



Prime Inspections, Inc.

Magnetic Particle (MT) Examination Procedure Yoke Technique — Wet Visible (Black on White)

Procedure No.: PII-TC-MT | Revision: 0 | Effective: 2026-07-28

Applicable Project: TC Energy (USA)

Technical Approval

**Joshua de Monbrun, CEng -
Consultant**

Quality Approval

Oscar Gonzales - VP of Quality

Company Approval for Use

Code & Specification Basis

- API 1104, Welding of Pipelines and Related Facilities — 21st Edition (2021, including current addenda)
- ASME BPVC Section V, Article 7 — Magnetic Particle Examination (2025 Edition)
- ASTM E709 — Standard Guide for Magnetic Particle Testing (latest edition)
- ASME B31.3 — Process Piping (2024 Edition); ASME B31.4 / B31.8 as applicable to project scope
- AWS D1.1 — Structural Welding Code - Steel (latest edition), when applicable
- TC Energy TES-NE-MT-GLE — Magnetic Particle Inspection (CAN-US-MEX), Rev. 04
- TC Energy TEN-NE-NDT-GL — Nondestructive Testing Standard (CAN-US-MEX), Rev. 01
- ISO 9712 — Qualification and Certification of NDT Personnel; ASNT SNT-TC-1A (2024)
- PII-WP-1 — Written Practice for Qualification and Certification of NDE Personnel

Revision History

Rev	Date	Prepared / Approved	Description of Change
0	2026-07-28	J. de Monbrun / O. Gonzales	Initial issue of Prime Inspections, Inc. (PII) controlled procedure under the PII Quality Management System. Issued as Rev 0 — no prior PII revision history. Aligned with API 1104 21st Edition (with current addenda), ASME BPVC Section V (2025 Edition), and the current TC Energy TES/TEN/TEP series specifications applicable to the project scope.

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1.0 Scope

- 1.1. This procedure establishes the minimum requirements implemented by Prime Inspections, Inc. (PII) for performing Magnetic Particle (MT) examination on TC Energy projects using the alternating-current (AC) electromagnetic-yoke technique with the wet visible indicating method (black on white).
- 1.2. This procedure applies to the detection of surface and slightly subsurface discontinuities in ferromagnetic materials such as girth welds, longitudinal welds, fillet welds, fittings, valves, piping, and related pressure-retaining components.
- 1.3. This procedure is applicable to the procedure qualification of welds, welder/welding-operator performance qualification welds, production welds, integrity excavations (in-service welding), and base-material anomaly investigations.
- 1.4. Where this procedure, API 1104, ASME Section V, or the applicable TC Energy specification does not explicitly address a required condition, parameter, or examination detail, PII shall identify the gap, notify TC Energy, apply the most technically conservative approach, and document the method used. When requirements conflict, the more stringent requirement shall govern.

2.0 Purpose

- 2.1. To provide a written, controlled, code-compliant procedure for the application of MT examination on TC Energy assets in Canada, the United States, and Mexico, satisfying the regulatory and contractual obligations imposed by 49 CFR §192/§195, API 1104 21st Edition, ASME BPVC Section V Article 7, ASTM E709, and TC Energy TES-NE-MT-GLE.

3.0 References (Latest Editions Unless Stated Otherwise)

3.1. Industry Codes and Standards

- 3.1.1. API 1104, Welding of Pipelines and Related Facilities, 21st Edition (2021), Section 11.4 Magnetic Particle Testing; Section 9.6 Acceptance Standards for Nondestructive Testing
- 3.1.2. ASME BPVC Section V, Article 7, Magnetic Particle Examination (2025 Edition), including Mandatory Appendices
- 3.1.3. ASTM E709, Standard Guide for Magnetic Particle Testing
- 3.1.4. ASTM E1444 / E1444M, Standard Practice for Magnetic Particle Testing
- 3.1.5. ASME B31.3, Process Piping (2024 Edition), paragraphs 302.3.3 and 344.3
- 3.1.6. ASME B31.4 / B31.8, Liquid and Gas Transmission Piping Systems (latest editions), as applicable
- 3.1.7. AWS D1.1/D1.1M, Structural Welding Code – Steel (latest edition), when the project scope includes structural welds

- 3.1.8. ASNT SNT-TC-1A (2024), Personnel Qualification and Certification in Nondestructive Testing
- 3.1.9. ANSI/ASNT CP-189, Standard for Qualification and Certification of Nondestructive Testing Personnel
- 3.1.10. ISO 9712, Non-destructive Testing — Qualification and Certification of NDT Personnel
- 3.1.11. ISO 9934-1, 2, 3; Magnetic Particle Testing (general principles, media, equipment)

