



Designation: E709 – 21

## Standard Guide for Magnetic Particle Testing<sup>1</sup>

This standard is issued under the fixed designation E709; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope\*

1.1 This guide<sup>2</sup> covers techniques for both dry and wet magnetic particle testing, a nondestructive method for detecting cracks and other discontinuities at or near the surface in ferromagnetic materials. Magnetic particle testing may be applied to raw material, semifinished material (billets, blooms, castings, and forgings), finished material and welds, regardless of heat treatment or lack thereof. It is useful for preventive maintenance testing.

1.1.1 This guide is intended as a reference to aid in the preparation of specifications/standards, procedures and techniques.

1.2 This guide is also a reference that may be used as follows:

1.2.1 To establish a means by which magnetic particle testing, procedures recommended or required by individual organizations, can be reviewed to evaluate their applicability and completeness.

1.2.2 To aid in the organization of the facilities and personnel concerned in magnetic particle testing.

1.2.3 To aid in the preparation of procedures dealing with the examination of materials and parts. This guide describes magnetic particle testing techniques that are recommended for a great variety of sizes and shapes of ferromagnetic materials and widely varying examination requirements. Since there are many acceptable differences in both procedure and technique, the explicit requirements should be covered by a written procedure (see Section 21).

1.3 This guide does not indicate, suggest, or specify acceptance standards for parts/pieces examined by these techniques. It should be pointed out, however, that after indications have been produced, they must be interpreted or classified and then evaluated. For this purpose there should be a separate code, specification, or a specific agreement to define the type, size, location, degree of alignment and spacing, area concentration,

and orientation of indications that are unacceptable in a specific part versus those which need not be removed before part acceptance. Conditions where rework or repair is not permitted should be specified.

1.4 This guide describes the use of the following magnetic particle method techniques.

1.4.1 Dry magnetic powder (see 8.4).

1.4.2 Wet magnetic particle (see 8.5).

1.4.3 Magnetic slurry/paint magnetic particle (see 8.5.7), and

1.4.4 Polymer magnetic particle (see 8.5.8).

1.5 *Personnel Qualification*—Personnel performing examinations in accordance with this guide should be qualified and certified in accordance with ASNT Recommended Practice No. SNT-TC-1A, ANSI/ASNT Standard CP-189, NAS 410, or as specified in the contract or purchase order.

1.6 *Nondestructive Testing Agency*—If a nondestructive testing agency as described in Specification E543 is used to perform the examination, the nondestructive testing agency should meet the requirements of Specification E543.

1.7 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.8 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury or mercury containing products, or both, into your state or country may be prohibited by law.

1.9 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.03 on Liquid Penetrant and Magnetic Particle Methods.

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code Applications, see related Guide S2-209 in Section II of that Code.

\*A Summary of Changes section appears at the end of this standard.

# Magnetic Particle Inspection Study Guide

**Jin-Ying Zhang**



## **Magnetic Particle Inspection Study Guide:**

Magnetic Particle Inspection M.J. Lovejoy, 2012-12-06 During the years since this book was first published in 1993 there have very few developments in the technology of magnetic particle inspection apart from improvements in instrumentation which has made the measurement of peak values of time varying currents practicable The major changes have arisen from health and safety and environmental concerns These involve chemicals and exposure of personnel to air borne electromagnetic fields and long wave ultraviolet UY A The changes in the acceptability of certain volatile halogenated hydrocarbons which led to the banning of 1,1,1 trichloroethane in 1995 were evident in 1993 The present discussions concerning the emissions of volatile organic compounds VOCs in general was also current and has now reached a stage where the effects of these deliberations will become evident over the next few years Concerns over the exposure of personnel to airborne electromagnetic fields has been current for some years as has discussions to the effects of long wave ultraviolet UY A on human skin Recommendations as to maximum permitted exposures over periods of time to both of these phenomena have been put forward and will doubtless form the basis of future legislation on the matter A number of new specifications have appeared notably EN European and ISO specifications and some of these are still in preparation Generally their impact will be minimal since these specifications are largely derived from existing documentation Engineering Dynamics Exam

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long wave ultraviolet UVA on human skin Recommendations as to maximum permitted exposures over periods of time to both of these phenomena have been put forward and will doubtless form the basis of future legislation on the matter A number of new specifications have appeared notably EN European and ISO specifications and some of these are still in preparation Generally their impact will be minimal since these specifications are largely derived from existing documentation

