
**Non-destructive testing — Metal
magnetic memory —**

**Part 2:
Inspection of welded joints**

Essais non destructifs — Mémoire magnétique des métaux —

Partie 2: Examen des assemblages soudés

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by IIW, *International Institute for Welding, Commission V, NDT and Quality Assurance of Welded Products*.

This second edition cancels and replaces ISO 24497-3:2007, which has been technically revised.

The main changes are as follows:

- [Clauses 2](#) and [3](#) have been updated;
- the scope has been modified, MMM is a technique of the MT method;
- [Clause 4](#) has been modified;
- [Clauses 5, 6](#) and [7](#) have been replaced by references to ISO 24497-1;
- figures and annexes have been modified for more exact descriptions.

A list of all parts in the ISO 24497 series can be found on the ISO website.

Any feedback, question or request for official interpretation related to any aspect of this document should be directed to IIW via your national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Non-destructive testing — Metal magnetic memory —

Part 2: Inspection of welded joints

1 Scope

This document specifies general requirements for the application of the non-destructive (NDT) metal magnetic memory (MMM) testing technique of the magnetic testing method for quality assurance of welded joints.

This document can be applied to welded joints in any type of ferromagnetic products: pipelines, vessels, equipment, and metal constructions, as agreed with the purchaser.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17635, *Non-destructive testing of welds — General rules for metallic materials*

ISO 24497-1:2020, *Non-destructive testing — Metal magnetic memory — Part 1: Vocabulary and general requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24497-1 apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Basic principles

4.1 MMM testing is based on measurement and analysis of the distribution of stray fields (SF) on the material of welded joints reflecting their technological past. Residual magnetization, induced during the welding process, for example, is the main driving force for the SF inspection.

4.2 MMM testing permits the detection of stray field indications (SFI) and gives recommendations for additional non-destructive testing in critical zones of vessels, pipelines, equipment, and construction welded joints.

4.3 MMM testing allows the inspection of welded joints of any size and configuration (butt, tee, fillet, lap, edge, intermittent, etc.) on all types of ferromagnetic and metastable austenitic steels and alloys, as well as on cast irons.

NOTE The evaluation of SFI of metastable austenitic steels is restricted to ferromagnetic phases.

4.4 MMM testing can be carried out on the weld after construction, during operation, or after repair.

4.5 The following indications can be found during MMM testing:

- zones of probable location of all types of micro- and macro-defects (pores, slag inclusions, discontinuities, cracks, ruptures);
- SFIs caused by the welding process and SFIs along the welded joints.

4.6 MMM testing can be used for inspection of the weld properties:

- the degree of quality degradation of welds by defects, and the presence of developing defects;
- the quality of welded joints for selection, acceptance and optimization of welding technology.

4.7 The MMM testing temperature range shall be from -20 °C to $+60\text{ °C}$, limited only by the conditions of the operators and sensors operational range.

4.8 Following MMM testing, conventional non-destructive testing methods shall be applied in zones of SFIs and probable locations containing micro- and macro-defects. ISO 17635 shall be used for selection of suitable NDT methods.

4.9 Weld seams are sources of local SF due their geometry, welding process and changes of the magnetic properties in the heat affected zone (HAZ), weld metal (WM) and parent metal (PM). For more information, see Bibliographic references [1], [2], [3] as well as the bibliography of ISO 24497-1.

5 Requirements for the inspected object

The requirements for the inspected object (IO) are defined in ISO 24497-1.

6 Testing equipment requirements

The requirements for the test equipment are defined in ISO 24497-1.

7 Preparation for testing

Preparation for testing is described in ISO 24497-1.

8 Test procedure

8.1 General

The mathematical basics of the MMM technique are described in ISO 24497-1.

8.2 Manual inspection of welded joints

Sequences of manual scanning with the sensor of the instrument for evaluation of several types of welded joints are shown in [Figure 1](#).