3.2. TC Energy Specifications

- 3.2.1. TES-NE-MT-GLE, Magnetic Particle Inspection (CAN-US-MEX), Item ID 007610003, Rev. 04 (2022-Sep-01)
- 3.2.2. TEN-NE-NDT-GL, Nondestructive Testing Standard (CAN-US-MEX), Item ID 1001828336, Rev. 01
- 3.2.3. TES-IN-FDATA-GL, Pipeline Integrity Field Data Specification (CAN-US-MEX), Item ID 006807037
- 3.2.4. TEP-NE-ADT-GLE, Nondestructive Examination Audits (CAN-US-MEX), Item ID 003797402
- 3.2.5. TC Energy Operator Qualification Program, Item ID 004504739 (Covered Tasks VF103, VF205)
- 3.2.6. TC Energy Controlled Document Library Variance Procedure (CAN-US-MEX), Item ID 007728702

3.3. Regulatory References

- 3.3.1. 49 CFR Part 192, Transportation of Natural and Other Gas by Pipeline (PHMSA)
- 3.3.2. 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline (PHMSA).
- 3.3.3. 29 CFR 1910, OSHA General Industry Standards (PPE, hazard communication, fall protection)

3.4. PII Internal Documents

- 3.4.1. PII-WP-1, Written Practice for the Qualification and Certification of NDE Personnel (per ASNT SNT-TC-1A, 2024)
- 3.4.2. PII-QM-01, PII Quality Manual
- 3.4.3. PII Job Hazard Analysis (JHA) Master Template
- 3.4.4. PII-MT-CAL-01, Yoke Lift-Check and Light-Source Verification Record

4.0 Definitions and Acronyms

Term	Definition
AC	Alternating Current.
Authorized Representative	The competent individual designated by TC Energy to represent the Company for matters covered by this procedure.
Company	TC Energy and its affiliates.

Term	Definition
Company Engineering Representative	TC Energy engineering point of contact for materials, welding, and integrity engineering support.
Contractor	Prime Inspections, Inc. is engaged to perform the MT examination work covered by this procedure.
Indication	Visible accumulation of magnetic particles on the test surface caused by leakage flux.
Linear Indication	An indication whose length is greater than three (3) times its width.
Rounded Indication	An indication of circular or elliptical shape whose length is equal to or less than three (3) times its width.
MT	Magnetic Particle Testing.
NDT	Nondestructive Testing.
Relevant Indication	An indication caused by a discontinuity that requires evaluation against the acceptance criteria.
Yoke	An AC electromagnetic device that induces magnetic flux between two poles in contact with the test surface.

5.0 Responsibilities

5.1. PII VP of Quality

- 5.1.1. Owns the preparation, review, control, and revision of this procedure;
- 5.1.2. Ensures the procedure is reviewed and approved by the responsible ASNT Level III in the MT method prior to issue;
- 5.1.3. Monitors continued compliance with this procedure and with TC Energy specifications.

5.2. PII ASNT Level III (MT)

- 5.2.1. Provides the technical review and approval of this procedure;
- 5.2.2. Performs annual technical review of this procedure for continued code compliance;
- 5.2.3. Approves all variances, alternative techniques, and equivalent methods prior to use.

5.3. Site Supervisor / Project Manager

- 5.3.1. Verifies that personnel deployed to TC Energy work hold current certifications and Operator Qualifications;
- 5.3.2. Ensures equipment is calibrated and within verification interval prior to use;
- 5.3.3. Confirms that 100% of accessible areas within the inspection zone receive examination per this procedure and that any inaccessible areas are documented on the inspection report.

5.4. NDT Technician (Level II or III)

- 5.4.1. Performs MT examination in strict accordance with this procedure;
- 5.4.2. Completes all required records and reports per Section 17.0;
- 5.4.3. Stops work and contacts the Site Supervisor or Level III when any requirement of this procedure cannot be met;
- 5.4.4. Demagnetizes parts as required by Section 13.0 and confirms ≤ 3 Gauss residual field with a calibrated Gauss meter

5.5. NDT Trainee / Level I

Level I personnel may assist a Level II/III in the conduct of MT examinations, but shall not independently set up the technique, interpret indications, or sign reports.

[Reference: ASNT SNT-TC-1A §8 and PII-WP-1 §6.]

6.0 Safety Requirements

- 6.1 All PII personnel performing work on TC Energy projects shall wear personal protective equipment (PPE) appropriate to the site hazards, at a minimum: hard hat, ANSI Z87.1 safety eyewear, FR-rated coveralls (where required), ASTM F2412/F2413 safety footwear, cut-resistant gloves, and hearing protection in posted areas.
- 6.2 A Job Hazard Analysis (JHA) shall be completed and signed by all crew members prior to performing work each day and reissued whenever conditions change.
- 6.3 Personnel shall comply with all TC Energy site-specific safety rules, lock-out/tag-out, hot-work permits, confined-space entry, and excavation protocols.

