INTERNATIONAL STANDARD

ISO 24497-1

First edition
2007-11-01

Non-destructive testing — Metal magnetic memory —

Part 1: Vocabulary

Essais non destructifs — Mémoire magnétique des métaux —

Partie 1: Vocabulaire

Reference number
ISO 24497-1:2007(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 24497-1 was prepared by the International Institute of Welding, Commission V, *Quality control and quality assurance of welded products*, recognized as an international standardizing body in the field of welding in accordance with Council Resolution 42/1999.

Requests for official interpretations of any aspect of this part of ISO 24497 should be directed to the ISO Central Secretariat, who will forward them to the IIW Secretariat for an official response.

ISO 24497 consists of the following parts, under the general title *Non-destructive testing — Metal magnetic memory*:

— *Part 1: Vocabulary*

— *Part 2: General requirements*

— *Part 3: Inspection of welded joints*

Introduction

The terms established in this part of ISO 24497 are located in a systematic order reflecting the system of concepts in the sphere of non-destructive testing by the method of metal magnetic memory.

One standardized term is assigned to each concept.

The definitions given can be changed, if necessary, by entering derived features into them, revealing the meanings of terms used in them, and indicating the objects relating to the concept defined. The changes should not disturb the concept volume and content defined in this part of ISO 24497.

Standardized terms are printed in boldface font, and their reduced forms are represented by abbreviations (in boldface) or symbols (in lightface).

Non-destructive testing — Metal magnetic memory —

Part 1: Vocabulary

1 Scope

This part of ISO 24497 specifies terms and definitions for procedures in the sphere of non-destructive testing by the method of metal magnetic memory.

The terms specified in this part of ISO 24497 are mandatory for application in all types of documentation and literature in the sphere of non-destructive testing, using the method of metal magnetic memory included in the scope of standardization works and/or using the results of these works.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
metal magnetic memory
MMM
after-effect which occurs as residual magnetization in components and welded joints formed in the course of their fabrication and cooled down to ambient temperatures under interaction with weak magnetic fields or due to irreversible change of the local magnetization state of components in zones of stress concentration and damage under working

NOTE Weak magnetic fields are the geomagnetic field of the planet Earth and other external fields in Rayleigh area.

2.2
self-magnetic-leakage field of the components
SMLF
magnetic-leakage field occurring on the component's surface in the zones of stable slip bands of dislocations under operational or residual stresses or in the zones of strong heterogeneity in the microstructure of the material

NOTE SMLF characterizes MMM.

2.3
method of metal magnetic memory
MMM method
non-destructive testing method based on the analysis of SMLF distribution on components' surfaces for determination of stress concentration zones, imperfections, and heterogeneity in the microstructure of the material and in welded joints

2.4
magneto-dislocation hysteresis
hysteresis curve due to the pinning of magnetic domain walls (Bloch walls) at dislocation clusters in weak magnetic fields

2.5
critical size of the local zones of instability of the shell (l_{cr}) of a component
minimal distance between the two nearest stable dislocation slip bands in material layers occurring at the moment of loss of shell stability of the component under the influence of loads

NOTE This critical size is characterized by the distance between the two nearest SMLF extreme values normalized on the value of the shell dimension.

2.6
SMLF intensity
characteristic value of the magnetic-leakage field intensity measured on the component surface by the method of metal magnetic memory

2.7
SMLF gradient
ratio between the difference of the magnetic-leakage field intensity, measured at two adjacent scanning points and the distance between them

2.8
magnetic index (m) of the deformation capability of the material
ratio between the maximum value of the SMLF gradient and the average value

2.9
limiting value (m_{lim}) of the magnetic index of the material deformation capability
limiting value for the ratio between the maximum value of the SMLF gradient, corresponding to the metal tensile strength, and the average value of the SMLF gradient, corresponding to the material yield strength

2.10
SMLF measurement channel
SMLF intensity measured with a single flux-gate sensor

2.11
base distance between two SMLF measurement channels
l_b
distance between the two SMLF measurement channels installed at the scanning instrument during the sensor adjustment

2.12
SMLF diagram
magnetic image of the graph reflecting the SMLF gradient along the scanning path

2.13
discreteness unit of the SMLF intensity recording
distance between two adjacent scanning points of the magnetic-leakage field intensity measurements

2.14
calibration of the equipment used to measure the metal magnetic memory
adjustment of the sensors for the measurement of the magnetic-leakage field by using a reference coil and of the position-sensing device by using a length-measurement reference standard

2.15
setting of equipment operational mode by the MMM method
equipment adjustment according to the instrument main menu and described in the manual

2.16
interference noise during measurements by the MMM method
presence of factors distorting the SMLF of the inspection object (IO)

NOTE Factors distorting the SMLF of the inspection object are the following:

— sources of strong and heterogeneous magnetic fields close to the test subject;

— presence of a foreign ferromagnetic product on the test subject and near the region of interest;

— presence of an external magnetic field and/or a welding electric current flow at the test subject;

— presence of a local artificial magnetization.

Index

ICS 01.040.25; 25.160.40

Price based on 4 pages