

Non-Destructive Testing Procedure for Positive Material Identification (PMI) Testing

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Non-Destructive Testing Procedure for Positive Material Identification (PMI) Testing

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1.0 SCOPE

This procedure establishes the requirements and methodology for conducting Positive Material Identification (PMI) testing using X-Ray Fluorescence (XRF) and/or Optical Emission Spectroscopy (OES) techniques. This procedure applies to the verification of chemical composition of metallic materials including but not limited to piping, pressure vessels, structural components, welds, and raw materials in accordance with project specifications and applicable codes.

2.0 REFERENCES

- ASTM E1476 - Standard Guide for Optical Emission Spectrometric Analysis of Stainless Steel
- ASTM E539 - Standard Test Method for Keywords and Phrases Relating to Analysis by X-Ray Fluorescence
- ASTM E2823 - Standard Guide for X-Ray Fluorescence (XRF) Analysis
- ASME B31.3 - Process Piping
- ASME Section VIII - Pressure Vessels
- ASME Section IX - Welding and Brazing Qualifications
- AWS D1.1 - Structural Welding Code - Steel
- ISO 9712 - Non-destructive Testing - Qualification and Certification of NDT Personnel
- ASNT SNT-TC-1A - Personnel Qualification and Certification in Nondestructive Testing
- Client/Project Specifications
- Manufacturer's Equipment Operation Manual

3.0 DEFINITIONS

PMI (Positive Material Identification): A non-destructive testing method used to verify the chemical composition and grade of metallic materials.

XRF (X-Ray Fluorescence): An analytical technique that uses X-rays to determine the elemental composition of materials.

OES (Optical Emission Spectroscopy): An analytical technique that identifies elements in a sample by

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analyzing the light spectrum emitted when the sample is excited.

Heat Number: A unique identification number assigned to a batch of material produced under the same manufacturing conditions.

CRS (Certified Reference Standard): A material standard with known and certified chemical composition used for equipment verification.

Base Metal: The parent material being welded or tested.

Weld Metal: The fused metal in a welded joint.

4.0 PERSONNEL QUALIFICATION

PMI testing shall be performed by technicians who meet the following minimum requirements:

4.1 Certification Requirements

- Certified to ASNT SNT-TC-1A Level II minimum or equivalent (ISO 9712)
- PMI-specific training and certification where required by client
- Trained and qualified in the operation of specific PMI equipment being used
- Familiar with material specifications, grades, and acceptance criteria
- Knowledge of applicable codes and standards (ASME, ASTM, AWS)

4.2 Medical Requirements

- Current vision examination (near vision acuity) performed annually
- Vision shall be natural or corrected to Jaeger #2 or equivalent at minimum reading distance of 12 inches

4.3 Training Records

- Personnel training records shall be maintained and include:
 - Certification documents
 - Equipment-specific training records
 - Annual vision test results
 - Continuing education records

5.0 EQUIPMENT AND MATERIALS

5.1 PMI Analyzer

- Portable XRF or OES analyzer with current calibration certificate
- Equipment capable of analyzing elements as per project requirements
- Calibration valid and traceable to NIST (National Institute of Standards and Technology) or equivalent international standards
- Equipment shall have unique identification/serial number

5.2 Certified Reference Standards

- Minimum two (2) certified reference standards covering the range of materials to be tested
- Standards shall be traceable to NIST or equivalent
- Standards should represent the primary alloy groups expected (e.g., carbon steel, stainless steel, low alloy steel)

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- Certification of standards shall be current and available

5.3 Surface Preparation Tools

- Wire brushes (stainless steel and carbon steel - separate)
- Portable grinder with abrasive discs
- Abrasive pads or emery cloth
- Files (if required)

5.4 Cleaning Materials

- Acetone or approved solvent
- Isopropyl alcohol
- Degreaser
- Lint-free cleaning cloths
- Paper towels

5.5 Marking and Documentation

- Permanent markers or paint markers
- Metal tags or labels
- Numbering stamps (if required)
- Test report forms
- Camera for photographic documentation (if required)

5.6 Personal Protective Equipment (PPE)

- Safety glasses with side shields
- Protective gloves (leather or heat-resistant)
- Safety shoes/boots
- Hearing protection (when grinding)
- Respiratory protection (when grinding in confined spaces)
- Protective clothing as per site requirements