6.4 Electrical Hazards

- 6.4.1 Yokes shall be inspected for cord/insulation damage before each shift.
- 6.4.2 GFCI protection shall be used on all 120 VAC sources.
- 6.4.3 Yokes shall not be used in atmospheres classified as Class I, Division 1 or 2 unless explicitly approved, and the equipment is rated for that location

6.5 Chemical Hazards

Particle suspensions, carriers, and contrast paints shall be stored, used, and disposed of in accordance with the manufacturer's Safety Data Sheet (SDS) and applicable environmental regulations. Bayol carrier (when used) is a petroleum distillate — avoid skin contact and ensure adequate ventilation.

7.0 Personnel Qualifications

- 7.1 Personnel performing MT examinations shall be qualified and certified in accordance with PII-WP-1 (which implements ASNT SNT-TC-1A, 2024 Edition). Certifications to ANSI/ASNT CP-189, ACCP, or ISO 9712 are acceptable as equivalent.

7.2 Minimum Certification Level

- 7.2.1 Examination, interpretation, and reporting: ASNT Level II (or ISO 9712 Level 2) in the MT method.
- 7.2.2 Procedure approval, technical review, and training: ASNT Level III (or ISO 9712 Level 3) in the MT method.

7.3 United States — TC Energy Operator Qualification (OQ)

Before performing work on TC Energy U.S. assets, personnel shall hold current qualification on the following Covered Tasks per the TC Energy Operator Qualification Program (Item ID 004504739):

- 7.3.1 VF103 — Non-Destructive Testing (Other Than Welds) Magnetic Particle (e.g., stress-corrosion cracking, dents).
- 7.3.2 VF205 — Non-Destructive Testing of Welds (Magnetic Particle).
- 7.3.3 Any additional Covered Tasks specified by the TC Energy project.

7.4 Vision Examination

All NDT personnel shall demonstrate annually: (a) near-vision acuity equivalent to Jaeger J-1 (or equivalent) at not less than 12 inches in at least one eye, corrected or uncorrected; and (b) color contrast differentiation sufficient to distinguish the colors used in this procedure. Vision records shall be retained by PII.

[Reference: ASNT SNT-TC-1A §8.2; PII-WP-1 §7.]

8.0 Magnetizing Equipment

8.1 Equipment Type

Magnetic flux shall be induced using AC electromagnetic yokes only. Permanent-magnet yokes are PROHIBITED. DC and half-wave DC yokes require prior written consent from TC Energy and the PII Level III before use.

[Reference: TES-NE-MT-GLE §4.2.1 and §4.2.2.]

8.2 Performance Requirements

- 8.2.1 AC yokes shall meet the requirements of ASTM E709 and ASME BPVC Section V Article 7, T-762.2.
- 8.2.2 AC yokes shall have a minimum lifting power of 10 lb (4.5 kg) with a maximum pole spacing of 4 in. (100 mm), or the inspection pole spacing, whichever is less.
- 8.2.3 DC yokes (when specifically approved per §8.1) shall have a minimum lifting power of 40 lb (18 kg) at the maximum pole spacing used.

8.3 Lift Check Frequency

- 8.3.1 Performed daily prior to first use on each shift.
- 8.3.2 Performed whenever the yoke has been dropped or has sustained damage.
- 8.3.3 Performed after each repair or modification of the yoke.
- 8.3.4 Documented on the PII-MT-CAL-01 record and on the daily MT report (Section 17.0).

[Reference: ASME V Article 7, T-762.2; TES-NE-MT-GLE §4.3.]

8.4 Test Weight Block

Calibrated test weights used for lift checks shall be traceable to the U.S. National Institute of Standards and Technology (NIST) or equivalent national metrology institute. Weight calibration certificates shall be retained by PII for the life of the equipment and made available for TC Energy audit.

8.5 Gauss Meter

A Gauss meter (residual-field indicator) shall be available at each MT inspection station. The meter shall have a current calibration certificate (calibration interval not to exceed 12 months) and shall be capable of reading residual fields ≤ 3 Gauss with appropriate resolution.

9.0 Indicating Medium

9.1 Preferred Method

The preferred indicating medium for TC Energy work is the wet visible method (black particles on a white contrast background).

9.2 Particle Suspensions

9.2.1 Particle suspensions shall meet the requirements of ASTM E709 (and ISO 9934-2 where applicable) and shall be supplied with a manufacturer's Certificate of Conformance, retained for project records.

