



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 41107.1-2021

**Destructive tests on welds in metallic materials - Hot cracking
tests for weldments - Arc welding processes - Part 1: General**

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foreword

This document is in accordance with the provisions of GB/T 1:1-2020 "Guidelines for Standardization Work Part 1: Structure and Drafting Rules of Standardization Documents"

drafted:

This document is the first part of GB/T (Z)41107 "Arc Welding Method for Destructive Testing of Welds in Metal Materials for Hot Crack Test"

point: GB/T (Z)41107 has released the following parts:

--- Part 1: General;

--- Part 2: Self-restraint test;

--- Part 3: External load test:

This document uses the redrafted method to modify the use of ISO 17641-1:2004 "Destructive test of welds in metallic materials Hot crack test of weldments"

Arc Welding Methods Part 1: General:

There are technical differences between this document and ISO 17641-1:2004, and the provisions involved in these technical differences have been

The vertical single line (|) in the blank position is marked, and the corresponding technical differences and their reasons are as follows:

- a) The description of the scope of application of this document has been changed to make the description of the scope of application more concise and comprehensive (see Chapter 1);
- b) Changed the unit of BTR, from "K" to " degrees C", to be consistent with the expression in 6:1 of GB /Z 41107:3-2021 (see Chapter 4);
- c) Added the symbol and description of the critical compression displacement "CCD" (see

Chapter 4);

d) Changed the description of "Vcrit", from "critical strain to generate the first thermal crack" to "critical tensile velocity to generate the first thermal crack"

"Rate", to be consistent with 6:3 in GB /Z 41107:3-2021 (see Chapter 4);

e) Changed the expression of the program-controlled flat plate tensile test, from "the strain rate when thermal crack initiation is defined as the critical strain rate" is "initiated"

The tensile rate at the time of hot crack is defined as the critical tensile rate", in accordance with 6:3 of GB /Z 41107:3-2021 (see 7:2:

4);

f) The index for evaluating solidification cracks by hot tensile test in Table 3 has been modified, from "BTR" to "CCD" (see Chapter 8):

The following editorial changes have also been made to this document:

--- Change "ductility recovery temperature (DTR)" in the description of "BTR" in Table 1 to "ductility recovery temperature (DRT)" (see Chapter 4);

--- Change the footnote of Table 1 to see related documents (see Chapter 4);

--- Added note (see 7:2:3);

--- Added note (see 7:2:4);

---GB/T 41107:2-2021 and GB /Z 41107:3-2021 are cited in the text for informative references, and transferred to references (see References

offer):

Please note that some content of this document may be patented: The issuing agency of this document assumes no responsibility for identifying patents:

Introduction

Hot cracks in the weld metal and the heat affected zone of the base metal are one of the most common defects in arc welding: Cracks affect the safety of welded parts

Use, in most codes and standards, any type of detectable cracks are not allowed, therefore, countries are working on research and development of thermal

Crack-insensitive welding consumables and base metals, and welding processes designed to reduce or eliminate the risk of hot cracking: At the same time, a variety of

Test methods for thermal crack susceptibility of metallic weldments (including weld consumables, base metals, and welded joints) are also being developed:

GB/T (Z)41107 "Arc Welding Method for Destructive Testing of Welds of Metal Materials for Hot Crack Test" is a guide for hot cracking of weldments in my country:

Basic and generic document for striae testing: GB/T (Z) 41107 aims to establish the terminology, basic principles and tests applicable to hot crack testing

type, which consists of three parts:

--- Part 1: General: A brief introduction to hot crack testing terminology, basic principles, test types, test overview, and test applications

The regulations aim to provide the corresponding basic information for the testing personnel:

--- Part 2: Self-restraint test: Specifications for specimen dimensions, specimen requirements and test procedures for self-restrained thermal crack tests are intended to

Provide inspectors with relevant technical information on thermal crack self-restraint testing:

--- Part 3: External load test (standardized guiding technical document): For thermal tensile test, adjustable restraint test and transverse adjustable restraint

Specimen size, specimen preparation, test procedures and evaluation methods for external load thermal crack tests such as beam test and program-controlled flat plate tensile test

The purpose is to provide inspectors with relevant technical information on thermal crack external load tests:

Destructive testing of welds in metallic materials

Arc welding method for hot crack test of weldments

Part 1: General

1 Scope

This document specifies the basic principles, test types, test overview and test application summary of hot crack testing:

This document applies to hot crack testing of weld metal and base metal in arc welding:

2 Normative references

There are no normative references in this document:

3 Terms and Definitions

The following terms and definitions apply to this document:

3:1

hot crack hotcrack

Material separation along grain boundaries (dendritic boundaries) at high temperatures occurs when the strain and strain rate exceed a certain level:

Note: Small cracks that can only be seen at magnifications of more than 50 times are often referred to as microcracks:

3:1:1

solidification crack

crystalline crack solidificationcrack

Hot cracks formed during liquid phase weld metal solidification:

NOTE: Solidification cracks usually extend to the surface of the weld metal, but sometimes extend below the surface:

3:1:2

liquefaction crack

Hot cracks formed due to liquefaction of the base metal heat affected zone (HAZ) or the liquefaction of the weld metal of a multi-pass weld by reheating of subsequent passes:

3:1:3

ductilitydipcrack

Hot cracks formed due to a steep drop in hot ductility during welding: Like liquefaction cracks, ductility cracks originate in the heat-affected zone of the base metal or

in multi-pass welds:

Note: Loss-ductile cracks are also known as loss-of-plastic cracks and brittle cracks:

3:2

self-restrainttest

A test in which the specimen is stressed by restraining the strain produced by the specimen during welding:

3:3

External load testexternallyloadedtest

A test in which a specimen is strained by applying an external test force through a specific test device: