

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 783

MECHANICAL TESTING OF STEEL AT ELEVATED TEMPERATURES
DETERMINATION OF LOWER YIELD STRESS AND PROOF STRESS
AND PROVING TEST

1st EDITION
July 1968

COPYRIGHT RESERVED

The copyright of ISO Recommendations and ISO Standards belongs to ISO Member Bodies. Reproduction of these documents, in any country, may be authorized therefore only by the national standards organization of that country, being a member of ISO.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 783, *Mechanical testing of steel at elevated temperatures – Determination of lower yield stress and proof stress and proving test*, was drawn up by Technical Committee ISO/TC 17, *Steel*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question by the Technical Committee began in 1961 and led, in 1965, to the adoption of a Draft ISO Recommendation.

In December 1966, this Draft ISO Recommendation (No. 930) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Hungary	South Africa,
Austria	India	Rep. of
Brazil	Israel	Spain
Canada	Netherlands	Sweden
Chile	New Zealand	Switzerland
Czechoslovakia	Norway	Thailand
Denmark	Poland	Turkey
Finland	Portugal	U.A.R.
France	Romania	United Kingdom

Five Member Bodies opposed the approval of the Draft :

Belgium
Germany
Italy
Japan
U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which, decided, in July 1968, to accept it as an ISO RECOMMENDATION.

MECHANICAL TESTING OF STEEL AT ELEVATED TEMPERATURES DETERMINATION OF LOWER YIELD STRESS AND PROOF STRESS AND PROVING TEST

1. SCOPE

This ISO Recommendation describes the determination of lower yield stress and proof stress of steel in which the test temperature does not exceed 1000 °C.*

2. PRINCIPLE OF TEST

The test consists of heating uniformly a test piece to a prescribed temperature and then subjecting it to tensile stress at that temperature with a view to

- (a) determining the lower yield stress (R_{eL}) or proof stress (R_p),
- (b) proving that the proof stress is above a specified minimum value.

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,
Original gauge length (L_0). Gauge length measured at ambient temperature before the test piece is strained.
- 3.2 *Extensometer gauge length* (L_g). The length of the parallel portion of the test piece used for the measurement of extension by means of an extensometer. This length may differ from L_0 .
- 3.3 *Stress* (actually "nominal stress"). At any moment during the test, load divided by the original cross-sectional area of the test piece at ambient temperature.
- 3.4 *Yield stresses*. In a steel which exhibits a yield phenomenon a point is reached during the test at which plastic deformation, soon after it has been initiated, continues to occur at nearly constant stress.

For the purpose of this ISO Recommendation the following definitions apply :

3.5 *Yield stress* (R_e) :

- 3.5.1 *Upper yield stress* (R_{eH}). The value of stress measured at the commencement of plastic deformation at yield (see clause 12.3 and Fig. 2(b), 2(c), 2(d) and 2(e)).

or

The value of stress measured at the first peak obtained during yielding even when that peak is equal to or less than any subsequent peaks observed during plastic deformation at yield.

* This limit of 1000 °C is fixed as a function of the condition of test, particularly for the tolerances on temperature in section 7. In particular, it does not imply that the conception of the proof stress from room temperature up to 1000 °C is equally significant for all steels.