

Materials testing machines and force verification equipment —

**Part 1: Specification for the grading of
the forces applied by materials testing
machines when used in the compression
mode**

Committees responsible for this British Standard

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- Aluminium Federation
- British Civil Engineering Test Equipment Manufacturers' Association
- British Gas Corporation
- British Non-ferrous Metals Federation
- British Railways Board
- British Steel Industry
- British Steel Industry (Wire Section)
- Copper Development Association
- Department of Industry (British Calibration Service)
- Department of Industry (National Engineering Laboratory)
- Department of Industry (National Physical Laboratory)
- Institution of Production Engineers
- Ministry of Defence
- Scientific Instrument Manufacturers' Association (BEAMA)
- Welding Institute
- Coopted members

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Foreword

This new edition of BS 1610-1 has been prepared under the direction of the Iron and Steel and Non-ferrous Standards Policy Committees. It, together with BS EN 10002-2, replaces BS 1610-1:1985 which is withdrawn.

This edition introduces technical changes to bring the standard up-to-date but it does not reflect a full review of the standard, which will be undertaken in due course. The opportunity has been taken, when preparing this new edition, to incorporate Amendment No. 1, published in 1989, to BS 1610-1:1985.

It is important to note the limitation to the scope introduced in this edition of BS 1610-1, which now specifies the grading of the forces applied by a materials testing machine, and the method of verification, when the machine is used in the compression mode only. BS EN 10002-2 specifies the grading of the forces applied by a materials testing machine, and the method of verification, when the machine is used in tension. BS 1610-2 specifies the grading of force verification equipment and the method of calibration of proving devices.

Cognizance has been taken of discussions in the International Organization for Standardization (ISO) and the International Organization for Legal Metrology (OIML). The numerical system of grading specified relates to that adopted internationally and is also conceptually similar to the system for testing machines specified in BS 1610:1964. 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.

This Part of BS 1610 does not restrict the type of equipment used for verification but, by reference to BS 1610-2, requires that the calibration forces be traceable to national standards held at the National Physical Laboratory (NPL) either directly or indirectly through a hierarchical chain such as that provided by a calibration laboratory accredited by the National Measurement Accreditation Service. 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 uniaxial materials testing machines, and describes the method of verification, when the machine is used in the compression mode only.

Verification of the dynamic forces applied by materials testing machines is excluded.

NOTE 1 BS EN 10002-2 specifies the grading of the forces applied by a materials testing machine, and the method of verification, when the machine is used in tension.

NOTE 2 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

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)

1.2.2

force-measuring system

a system for measuring force by means of an analogue or digital display or a chart recorder. Each form of display and each range in a multi-range machine is an independent force-measuring system

1.2.3

loading mode

the direction of an increasing force, either tensile or compressive

1.2.4

repeatability

depending on the method of verification adopted (see 3.5.1), one of the following definitions applies

- a) When the true force method is used, the repeatability is the greatest difference between the indicated forces corresponding to repeated applications of the true force.
- b) When the indicated force method is used, the repeatability is the greatest difference between the true forces corresponding to repeated applications of the indicated force.

1.2.5

error

depending on the method of verification adopted (see 3.5.1), one of the following definitions applies

- a) When the true force method is used, the error is the mean indicated force corresponding to repeated applications of the true force minus the true force.
- b) When the indicated force method is used, the error is the indicated force minus the mean true force, corresponding to repeated applications of the indicated force.

1.2.6

resolution

the smallest specified measurement interval on a given force-measuring range (see 3.2.1)

1.2.7

lower limit of verification

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

1.2.8

error of zero force

the residual force indicated after applying and removing a series of forces

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