9.2.2 Particles shall be non-fluorescent (visible).

9.2.3 When using suspensions other than pre-mixed aerosol form, Bayol is the preferred carrier; alternative carriers require verification, along with customer and Level III approval.

9.2.4 Particle suspensions and contrast paint shall be compatible and, whenever practicable, shall be from the same manufacturer.

9.2.5 The medium and the magnetizing force shall be applied simultaneously.

9.3 Contrast Paint

Visible suspensions shall be used in conjunction with adequately contrasting white paint. For machined or polished surfaces where white paint is inappropriate, particles of contrasting color shall be selected.

9.4 Dry Particle Method (Conditional Use)

Dry particle inspections may be used for hot-work applications (e.g., repair excavations, root inspection) and for non-complete weld inspections without further consent. For all other uses, Company consent shall be obtained prior to use. When dry powder is used, a colored powder that provides maximum contrast shall be selected and dusted gently and directly onto the area to be inspected while the magnetizing current is applied. Excess powder shall be removed only with magnetizing current applied, taking care that particles attracted by leakage flux are not removed.

[Reference: TES-NE-MT-GLE §4.4.3 and §4.4.8.]

9.5 Examination Through Coatings

MT examination through barrier coatings (paint, pipeline coatings, galvanizing) of any type, thickness, or relative conductivity is PROHIBITED. Coatings shall be removed for a distance of at least 25 mm (1 in.) from the area of interest.

[Reference: TES-NE-MT-GLE §2.1.2.]

10.0 Surface Preparation

- 10.1 Before examination, the area to be examined and all adjacent areas within 25 mm (1 in.) shall be free from grease, oil, scale, weld slag, silica deposits, dirt, loose paint, and any other matter that could interfere with the distribution, concentration, intensity, character, or definition of the magnetic substance.
- 10.2 Welds shall have any slag and silica deposits removed before inspection. Cleaning with a hand wire brush or power wire wheel is acceptable. Grinding or other surface conditioning shall not exceed the limits of the referencing code of construction.
- 10.3 If the condition of the inspection area is such that the weld or surrounding base metal may mask imperfections, the PII Site Supervisor shall contact the Company Engineering Representative for guidance before proceeding.
- 10.4 For investigation of pipe-body defects and anomaly investigations, the pipe surface shall be prepared to a finish and cleanliness suitable for MT examination (non-inclusive example: NACE 2 finish).

[Reference: TES-NE-MT-GLE §4.1; ASME V Article 7, T-741.]

11.0 Lighting and Light-Source Verification

- 11.1 Minimum visible-light intensity at the examination surface shall be 1076 lux (100 fc), measured at 24 in. (610 mm) from the source.
- 11.2 The light source (e.g., LED flashlight, headlamp, or portable luminaire) shall be verified annually using a calibrated light meter (with NIST-traceable calibration $\leq$ 12 months) OR shall be supplied with a current manufacturer's letter of conformance demonstrating $\geq$ 1076 lux at the working distance. The light-source identification, output, and verification method shall be recorded in the MT inspection report.

[Reference: TES-NE-MT-GLE §4.5; ASME V Article 7, T-777.1.]

12.0 Examination Technique

12.1 Two Orthogonal Examinations Required

Each area of interest shall be examined a minimum of two (2) times, with the lines of magnetic flux of the second examination approximately perpendicular

(90° ± 10°) to the lines of the first examination, to ensure detection of indications in any orientation.

[Reference: ASME V Article 7, T-754; TES-NE-MT-GLE §4.3.3.]

12.2 Examination Coverage

12.2.1 100% of the weld surface and a minimum 25 mm (1 in.) of adjacent base metal on each side shall be examined.

12.2.2 Inaccessible areas (e.g., behind clamps, restricted geometry, weld-prep features) shall be identified on the inspection report with a sketch and the reason for non-coverage.

12.3 Continuous Method

The continuous method shall be used: the indicating medium is applied while the magnetizing current is energized, and the magnetizing current is maintained for the duration sufficient to allow indication formation. The residual method is not permitted for TC Energy work.

12.4 Pole Spacing and Yoke Manipulation

12.4.1 Pole spacing shall not exceed 4 in. (100 mm), sized to the examination area but no greater than the maximum verified lift-check spacing.

12.4.2 Overlap of magnetized areas shall be a minimum of 10% to ensure full coverage.

12.4.3 Yoke contact surfaces shall be clean and flush with the test surface to maximize flux coupling.

12.5 Temperature Range

Examination shall be conducted with the test surface temperature between 32°F and 600°F (0°C and 316°C), consistent with the temperature ratings of the indicating medium and contrast paint per the manufacturer's SDS. Outside this range, prior Level III approval and demonstration is required.

13.0 Demagnetization

13.1 Parts shall be demagnetized between successive magnetization operations when residual fields could adversely affect subsequent examinations.

13.2 All parts shall be demagnetized after completion of all magnetizations whenever practicable, particularly when the part will be welded, machined, or placed near sensitive instrumentation.

13.3 Verification: A calibrated Gauss meter shall be used to verify demagnetization. The residual field shall read ≤ 3 Gauss (≤ 0.3 mT) measured on the test surface.

[Reference: TES-NE-MT-GLE §4.6; ASME V Article 7, T-775.]

14.0 Post-Examination Cleaning

14.1 PII personnel shall completely remove magnetic media, contrast paint, and any residue from all parts after examination and demagnetization, taking care to clean out holes, cavities, threads, and weld root areas.

- 14.2 Cleaning agents shall be compatible with the base material and any subsequent coatings. Chlorinated solvents shall not be used on austenitic stainless steel or nickel-based alloys.

[Reference: TES-NE-MT-GLE §4.7.]

15.0 Evaluation of Indications

- 15.1 Indications shall be evaluated against the acceptance criteria of the applicable code of construction or project-specific specification (Section 16.0).
- 15.2 Localized surface irregularities (e.g., machining marks) and broad areas of particle accumulation that mask discontinuities are unacceptable and shall be removed by surface conditioning and re-examined.
- 15.3 Nonrelevant indications (those judged not to result from imperfections) shall be regarded as unacceptable until either eliminated by surface conditioning or demonstrated to be nonrelevant by re-examination using MT or another NDT method.

15.4 Classification of Indications

- 15.4.1 Linear indication — length is greater than three (3) times its width.
- 15.4.2 Rounded indication — circular or elliptical, with length equal to or less than three (3) times its width.
- 15.4.3 Indications $\leq 1/16$ in. (1.6 mm) maximum dimension are classified as non-relevant per API 1104 §9.6.4.

16.0 Acceptance Standards

- 16.1 The acceptance criteria shall be defined by the Company before MT begins and shall be in accordance with the applicable code of construction (e.g., ASME B31.3, API 1104, CSA Z662) or project-specific acceptance criteria. Where conflict exists, the more stringent criteria shall govern.

[Reference: TES-NE-MT-GLE §2.2.1.]

16.2 API 1104, 21st Edition — Acceptance Criteria (Pipelines)

16.2.1 Classification of Indications

- 16.2.1.1 Indications produced by magnetic particle testing are not necessarily imperfections. Machining marks, scratches, and surface conditions may produce indications that are similar to those produced by imperfections but that are not relevant to acceptability. The criteria given in b and c apply when indications are evaluated.
- 16.2.1.2 Any indication with a maximum dimension of $1/16$ in (2mm) or less shall be classified as non-relevant. Any larger indication believed to be non-relevant shall be regarded as relevant until re-examined by magnetic particle or another nondestructive testing method to determine whether or not an actual imperfection exists. The surface may be ground or otherwise

conditioned before re-examination. After an indication is determined to be non-relevant, other non-relevant indications of the same type need not be re-examined.

- 16.2.1.3 Relevant indications are those caused by imperfections. Linear indications are those in which the length is more than three times the width. Rounded indications are those in which the length is three times the width or less.

16.2.2 Acceptance Standards: Relevant indications shall be considered defects should any of the following conditions exist:

16.2.2.1 Linear Indications

- a. Linear indications evaluated as crater cracks or star cracks and exceed 5/32in (4mm) in length.
- b. Linear indications evaluated as cracks other than crater cracks or star cracks.
- c. Linear indications evaluated as IF and exceed 1in (25mm) in total length in a continuous 12in (300mm) length of weld or 8% of the weld length.

16.2.2.2 Rounded Indications - For evaluation purposes, the maximum dimension of a rounded indication shall be considered its size. Rounded indications shall be evaluated as follows:

- a. Individual or scattered porosity (P) shall be considered a defect should any of the following conditions exist:
 - i. The size of an individual pore exceeds 1/8in (3mm) in diameter or 25 % of the specified wall thickness, whichever is less;
 - ii. The size of an individual pore exceeds 25% of the thinner of the nominal wall thicknesses joined, but no more than 1/8in (3 mm) in diameter;
 - iii. The distribution of scattered porosity exceeds the concentrations permitted by Figures 1 or 2.
- b. Cluster porosity (CP) that occurs in any pass except the finish pass shall comply with the criteria for individual or scattered porosity ("a" above). CP that occurs in the finish pass shall be considered a defect should any of the following conditions exist:
 - i. The diameter of the cluster exceeds 1/2in (13mm).
 - ii. The aggregate length of CP in any continuous 12in (300mm) length of weld exceeds 1/2in (13mm).

NOTE: Where doubt exists about the type of imperfection disclosed by an MT indication, verification shall be obtained using a complementary NDT method (e.g., UT, RT) prior to disposition.

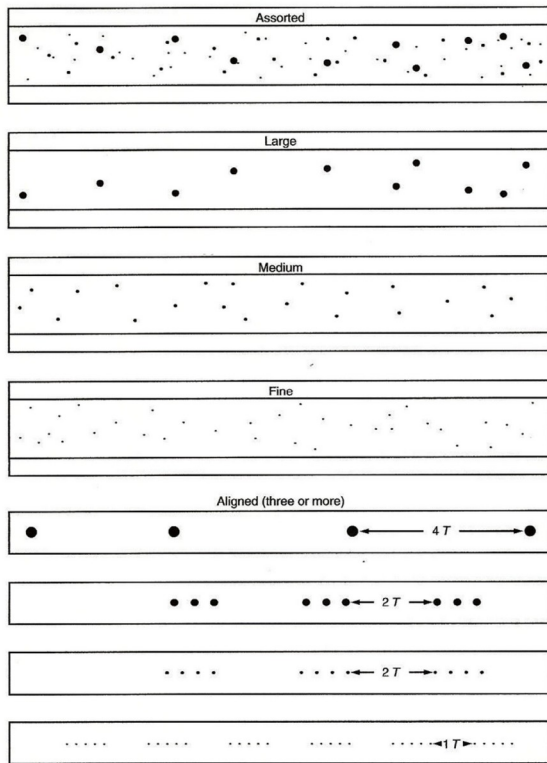


Figure 1: Max Distribution of Porosity ≤ 0.500 in (12.7mm)

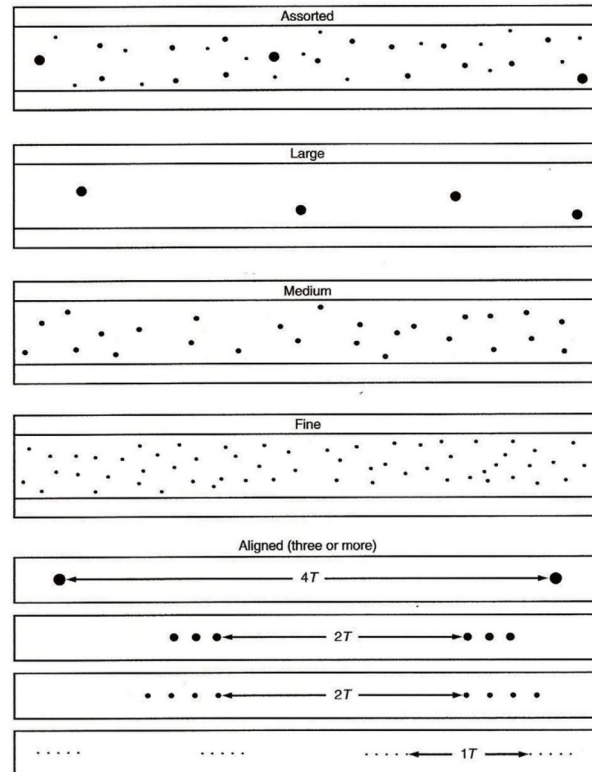


Figure 2: Max Distribution of Porosity > 0.500 in (12.7mm)

16.3 ASME B31.3 (2024 Edition) Acceptance Criteria (Process Piping)

16.3.1 Magnetic particle indications are caused by the attraction of the test media to surface or near-surface discontinuities in the area under test. However, not all such indications are necessarily imperfections, since excessive roughness, magnetic permeability variations, etc., may produce non-relevant indications. Inadvertent accumulation of particles not related to magnetic attraction is classified as a false indication. Indications shall be verified as being relevant, non-relevant, or false. Additional surface preparation and/or other test methods may be used as needed to verify the relevance of an indication.

16.3.2 An indication of an imperfection may be larger than the imperfection that causes it; however, the size of the indication is the basis for acceptance evaluation. Only indications that have any dimension greater than 1/16in (1.5mm) shall be considered relevant.

16.3.3 Indications

16.3.3.1 A linear indication is one having a length greater than three times its width;

16.3.3.2 A rounded indication is one of circular or elliptical shape with a length equal to or less than three times its width.

16.3.4 Acceptance Standards - All surfaces to be examined shall be free of:

- 16.3.4.1 Relevant linear indications;
- 16.3.4.2 Relevant rounded indications greater than 3/16in (5.0mm);
- 16.3.4.3 Four or more relevant rounded indications in a line separated by 1/16in (1.5mm) or less, edge to edge.

