

CONFIRMED
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Determination of anti-wear properties of hydraulic fluids using the oscillating pin on rotating disc method

Committees responsible for this Draft for Development

The preparation of this Draft for Development was entrusted to Technical Committee MCE/18, Fluid power systems and components, upon which the following bodies were represented:

- Association of British Mining Equipment Companies
- British Compressed Air Society
- British Fluid Power Association
- British Hydromechanics Research Association
- British Iron and Steel Producers Association
- Department of Trade and Industry (National Engineering Laboratory)
- Ministry of Defence
- University of Bath

The following bodies were also represented in the drafting through subcommittees and panels:

- British Railways Board
- University of Leeds

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Foreword

This Draft for Development describes a short test method which can be used to assess the anti-wear properties of hydraulic fluids. Tests based on the use of a vane pump and a fluid circulating system are currently in use, but these test methods are laborious, expensive to perform, and require a large volume of hydraulic fluid.

The apparatus used in this test procedure has been designed to give an acceptable simulation of the sliding contact conditions in a vane pump, rather than using any of the existing designs of wear test rig, which are not representative of vane pump sliding contacts.

WARNING. The tests described in this Draft for Development are considered hazardous. The user should therefore adhere to all appropriate safety precautions. Attention is drawn to the dangers associated with rotating machinery and to potential fire risks.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature so as to establish confidence in the method presented herein. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

Supporting data from a development program is available and is being further generated as part of an on-going program. Information can be obtained from the Technical Manager, BFPA, Cheriton House, Cromwell Business Park, Chipping Norton, Oxfordshire OX7 5SR.

A review of this Draft for Development will be carried out not later than 2 years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development, will be made in an announcement in the appropriate issue of *BSI News*.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

Observations which it is felt should receive attention before the official call for comments will be welcomed.

These should be sent to the Secretary of BSI Technical Committee MCE/18/6 at BSI, 389 Chiswick High Road, London W4 4AL.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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 Draft for Development describes a method for determination of the steel-on-steel anti-wear properties of hydraulic fluids. The method is intended for use with industrial hydraulic fluids of all types.

NOTE The method has been developed using ISO VG 32 and ISO VG 46 mineral oil fluids and ISO VG 46 grade water based fluids. Modifications may be required for other viscosity grades and fluids.

2 Normative references

This Draft for Development 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 Draft for Development 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.

3 Definitions

For the purposes of this Draft for Development the following definitions apply.

3.1

test disc

the larger test specimen which is rotated in one direction

3.2

test pin

the smaller test specimen which is oscillated about its longitudinal axis

3.3

contact load

the normal load at the contact between test disc and test pin produced by the loading mechanism of the test machine

3.4

deadweight load

the load, in kilograms, applied to the hanger of the loading arm

3.5

load stage

a specified loading condition at the test disc and pin interface resulting from the inherent mass of the rig mechanism and the addition of deadweight load

NOTE The various load stages are defined in Table 1.

Table 1 — Load stages

Load stage	Deadweight load kg
1	No deadweight load; load due to test pin and lever assembly only
2	0.5
3	1.0
4	1.5
5	2.0
6	2.5
7	3.0
8	3.5
9	4.0

3.6

test fluid

the hydraulic fluid for which an assessment of the anti-wear properties is required

4 Principle

An electric motor rotates the test disc at a continuous steady speed. The test pin is oscillated about its axis through an angle of approximately 30° by a separate electric drive. The loading system brings the test pin into contact with the periphery of the test disc and the contact between the two is flooded with the test fluid by the circulating system. The load applied is increased in steps until the desired test load is reached. The test is then run for a set duration or until severe wear of the pin occurs. The anti-wear properties of the fluid are evaluated from the loss in mass and condition of the test pin at the end of the run.

5 Reagents and materials

5.1 Solvents

5.1.1 Petroleum ether 40/60

5.1.2 White spirit

5.1.3 Iso-propyl alcohol

5.2 Filter elements

Filter elements shall conform to BS 6275-1 ($\beta_3 \geq 75$).

5.3 Test disc

Dimensions shall be as shown in Figure 1.

Steel shall conform to 535A99 of BS 970-1:1983 (formerly EN 31), through hardened 60 HRC to 63 HRC.

NOTE BS 970-1:1983 has been withdrawn but for information the composition of steel designation 535A99 is 0.95–1.10 C, 0.40–0.70 Mn, 1.20–1.60 Cr, 229 max.(19) HB.