

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 190

TENSILE TESTING OF LIGHT METALS AND THEIR ALLOYS

1st EDITION
March 1961

*To become
ISO 6892-1984*

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BRIEF HISTORY

The ISO Recommendation R 190, *Tensile Testing of Light Metals and their Alloys*, was drawn up by Technical Committee ISO/TC 79, *Light Metals and their Alloys*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1955 and led in 1956 to the adoption of a Draft ISO Recommendation.

This first Draft ISO Recommendation (No. 263) was circulated to all the ISO Member Bodies for enquiry. As the results of this consultation were not considered satisfactory, the Technical Committee presented a second Draft ISO Recommendation, which was circulated to all the Member Bodies in December 1958, and which was approved by the following Member Bodies:

Austria	India	Portugal
Brazil	Ireland	Spain
Burma	Israel	Sweden
Canada	Italy	Switzerland
Finland	Japan	United Kingdom
France	Netherlands	U.S.S.R.
Germany	New Zealand	Yugoslavia
Hungary	Poland	

Two Member Bodies opposed the approval of the Draft:

Belgium	Romania
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The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in March 1961, to accept it as an ISO RECOMMENDATION.

TENSILE TESTING OF LIGHT METALS AND THEIR ALLOYS

1. SCOPE

This ISO Recommendation applies to wrought products of diameter or thickness equal to or greater than 0.2 mm, and to castings. For the tensile testing of certain products, such as foils or wires of small diameter, special methods are required, and for tubes special test pieces.

Methods of selection and preparation of test samples are to be the subject of a separate Recommendation.

2. PRINCIPLE OF TEST

The test consists in subjecting a test piece to tensile stress, generally to fracture, with a view to determining one or more of the mechanical properties enumerated below. The test is carried out at ambient temperature, unless otherwise specified.

3. DEFINITIONS

3.1 Gauge length. At any moment during the test, the prescribed part of the cylindrical or prismatic portion of the test piece on which elongation is measured. In particular, a distinction should be made between the following:

- (a) *the original gauge length (L_0).* Gauge length before the test piece is strained, and
- (b) *the final gauge length (L_u).* Gauge length after the test piece has been fractured and the fractured parts have been carefully fitted together so that they lie in a straight line.

- 3.2** *Percentage permanent elongation.* Variation of the gauge length of a test piece subjected to a prescribed stress (see clause 3.7) and, after removal of the stress, expressed as a percentage of the original gauge length. The symbol of this elongation is supplemented by an index indicating the prescribed stress.
- 3.3** *Percentage elongation after fracture (A).* Permanent elongation of the gauge length after fracture $L_u - L_o$, expressed as a percentage of the original gauge length L_o .
- 3.4** *Percentage reduction of area (Z).* Ratio of the maximum change in cross-sectional area which has occurred during the test, $S_o - S_u$, to the original cross-sectional area S_o , expressed as a percentage.
- 3.5** *Maximum load (F_m).* The highest load which the test piece withstands during the test.
- 3.6** *Final load (F_u).* Load imposed on the test piece at the moment of fracture.
- 3.7** *Stress* (actually "nominal stress"). At any moment during the test, load divided by the original cross-sectional area of the test piece.
- 3.8** *Tensile strength (R_m).* Maximum load divided by the original cross-sectional area of the test piece, i.e. stress corresponding to the maximum load.
- 3.9** *Stress at specified permanent set (R_r).* Stress at which, after removal of load, a specified permanent elongation, expressed as a percentage of the original gauge length, occurs (see Fig. 4 (a), page 7).
- 3.9.1** The symbol used for this stress is followed by a suffix giving the specified percentage of the original gauge length (frequently 0.2).
- 3.10** *Proof stress or Yield strength (offset)* (R_p).* Stress at which a non-proportional elongation, equal to a specified percentage of the original gauge length, occurs (see Fig. 4 (b), page 7).
- 3.10.1** The symbol used for this stress is followed by a suffix giving the specified percentage of the original gauge length (e.g. 0.1 or 0.2).

* This last term is used in the U.S.A. and Canada.