16.3.5 The acceptability of castings shall be evaluated in accordance with reference 2.13. The reference photographs exhibited in ASTM E 125 (see reference 2.9, ASME Sec. V, for additional information) shall be used for clarification, when required.

Castings: refer to ASME B31.3 §302.3.3 for casting-specific MT acceptance.

16.4 AWS D1.1 (When Applicable to Structural Welds)

16.4.1 For welds tested in accordance with AWS D1.1/D1.1M, see Table 1 for Visual and Magnetic Particle Acceptance Criteria.

16.5 Base-Material Imperfections

Imperfections in the base material detected by MT shall be reported immediately to the TC Energy site contact. Disposition of such imperfections shall be as directed by TC Energy.

[Reference: TES-NE-MT-GLE §5.1; PHMSA 49 CFR §192.713 / §195.422.]

17.0 Records and Reporting

17.1 Each MT examination shall be documented in the PII MT Inspection Report. As a minimum, the following information shall be recorded:

- 17.1.2 Project, facility, drawing, weld number, and chainage/station (as applicable).
- 17.1.3 Date and time of inspection.
- 17.1.4 NDT Technician's name, signature, certification standard (SNT-TC-1A / CP-189 / ISO 9712), and certification level in MT.
- 17.1.5 Yoke serial number, manufacturer, model, and type of current (AC).
- 17.1.6 Lift-check verification (test weight value, date of last calibration, pass/fail).
- 17.1.7 Light-source identification, output (lux), and verification reference (calibrated meter or letter of conformance).
- 17.1.8 Visible light meter serial number and calibration date, if used.
- 17.1.9 Indicating medium: manufacturer, product, batch/lot number, and Certificate of Conformance reference.
- 17.1.10 Contrast paint: manufacturer, product, and lot number.
- 17.1.11 Method (wet continuous visible, or dry — with consent reference).
- 17.1.12 Material specification, grade, and thickness inspected.
- 17.1.13 Surface preparation method.
- 17.1.14 Demagnetization performed (yes/no), residual field measurement (Gauss), and Gauss meter serial.
- 17.1.15 Acceptance code/specification used (e.g., API 1104 §9.6; ASME B31.3 §344.3; project specification).

- 17.1.16 Results: number, type, location, and dimension of indications; disposition (accept/reject / for evaluation).
- 17.1.17 Sketch or photograph of the weld and the indication of the location, when indications are recorded.
- 17.1.18 Signature of Level II/III examiner and date.
- 17.1.19 Procedure number and revision (PII-TC-MT Rev 0).
- 17.2 MT inspection reports shall be transmitted to the TC Energy Company contact at the end of each day of inspection, and originals retained in the PII Project Records system.
- 17.3 PII shall retain the MT inspection reports as part of the construction record for a minimum of seven (7) years, or for the design life of the asset, whichever is greater, per 49 CFR §192.709 / §195.404.
- 17.4 Integrity-related MT examinations shall additionally be documented using the TC Energy Integrity Field Report T-form per TES-IN-FDATA-GL Pipeline Integrity Field Data Specification.
- 17.5 Any questions regarding documentation requirements shall be directed to the Company Engineering Representative for resolution prior to deviation.

18.0 Variances

- 18.1 Any deviation from the requirements of this procedure or from TES-NE-MT-GLE shall be processed through the TC Energy Controlled Document Library Variance Procedure (CAN-US-MEX), Item ID 007728702. To initiate a variance, PII shall contact the TC Energy Authorized Representative in writing.
- 18.2 PII shall additionally record the variance in its internal Variance/Concession Log (PII-QM-VAR) and obtain Level III concurrence before implementation.

19.0 Compliance Cross-Reference Matrix

The following matrix demonstrates that each substantive requirement of this procedure is traceable to one or more governing codes/specifications, supporting audit defensibility under TC Energy's NDT audit protocol (TEP-NE-ADT-GLE).