5.7 Safety Equipment (for XRF)

- Radiation warning signs and labels
- Barrier tape (if required)
- Radiation survey meter (if required by regulations)

6.0 SAFETY REQUIREMENTS

6.1 General Safety

- All personnel shall wear appropriate PPE as required by site safety procedures
- Follow all site-specific safety procedures, hot work permits, and confined space requirements
- Ensure proper ventilation when grinding or preparing surfaces
- Be aware of working at heights, scaffolding safety, and fall protection requirements
- Lock-out/Tag-out procedures shall be followed when working on equipment
- Obtain all necessary work permits before commencing testing

6.2 Radiation Safety (XRF Equipment)

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- Operator shall be trained in radiation safety procedures and aware of regulatory requirements
- Post radiation warning signs in the immediate work area when equipment is in use
- Never point the analyzer at any person or body part
- Ensure trigger interlock and safety features are functional before use
- Do not override safety interlocks
- Maintain safe distance as per manufacturer's recommendations during operation
- Perform radiation leak testing as per regulatory requirements
- Report any equipment malfunction immediately
- Keep records of radiation safety training

6.3 Grinding Safety

- Wear appropriate PPE including face shield or safety goggles
- Ensure grinding wheels are properly mounted and guards are in place
- Check grinder for damage before use
- Be aware of spark direction and hot surface hazards
- Ensure adequate ventilation to prevent inhalation of dust and fumes
- Obtain hot work permit if required

6.4 Chemical Safety

- Use solvents in well-ventilated areas
- Avoid skin contact with cleaning chemicals
- Have Material Safety Data Sheets (MSDS/SDS) available
- Dispose of contaminated materials as per environmental regulations
- Keep fire extinguisher accessible when using flammable solvents

7.0 CALIBRATION AND VERIFICATION

7.1 Equipment Calibration

7.1.1 Factory Calibration

- PMI analyzers shall be calibrated by the manufacturer or qualified service provider
- Calibration interval shall not exceed manufacturer's recommendations or 12 months, whichever is sooner
- Calibration shall be traceable to NIST or equivalent standards
- Calibration certificate shall include:
 - Equipment identification (make, model, serial number)
 - Calibration date and due date
 - Standards used (with traceability)
 - Calibration results and uncertainty
 - Name and signature of person performing calibration
 - Accreditation details of calibration laboratory

7.1.2 Calibration Records

- Calibration certificates shall be maintained on file and readily available
- Equipment with expired calibration shall not be used

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- Equipment identification shall be marked with calibration due date

7.2 Daily Verification Check

Prior to testing each day, after any equipment malfunction, and after every 4 hours of continuous use:

7.2.1 Verification Procedure

- Clean the probe window and ensure it is free from contamination
- Perform system self-check as per manufacturer's instructions
- Test minimum of two (2) certified reference standards
- Standards should bracket the expected range of materials to be tested
- Perform multiple readings (minimum 2) on each standard
- Record all verification results on the test report

7.2.2 Acceptance Criteria for Verification

- Measured grade must match the certified grade of the standard
- For elemental composition, results must be within $\pm 10\%$ relative error of certified values for major alloying elements
- Repeatability between duplicate readings should be consistent (within instrument precision)

7.2.3 Failed Verification

If verification fails:

- Do not use equipment for testing
- Check for probe contamination and clean thoroughly
- Repeat verification check
- If failure persists, contact equipment manufacturer or service provider
- Document the failure and corrective actions taken
- Equipment may require recalibration before returning to service

8.0 TEST PROCEDURE

8.1 Pre-Test Requirements

8.1.1 Documentation Review

- Review project specifications, material requirements, and applicable codes
- Review drawings, isometric diagrams, and component identification
- Identify required material grades and acceptable alternatives
- Review heat traceability documentation (Mill Test Certificates/Reports)
- Determine acceptance criteria for each material type
- Review previous inspection reports if available

8.1.2 Test Planning

- Develop sampling plan based on project requirements
- Identify specific test locations on components



- Coordinate with construction/installation team
- Obtain access to test areas
- Ensure adequate lighting for testing

8.1.3 Equipment Preparation

- Verify equipment calibration status
- Perform daily verification check using certified standards
- Ensure battery is fully charged (for portable units)
- Select appropriate analysis method/grade library in analyzer
- Prepare surface preparation tools and cleaning materials

8.1.4 Safety Preparation

- Obtain all necessary work permits (hot work, confined space, etc.)
- Conduct Job Safety Analysis (JSA) or Take 5 safety briefing
- Set up radiation warning signs (for XRF equipment)
- Ensure all personnel in area are aware of testing activities
- Verify PPE is adequate and in good condition

8.2 Surface Preparation

Proper surface preparation is critical for accurate PMI results.

