
INTERNATIONAL STANDARD



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Steel products for pressure purposes — Derivation and verification of elevated temperature properties — Part I : Yield or proof stress of carbon and low alloy steel products

*Produits en acier pour récipients à pression — Dérivation et vérification des valeurs à température élevée —
Partie I : Limite d'élasticité ou limite conventionnelle d'élasticité des produits en acier au carbone ou faiblement allié*

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2605/1 was drawn up by Technical Committee ISO/TC 17, *Steel*, and was circulated to the Member Bodies in February 1975.

It has been approved by the Member Bodies of the following countries :

Austria	Iran	Spain
Bulgaria	Ireland	Sweden
Czechoslovakia	Mexico	Switzerland
Denmark	Netherlands	Turkey
Finland	Norway	United Kingdom
Germany	Poland	U.S.S.R.
Hungary	Romania	Yugoslavia
India	South Africa, Rep. of	

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Australia	Canada	Japan
Belgium	France	U.S.A.

Steel products for pressure purposes — Derivation and verification of elevated temperature properties — Part I : Yield or proof stress of carbon and low alloy steel products

0 INTRODUCTION

In the ISO rules for the construction of stationary boilers (ISO/R 831) and the draft rules for the construction of unfired pressure vessels, minimum lower yield or proof stress at elevated temperature is listed as one of the design criteria. Accordingly, International Standards for pressure vessel steels or national standards conforming to the above rules should specify lower yield or proof stress properties at elevated temperature.

NOTE — Where this International Standard subsequently makes reference to proof stress, it should be understood that lower yield stress also applies where appropriate.

International Standards for pressure vessels steels will normally give specified elevated temperature proof stress values which are derived statistically from a body of data. In all such cases the manufacturer may satisfy the customer that the product supplied consistently meets the properties by either

- a) hot-testing the product, or
- b) producing a body of data on the product.

This International Standard has been prepared in order to implement the alternative procedure using a body of data. It also defines the method by which the minimum elevated temperature yield or proof stress values to be included in International Standards for pressure vessel steels should be derived.

NOTES

1 Whilst the validity of the derivation procedure has been examined in relation to data for a variety of steels, future experience may indicate that modifications are desirable, particularly in relation to the minimum quantity and distribution of data required by the derivation and verification procedures.

2 All tests used to implement this procedure either at room temperature or at elevated temperature shall be carried out in conformity with the appropriate ISO documents (for example ISO 82, ISO 375, at room temperature, and ISO/R 783 at elevated temperatures). However, data previously obtained using other test methods may be used for an interim period.

1) Application to national standards

If a country adopts in its national standard an ISO steel together with the properties specified in International Standards for this steel (or properties derived in accordance with this International Standard from the agreed regression lines), then it is not necessary for the country to separately apply the derivation procedure. If a country specifies non-ISO steels for use in compliance with ISO boiler and pressure vessel design codes, the procedures as given in ISO . . . , *Steel products for pressure purposes — Derivation and verification of elevated temperature properties — Part . . . Derivation of yield or proof stress from limited data*, (in preparation) shall apply.

REFERENCES IN INTRODUCTION

ISO 82, *Steel — Tensile testing*.

ISO 375, *Tensile testing of tubes*.

ISO/R 783, *Mechanical testing of steel at elevated temperatures — Determination of lower yield stress and proof stress and proving test*.

ISO/R 831, *Rules for construction of stationary boilers*.

1 SCOPE AND FIELD OF APPLICATION

This International Standard defines

- a method for deriving minimum elevated temperature lower yield or proof stress values for inclusion in International Standards for steel products for pressure purposes;¹⁾
- a verification procedure which may be used by a manufacturer as an alternative to hot-testing for satisfying the purchaser that his product consistently meets the specified minimum elevated temperature proof stress values in such specifications.

2 PROCEDURE FOR DERIVING MINIMUM PROPERTIES

2.1 Basis of method

2.1.1 The elevated temperature proof stress properties are derived from a well-defined body of data on the basis of a linear regression analysis of the elevated temperature proof stress values against the room temperature tensile strengths at each of a number of temperatures.

2.1.2 For the purpose of this International Standard, the specified minimum proof stress value (E_t) at a given temperature is defined as the proof stress derived from the lower 95 % confidence level at a level at a tensile strength 30 N/mm² above the specified minimum tensile strength.