocabulary* (implementing ISO 6194-2:1991);
- *Part 3: Storage, handling and installation* (implementing ISO 6194-3:1988);
- *Part 4: Identification of visual imperfections* (implementing ISO 6194-5:1990).

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover 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.

1 Scope

This Part of BS 7780 specifies test requirements for rotary shaft lip type seals. The tests may be used for qualification purposes. Materials quality control, dynamic testing and supplementary low temperature testing requirements are also covered.

2 References

2.1 Normative references

This Part of BS 7780 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies: any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Pre-test procedure

3.1 Inspect all seals submitted for testing for conformity to a relevant drawing or detailed specification declared by the seal manufacturer.

3.2 For seals with an elastomeric component, ensure that the seal manufacturer has stated the material batch number from which the seals have been made, together with the nominal density, nominal hardness, maximum compression set value and maximum mass change after immersion in the test fluid.

Where the seal is required for the low temperature stiffness test, ensure that the seal manufacturer has also stated the maximum modulus after test at the selected test temperature.

Ensure that the batch of elastomer has been tested in accordance with clause 6.

3.3 To facilitate accurate analysis of the test results, determine the following data concerning the physical characteristics of the seal and test apparatus before testing:

- a) lip diameter (without spring, measured not less than 24 h after removal of spring);
- b) lip diameter (with spring, immediately after fitting);

- c) outer case mean diameter and out-of-roundness;
- d) shaft diameter, material hardness and surface roughness;
- e) housing diameter, material and surface roughness;
- f) wiper lip diameter, where applicable (with and without primary lip spring fitted).

3.4 Ensure that the specified shaft eccentricity and housing off-set of the test apparatus have been incorporated.

4 Dynamic test

4.1 Test apparatus

The test apparatus shall be similar to the typical example shown in Figure 1 and shall consist of a suitable housing for retaining the test fluid and for positioning the test seals, as well as a rotating member having a spindle mounted horizontally on suitable bearings. The design of the housing for the seal shall be in accordance with the dimensions specified in BS 7780-1:1994. The housing and the rotating member shall be capable of reproducing the eccentricity and off-set referred to in 3.4.

Where it is not practicable to provide a test apparatus with the particular shaft and housing size relevant to the application, the test apparatus shall be selected from the standard sizes listed in Table 1. The size selected shall be that nearest to the application size.

Table 1 — Standard shaft and housing dimensions

Shaft diameter mm	Housing diameter mm	Seal width mm
20	35	7
40	55	8
60	80	8
90	120	12
200	230	15

The test apparatus shall also conform to the following additional requirements:

- a) the shaft shall be capable of cycling and/or maintaining the shaft speeds to within $\pm 3\%$;
- b) the shaft shall be capable of maintaining the specified test eccentricity under dynamic conditions to within ± 0.03 mm throughout each test;
- c) the test head shall be designed and constructed so as to maintain the housing bore alignment relative to the test shaft axis within 0.03 mm throughout the operating temperature range;