Procedure §	Subject	Governing Code / Specification Reference
7.0	Personnel Qualification	ASNT SNT-TC-1A §8; PIIQ-WP-1; ISO 9712; TES-NE-MT-GLE §3.3; TC Energy OQ VF103/VF205
8.0	Yoke Equipment & Lift Check	ASTM E709; ASME V Art. 7 T-762.2; TES-NE-MT-GLE §4.3
9.0	Indicating Medium	ASTM E709; ISO 9934-2; TES-NE-MT-GLE §4.4
9.5	No MT Through Coatings	TES-NE-MT-GLE §2.1.2

Procedure §	Subject	Governing Code / Specification Reference
10.0	Surface Preparation	ASME V Art. 7 T-741; TES-NE-MT-GLE §4.1
11.0	Lighting (1076 lux @ 24 in.)	ASME V Art. 7 T-777.1; ASTM E709; TES-NE-MT-GLE §4.5
12.1	Two Orthogonal Examinations	ASME V Art. 7 T-754; TES-NE-MT-GLE §4.3.3
13.0	Demagnetization $\leq$ 3 Gauss	ASME V Art. 7 T-775; TES-NE-MT-GLE §4.6
14.0	Post-Examination Cleaning	TES-NE-MT-GLE §4.7
16.2	API 1104 Acceptance	API 1104 21st Ed. §9.6
16.3	ASME B31.3 Acceptance	ASME B31.3 §344.3
17.0	Records & Reporting	TES-NE-MT-GLE §5.1; ASME V Art. 7 T-790; 49 CFR §192.709 / §195.404
18.0	Variance Process	TC Energy Item ID 007728702

20.0 Table 1: AWS D1.1 (Table 8.1) - Inspection Acceptance Criteria

Discontinuity Category and Inspection Criteria	Statically Loaded Nontubular Connection	Cyclically Loaded Nontubular Connections	Tubular Connections (All Loads)
(1) Crack Prohibition Any crack shall be unacceptable, regardless of size or location.	X	X	X
(2) Weld/Base Metal Fusion <u>Complete</u> fusion shall exist between adjacent layers of weld metal and between weld metal and base metal.	X	X	X
(3) Crater Cross Section All craters shall be filled to provide the specified weld size (full cross section), except for the ends of intermittent fillet welds outside of their effective length.	X	X	X
(4) Weld Profiles Weld profiles shall be in conformance with the requirements of the referenced code.	X	X	X
(5) Time of Inspection Visual inspection of welds in all steels may begin immediately after the completed welds have cooled to ambient temperature. Acceptance criteria for ASTM A514, A517 and A709 Grade 100 and 100W steels shall be based on visual inspection performed not less than 48 hours after weld completion.	X	X	X
(6) Undersized Welds The size of a fillet weld in any continuous weld may be less than the specified nominal size (L), without correction, by the following amounts(U): $\frac{L}{\text{Specified nominal weld size, in (mm)}}$ $\leq 3/16 \text{ (5)}$ $1/4 \text{ (6)}$ $\geq 5/16 \text{ (8)}$ $\frac{U}{\text{Allowable decrease from L, in (mm)}}$ $\leq 1/16 \text{ (2)}$ $\leq 3/32 \text{ (2.5)}$ $\leq 1/8 \text{ (3)}$ In all cases, the undersize portion of the weld shall not exceed 10% of the weld length. For web-to-flange welds on girders, underrun shall be prohibited at the ends for a length equal to twice the width of the flange.	X	X	X
(7) Undercut (A) For material less than 1in (25 mm) thick, undercut shall not exceed 1/32in (1mm), except that a maximum 1/16in (2 mm) is permitted for an accumulated length of up to 2in (50mm) in any 12in (305mm). For material equal to or greater than 1in (25 mm) thick, undercut shall not exceed 1/16in (2 mm) for any length of weld.	X		
(B) In primary members, undercut shall be no more than 0.01in (0.25 mm) deep when the weld is transverse to tensile stress under any design loading condition. Undercut shall be no more than 1/32in (1 mm) deep for all other cases.		X	X
(4) Porosity (A) Complete joint penetration groove welds in butt joints transverse to the direction of computed tensile stress shall have no visible piping porosity. For all other groove welds and for fillet welds, the sum of the visible piping porosity 1/32in (1 mm) or greater in diameter shall not exceed 3/8in (10 mm) in any linear inch of weld and shall not exceed 3/4in (20 mm) in any 12in (300 mm) length of weld.	X		
(B) The frequency of piping porosity in fillet welds shall not exceed one in each 4in (100mm) of weld length and the maximum diameter shall not exceed 3/32in (2.5 mm). Exception: for fillet welds connecting stiffeners to web, the sum of the diameters of piping porosity shall not exceed 3/8in (10 mm) in any linear inch of weld and shall not exceed 3/4in (20 mm) in any 12in (300mm) length of weld.		X	X
(C) Complete joint penetration groove welds in butt joints transverse to the direction of computed tensile stresses shall have no piping porosity. For all other groove welds, the frequency of piping porosity shall not exceed one in 4in (100 mm) of length and the maximum diameter shall not exceed 3/32in (2.5 mm).		X	X

Note 1: An "X" indicates applicability for the connection type; a shaded area indicates non-applicability.

