

Materials testing machines and force verification equipment —

**Part 3: Specification for the grading of
the forces applied by deadweight and
lever creep testing machines**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) and the Non-ferrous Metals Standards Policy Committee (NFM/-) to Technical Committee ISM/NFM/4, upon which the following bodies were represented:

- Aluminium Federation
- British Gas plc
- British Non-ferrous Metals Federation
- British Railways Board
- British Steel Industry
- Copper Development Association
- Department of Trade and Industry (National Engineering Laboratory)
- Department of Trade and Industry (National Physical Laboratory)
- ERA Technology Ltd.
- GAMBICA (BEAMA Ltd.)
- Ministry of Defence
- Society of British Aerospace Companies Ltd.
- Welding Institute

The following body was also represented in the drafting of the standard, through subcommittees and panels:

- Electricity Association

This British Standard, having been prepared under the direction of the Iron and Steel and the Non-ferrous Metals Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 January 1991

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The following BSI references relate to the work on this standard:
Committee reference ISM/NFM/4
Draft for comment 87/40632 DC

ISBN 0 580 17546 4

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This Part of BS 1610 has been prepared under the direction of the Iron and Steel Standards Policy Committee and the Non-ferrous Metals Standards Policy Committee.

Part 1 of BS 1610 specifies requirements for the grading of the forces applied by a materials testing machine and the method of verification. Part 2 of BS 1610 specifies requirements for the grading of force verification equipment and the method of calibration of proving devices. It has been found that a new Part of BS 1610 is required as Parts 1 and 2 do not adequately cover requirements for creep testing. This Part of BS 1610 specifies requirements for the grading of the forces applied by deadweight and lever creep testing machines and describes the method of verification.

Cognizance has been taken of discussions in the International Organization for Standardization (ISO) and the International Organization for Legal Metrology (OIML). A numerical system of grading is specified which relates to that being adopted internationally and is also conceptually similar to the system for testing machines specified in Parts 1 and 2 of BS 1610. For each grade of the verification equipment, the numerical value of repeatability has been defined as five times better than that required for the corresponding grade of the test machine.

Some parameters adopted in this Part of BS 1610 differ slightly from international views because they have been chosen as a result of national experience and to maintain conformity with a wide range of commercial interests.

This Part of BS 1610 does not restrict the type of equipment used for verification but, by reference to Part 2 of BS 1610, requires that calibration forces be traceable to national standards held at the National Physical Laboratory, either directly or indirectly through a hierarchical chain such as that provided by a calibration laboratory accredited by the National Measurement Accreditation Service (NAMAS). Traceability to national standards of other countries is acceptable, provided these standards are recognized by NPL.

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.

Section 1. General

1.1 Scope

This Part of BS 1610 specifies requirements for the grading of the forces applied by deadweight and lever creep testing machines, and describes the method of verification.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

1.2 Definitions

For the purposes of this Part of BS 1610 the following definitions apply.

1.2.1

creep testing machine

a machine used for applying a constant or changing load to a test specimen for an extended period of time, usually at an elevated temperature for the purposes of creep, creep rupture or stress-relaxation testing

NOTE Details of creep testing procedures are given in BS 3500

1.2.2

SI unit of force

the force that, when applied to a mass of 1 kg, gives the mass an acceleration of 1 m/s^2 , i.e. the newton (N)

1.2.3

force-measuring system

a system for measuring force by means of an analogue or digital display or a chart recorder

NOTE Each form of display and each range in a multi-range machine is an independent force-measuring system

1.2.4

loading mode

the direction of an increasing force, either tensile or compressive

1.2.5

repeatability

the greatest difference between the true forces corresponding to repeated applications of the indicated force

1.2.6

error

the error is the indicated force minus the mean true force, corresponding to repeated applications of the indicated force

1.2.7

resolution

the smallest increment of force that may be applied to a testpiece

NOTE Methods for determining the resolution of the various categories of machine are given in 3.2.1 to 3.2.3

1.2.8

lower limit of verification

the lowest specified force on a given measurement range to which a creep testing machine can be verified

1.2.9

verification equipment

equipment consisting of proving devices, verification masses and proving levers (see BS 1610-2)

1.2.10

proving device

a device that determines force by the measurement of the elastic deflection of a loaded member

1.2.11

deflection

a value obtained by subtracting the reading of the deflection-measuring indicator of the proving device at zero force from the reading with a force applied

1.2.12

lever ratio

the multiplication factor, R , determined during calibration over a range of forces, relating the magnitude of the masses applied to the scale pan to the force measured in the specimen loading train

1.2.13

verification masses

a set of masses reserved for calibration purposes only

1.2.14

working masses

the masses used to apply a load to a test specimen during creep testing