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Specification for

Testing machines for rubbers and plastics —

**Part 2: Constant rate of force
application machines**

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- British Rubber Manufacturers' Association*
- Chemical Industries Association
- Department of Industry (Chemicals and Textiles)
- Department of Industry (National Physical Laboratory)
- Department of the Environment (Building Research Establishment)
- Electrical and Electronic and Insulation Association (BEAMA)
- Electrical Installation Equipment Manufacturers' Association (BEAMA)
- Electrical Research Association
- Engineering Equipment Users' Association
- Institution of Production Engineers
- Malaysian Rubber Producers' Research Association
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The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Individual experts

This British Standard, having been prepared under the direction of the Plastics and Rubber Standards Committee, was published under the authority of the Executive Board on 30 September 1978

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Contents

	Page
Cooperating organizations	Inside front cover
Foreword	ii
1 Scope	1
2 References	1
3 Definitions	1
4 Designation of machine accuracy	1
5 Design features	2
6 Force measuring system	2
7 Force measuring system accuracy	2
8 Measurement of elongation (deflection)	3
9 Rate of application of force	4
10 Accuracy of force control	4
11 Machine stiffness	5
12 Stability	5
13 Operational aspects	5
14 Certificate of verification	5
Appendix A Testing at a constant rate of force application	6
Figure 1 — Accuracy of force control	7
Figure 2 — Typical actual force/time curve obtained during a test compared with the required curve	8
Figure 3 — Machine element displacement/time curve corresponding to the actual force curve shown in Figure 2	8
Figure 4 — Machine accuracy gradings from BS 1610	9
Table 1 — Grades of accuracy for force measurement	3
Table 2 — Grades of accuracy for displacement measurement	4
Table 3 — Accuracy of force control	5
Publications referred to	Inside back cover

Foreword

This part of this British Standard has been produced under the direction of the Plastics and Rubber Standards Committees. It covers machines used for measuring the tensile, flexural and compression properties of adhesive joints, rubbers and plastics under constant rate of force application. This standard is therefore complementary to BS 5214-1 which covers machines operating at constant rate of traverse. An explanatory appendix on aspects of testing at a constant rate of force application is provided.

It is intended to produce further Parts of this standard, dealing with other equipment used for testing plastics and rubber. It is the intention that the various Parts of this standard will be quoted in the corresponding British Standards covering methods of test, e.g. BS 903, BS 2782, BS 4370 and BS 4443.

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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 this British Standard specifies the requirements for tensile testing systems suitable for testing rubbers, plastics and adhesive joints under the condition of a constant rate of application of force although any one system may only be applicable to a narrower range of materials. It also covers such systems when used for flexural, shear and compression tests.

2 References

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

3 Definitions

For the purposes of this Part of this British Standard the following definitions apply.

3.1

tensile testing system

a machine composed of a nominally fixed and a movable member to which may be attached suitable grips or jigs for holding the test specimen. The machine is equipped with a force measuring system and is capable of controlling the rate of application of force applied to the test specimen. The force measuring system is complete with indicator and/or recorder. In addition there may be included a system for measuring the displacement (extension or deflection) of the test specimen

NOTE According to the arrangement of grips or jigs, the test specimen will be in tension, shear, compression or flexure. If the machine is used for tests other than in tension, the term "grip" should be taken to include a platen or other member for the application of force to the test specimen.

3.2 *Text deleted*

3.3

elongation

the increase in the test length of a tensile test specimen

3.4

deflection

the distortion in the direction of the applied force of a test specimen in compression, shear or flexure

3.5

repeatability of force¹⁾, elongation and deflection measurement

the greatest difference, at a given true value, between the indicated values corresponding to repeated applications of the true value

3.6

error

the mean indicated value, at a given true value, corresponding to repeated applications of the true value, less the true value

NOTE The definitions of repeatability and error assume verification by observing the variation in indicated values obtained with repeated application of known values.

3.7

accuracy of force control

the maximum permitted positive or negative deviation of the value of the actual force from the value of the required force at any instant of time during the test. The commencement of the test is defined as the instant of the initial increment of force from zero

the accuracy is expressed as a percentage of the required force or as the same percentage of 1/5 of the maximum demanded force, whichever is the greater. This is illustrated in Figure 1

NOTE The accuracy of force control is the sum of the control system accuracy and a proportion of the force measuring system accuracy.

3.8

accuracy of control of rate of force application

the maximum permitted positive or negative deviation of the actual rate of application of force from that required, up to the point where the change of rate of strain relative to that in the initial linear zone exceeds 10 : 1 (see Figure 2 and Figure 3) or there is a peak of force

the value is expressed as the percentage deviation from the rate of application of force required. This is illustrated in Figure 1

4 Designation of machine accuracy

Machines shall be designated according to accuracy in respect of the following parameters:

- a) measurement of force (grade A or B);
- b) measurement of elongation or deflection (grade A, B, C, D or E).

For example, a machine of the highest accuracy shall be designated as "force: grade A, elongation (deflection): grade A".

If for any application it is not considered necessary to specify accuracy limits for either of these parameters, then no grade letters shall be quoted.

¹⁾ The term force throughout this standard refers to the force acting along the straining axis of the machine.