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Ness, Charles N. Sherlock, 1996      The 1984 Guide to the Evaluation of Educational Experiences in the Armed Services: Air Force American Council on Education, 1984      **Welding Licensing Exam Study Guide, Second Edition** Rex Miller, Mark R. Miller, 2021-11-19 Everything you need to pass the welding certification exams fully updated for the latest advances This thoroughly revised study guide helps you pass your licensing certification exams including the AWS certification exam and obtain your professional license Inside you ll find a valuable review of material that is most likely to appear on welding certification exams from basic safety and cutting practices to different types of welding including plasma arc shielded metal arc oxyacetylene flux cored gas metal and gas tungsten brazing soldering and more Welding Licensing Exam Study Guide Second Edition features Over 1 000 updated multiple choice and true false practice exam questions and answers Numerous welding calculations and troubleshooting tips Hundreds of detailed drawings and illustrations New Info on plastic pipes and tubing New Methods of welding repair and maintenance In depth coverage of welding tools and their uses The latest welding safety practices Guidance on studying welding methods SI and English units for all problems and equations Welding and Cutting Processes Plasma Arc Cutting and Welding Shielded Metal Arc Welding Oxyacetylene Welding Flux Cored Arc Welding Gas Metal Arc Welding Gas Tungsten Arc Welding Braze Welding Brazing Soldering Lead Tin and Zinc Identifying Metals Cast Iron and Its Alloys Wrought Iron Carbon Steels Low and High Alloy Steels Hardfacing Tool and Die Steels Reactive and Refractory Metals Galvanized Metals Soft Metals and Their Alloys Submerged Arc Welding Arc Welding Electrodes Types of Joints Welding Positions Welding Tips and Tests Common Welding Problems Certifications Conversion Tables Welding Terminology Tips for Producing Good Welds      **Materials Evaluation** ,2000      **MATERIAL SELECTION AND CORROSION - Volume II** ,2010-12-15 These volumes are a component of Encyclopedia of Water Sciences Engineering and Technology Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias The books are concerned with the development and selection of the best possible material for a particular engineering task and the determination of the most effective method of producing the materials and the component The complexity of modern processing and the need for efficient production and use of materials are discussed and illustrated by examples from current practice Properties are determined by structure which in turn depends on the processing route Theses volumes are aimed at the following five major target audiences University and College Students Educators Professional Practitioners Research Personnel and Policy and Decision Makers      **Magnetic Particle Study Guide** Ed W. McKelvey, 1980      **Industrial Radiography and Non-destructive Testing** ,1997      **Resources in Education** ,1981      **An Introductory Guide to EC Competition Law and Practice** Valentine Korah, 1994      **Handbook of Oil and Gas Piping** Murali Sambasivan, Sekar Gopal, 2018-09-20 The objective of this practical oil and gas piping handbook is to facilitate project management teams of oil and gas piping related construction projects to understand the key requirements of the discipline and to equip them with the necessary knowledge and protocol It provides a comprehensive

coverage on all the practical aspects of piping related material sourcing fabrication essentials welding related items NDT activities erection of pipes pre commissioning commissioning post commissioning project management and importance of ISO Management systems in oil and gas piping projects This handbook assists contractors in ensuring the right understanding and application of protocols in the project One of the key assets of this handbook is that the technical information and the format provided are practically from real time oil and gas piping projects hence the application of this information is expected to enhance the credibility of the contractors in the eyes of the clients and to some extent simplify the existing operations Another important highlight is that it holistically covers the stages from the raw material to project completion to handover and beyond This will help the oil and gas piping contractors to train their project management staff to follow the best practices in the oil and gas industry Furthermore this piping handbook provides an important indication of the important project related factors hard factors and organizational related factors soft factors to achieve the desired project performance dimensions such as timely completion cost control acceptable quality safe execution and financial performance Lastly the role of ISO management systems such as ISO 9001 ISO 14001 and OHSAS 18001 in construction projects is widely known across the industry however oil and gas specific ISO quality management systems such as ISO 29001 and project specific management systems such as ISO 21500 are not widely known in the industry which are explained in detail in this handbook for the benefit of the oil and gas construction organizations Features Covering the stages from the raw material to project completion to handover and beyond Providing practical guidelines to oil and gas piping contractors for training purposes and best practices in the oil and gas industry Emphasizing project related factors hard factors and organizational related factors soft factors with a view to achieve the desired project performance Highlighting the roles of ISO management systems in oil and gas projects

**Steel Forgings** ,1997      Associations' Publications in Print ,1984 1981 in 2 v v 1 Subject index v 2 Title index Publisher title index Association name index Acronym index Key to publishers and distributors abbreviations      **Scientific and Technical Aerospace Reports** ,1992      **Energy Research Abstracts** ,1989

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