
International Standard



2605/3

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Steel products for pressure purposes — Derivation and verification of elevated temperature properties — Part 3: An alternative procedure for deriving the elevated temperature yield or proof stress properties when data are limited

Produits en acier pour récipients à pression — Dérivation et vérification des valeurs à température élevée — Partie 3: Autre méthode de dérivation des valeurs de limites apparente et conventionnelle d'élasticité à température élevée à partir de données réduites

First edition — 1985-12-15

UDC 669.14.018.4 : 620.171.251.222

Ref. No. ISO 2605/3-1985 (E)

Descriptors : steel products, pressure vessels, tests, high temperature tests, verification, elastic limit.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2605/3 was prepared by Technical Committee ISO/TC 17, *Steel*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Steel products for pressure purposes — Derivation and verification of elevated temperature properties — Part 3: An alternative procedure for deriving the elevated temperature yield or proof stress properties when data are limited

0 Introduction

In the ISO rules for the construction of stationary boilers¹⁾ (ISO/R 831) minimum lower yield stress, R_{eL} , or proof stress, R_p , 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 stress or proof stress properties at elevated temperatures. (See note 1.)

For such International Standards, these values are derived statistically from a body of data by using the procedures given in ISO 2605/1 and ISO 2605/2. This statistical derivation may also be used for national standards. However, the data requirements of ISO 2605/1 and ISO 2605/2 have frequently proved difficult to achieve in the case of International Standards and may prove to be impossible to meet in the case of national standards or newly developed steels, and this alternative procedure provides a means by which minimum properties may be derived when data are limited.

NOTES

1 Where this part of ISO 2605 subsequently makes reference to proof stress, it should be understood that lower yield stress also applies where appropriate.

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

3 All tests used to implement this procedure at room temperature or at elevated temperature should be carried out in conformity with the appropriate ISO documents (for example ISO 6892, 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 Scope and field of application

This part of ISO 2605 defines an alternative to the method specified in ISO 2605/1 and ISO 2605/2, for deriving minimum elevated temperature lower yield stress or proof stress values for steel products for pressure purposes.

It does not define a verification procedure; where verification of elevated temperature properties is required this shall be by hot testing until the requirements of ISO 2605/1 and ISO 2605/2 can be satisfied.

2 References

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.*

ISO 2605, *Steel products for pressure purposes — Derivation and verification of elevated temperature properties —*

Part 1: Yield or proof stress of carbon and low alloy steel products.

Part 2: Proof stress of austenitic steel products.

ISO 6892, *Metallic materials — Tensile testing.*

3 Procedure for deriving minimum properties

3.1 Basis of method

3.1.1 The elevated temperature proof stress properties are derived from a well-defined body of data on the basis of a regression analysis of normalized values of proof stress against temperature. The elevated temperature proof stress values are normalized by expressing each elevated temperature value as a ratio to the room temperature value for the same cast. The regression curve developed represents the average temperature variation of proof stress and may be identified as "the average proof stress ratio trend curve".

3.1.2 For a specific grade of steel, minimum proof stress values, for elevated temperature, are obtained by factoring the average ratio trend curve against the specified minimum proof stress at room temperature for that grade, and then subtracting

1) Pressure vessels and shell boilers will form the subjects of future International Standards.