8.2.1 Cleaning

- Remove all paint, coating, rust, scale, mill scale, and oxidation from test area
- Remove oil, grease, marking ink, or any other contaminants
- Clean test surface using wire brush, grinder, or abrasive pad
- Use appropriate wire brush (stainless steel brush for stainless materials, carbon steel brush for carbon materials)
- Do not cross-contaminate materials with brushes or tools

8.2.2 Grinding Requirements

- Grind surface to bare, bright metal
- Remove minimum 0.5mm of material from surface
- Prepared area should be minimum 10mm x 10mm for adequate probe contact
- Ensure surface is smooth, flat, and free from pitting, porosity, or rough texture
- Grinding direction should be uniform if possible
- For curved surfaces, ensure adequate flat area for probe contact

8.2.3 Final Cleaning

- Wipe ground surface with clean cloth to remove grinding residue
- Clean with acetone or approved solvent using lint-free cloth
- Allow solvent to evaporate completely before testing
- Ensure surface is dry and free from any contamination

8.2.4 Special Considerations



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- **Welds:** Prepare both base metal surfaces (on each side of weld) and weld metal surface
- **Castings:** Grind deeper to ensure reading is representative (may have surface segregation)
- **Coated Materials (Galvanized, Plated):** Remove all coating material completely
- **Heat-Affected Zone:** Avoid testing in HAZ; test base metal away from weld
- **Thin Materials:** Exercise caution when grinding to avoid excessive material removal

8.3 Testing Procedure

8.3.1 Analyzer Setup

- Power on the analyzer and allow warm-up period (if required)
- Select appropriate analysis method or grade library:
 - Carbon Steel Library (for carbon and low alloy steels)
 - Stainless Steel Library (for austenitic, ferritic, martensitic grades)
 - Nickel Alloy Library (for Inconel, Monel, Hastelloy)
 - Custom library if required by project
- Set analysis time as per manufacturer recommendation (typically 5-10 seconds for XRF)

8.3.2 Performing the Test

- Position analyzer probe perpendicular (90°) to test surface
- Ensure full contact between probe window and material surface (no gaps or air pockets)
- Hold analyzer firmly and steadily against surface
- Avoid touching prepared test area with fingers or gloves before testing
- Activate analyzer trigger (ensure safety protocol for XRF)
- Wait for complete analysis cycle (do not move analyzer during reading)
- Observe display for grade identification and elemental composition
- For XRF: Radiation is emitted during trigger activation - follow safety procedures

8.3.3 Recording Results

- Record the identified material grade (e.g., 316L, A106 Gr.B, F304)
- Record key elemental percentages (C, Si, Mn, Cr, Ni, Mo, etc. as applicable)
- Note analyzer confidence level or match quality (if displayed)
- Mark tested location with permanent identifier (paint marker or tag)
- Take photograph of test location if required by project

8.3.4 Multiple Readings

For critical applications or when initial results are questionable:

- Perform duplicate or triplicate readings on the same location
- Results should be consistent between readings
- If results vary significantly, prepare surface again and retest
- For welds, always test in three locations minimum:
 - Base metal on one side
 - Weld metal (center of weld)
 - Base metal on other side

8.3.5 Documentation During Testing

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- Maintain sequential test numbering
- Record component identification (line number, equipment tag, etc.)
- Note test location description (e.g., "6 o'clock position", "top flange")
- Record heat number if marked on component
- Document any observations or anomalies

8.4 Sampling Requirements

Unless otherwise specified by project specifications or client requirements:

8.4.1 Piping Systems

- Test one location per heat number per line
- Minimum 5% of welded joints per system or as specified
- Test at least one spool piece per heat number
- Include testing of fittings, flanges, valves from each heat lot
- For dissimilar metal welds, test both base metals and weld metal

8.4.2 Pressure Vessels

- Test one location per plate/component per heat number
- Test nozzles, flanges, and reinforcement pads
- Verify shell plates, heads, and major components
- Test at least 5% of welded attachments
- Document heat number traceability for all pressure boundary components

