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Guidelines for specifying Charpy V-notch impact prescriptions in steel specifications

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National foreword

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Guidelines for specifying Charpy V-notch impact prescriptions in steel specifications

Lignes directrices pour la spécification des prescriptions d'énergie de rupture sur éprouvette Charpy à entaille en V dans les normes d'acier

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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 20, *General technical delivery conditions, sampling and mechanical testing methods*.

This first edition of ISO/TS 7705 cancels and replaces ISO/TR 7705:1991, which has been technically revised.

Guidelines for specifying Charpy V-notch impact prescriptions in steel specifications

1 Scope

This document gives guidelines for specifying Charpy V-notch impact prescriptions in steel specifications.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 General features of Charpy V-notch impact test

4.1 Toughness testing methods in design codes and in steel specifications

Tests for evaluating the toughness of steel can be divided into two categories: notch toughness tests and fracture toughness tests based on fracture mechanics.

Notch toughness tests are used to measure the ability of a material to absorb energy and deform plastically in the presence of a mechanical notch. The Charpy V-notch impact test and the drop weight test are typical examples of small scale tests which are used for evaluations of notch toughness. They are often used to determine the ductile to brittle transition temperature of a material and to give a qualitative estimate of the material's toughness. Due to relatively good reproducibility and low cost these methods are highly suitable for use as delivery tests for steel consignments.

Fracture toughness tests such as the crack-tip opening displacement (CTOD) test (see ISO 12135) are fracture mechanics tests which are generally concerned with the determination of critical crack sizes which can appear without causing fracture in a material loaded to a specific stress level. Fracture mechanics tests are very complicated and expensive to carry out. They are primarily used to examine the behaviour of pressurized or structural components with respect to safety rules, etc. Therefore, fracture mechanics testing is primarily connected with design codes and not with steel specifications.

For these reasons, only notch toughness tests are dealt with in these guidelines for steel specifications.

4.2 Historical background to the Charpy V-notch impact test

When welded structures, especially heavy ones such as bridges and ships, were first developed on an industrial scale, and especially when the fabrication methods called for joining heavy segments by welding, problems with brittle fractures became more common. This was especially evident during the Second World War when the USA began to produce welded ships of the Liberty and Victory type, where a large number of failures occurred due to brittle fractures.