8.4.3 Structural Steel

- Test as per project specification or minimum 2% of members
- Test one location per heat per member type (beams, columns, plates)
- Increased testing for critical structural components
- Test base metal on both sides of welded connections

8.4.4 Bolting and Fasteners

- Test minimum 10% of each size and grade
- Test from each heat lot or manufacturer batch
- For critical applications (pressure-retaining), test 100% or as specified

8.4.5 Welds

- Base metal testing: Both sides of weld joint
- Weld metal testing: Center of weld cap or root (as accessible)
- Minimum three (3) test points per weld joint (two base metals + one weld metal)
- Increased frequency for critical welds or dissimilar metal welds

8.4.6 Raw Materials/Stock

- Test each bar, plate, or section from different heats



- Test minimum one location per piece for traceability verification
- For large plates, test corners and center if required

9.0 ACCEPTANCE CRITERIA

9.1 Material Grade Verification

Materials shall be accepted when:

9.1.1 Grade Match

- Identified grade matches the specified grade per project requirements
- Grade is within the acceptable alternatives listed in specifications
- For example: If SA-106 Gr.B is specified, identification of A106 Gr.B or equivalent is acceptable

9.1.2 Elemental Composition

- All major alloying elements are within the compositional range specified by the material standard
- Key elements to verify (depending on material type):
 - **Carbon Steel:** C, Si, Mn, P, S
 - **Low Alloy Steel:** C, Si, Mn, Cr, Mo, V
 - **Stainless Steel:** C, Cr, Ni, Mo, Mn, Si
 - **Nickel Alloys:** Ni, Cr, Fe, Mo, Cu, C

9.1.3 Critical Elements

Special attention to critical elements:

- **Carbon (C):** Critical for mechanical properties and weldability
- **Chromium (Cr):** Critical for corrosion resistance
- **Nickel (Ni):** Critical for austenitic structure and toughness
- **Molybdenum (Mo):** Critical for high-temperature strength and corrosion resistance
- **Sulfur (S) & Phosphorus (P):** Tramp elements - should be within limits

9.2 Acceptance Tolerance

9.2.1 Elemental Analysis Tolerance

For individual elements, results shall be:

- Within the compositional range specified by the applicable material standard (ASTM, ASME specifications), OR
- Within $\pm 10\%$ relative error of the certified value (whichever is more stringent)

9.2.2 Grade Library Match

- For grade identification, analyzer confidence level should be high (typically $>90\%$ if displayed)
- If multiple grades show similar match, verify elemental composition against specification

9.3 Special Considerations

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9.3.1 Borderline Results

- If composition is at the boundary of specified range, perform duplicate testing
- Consider laboratory chemical analysis for confirmation if critical
- Document as observation in test report

9.3.2 Weld Metal

- Weld metal composition may differ slightly from base metal
- Verify weld filler material is compatible with base metal
- Ensure weld metal meets minimum alloy requirements for service conditions

9.3.3 Material Mix-Up

- Any indication of wrong material grade is a critical non-conformance
- If lower-grade material is identified when higher grade is specified, reject immediately
- Example: Finding 304 stainless when 316L is specified

10.0 REPORTING REQUIREMENTS

10.1 Test Report Preparation

- Complete PMI test report for each component, system, or batch tested
- Use approved test report format (attached at end of this procedure)
- Include all required information completely and legibly
- Reports may be handwritten or computer-generated

10.2 Report Content

Test reports shall include:

10.2.1 General Information

- Report number (unique identifier)
- Project name and number
- Client name
- Location of work
- Date of testing
- Drawing numbers and revisions
- Applicable specifications and codes
- Purchase order or contract number

10.2.2 Equipment Information

- Analyzer make, model, and serial number
- Calibration date and due date
- Analysis method (XRF or OES)
- Analysis mode or grade library used

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10.2.3 Verification Records

- Daily verification check results
- Certified reference standards used
- Measured values vs. certified values
- Pass/Fail status of verification

10.2.4 Test Results

- Sequential test identification numbers
- Component identification (line number, equipment tag, etc.)
- Heat number (if marked on component)
- Test location description
- Required material grade per specification
- Identified material grade from testing
- Elemental composition (key elements)
- Accept/Reject status
- Remarks or observations

10.2.5 Attachments

- Calibration certificates (current)
- Certified reference standard certificates
- Photographs (if required)
- Sketches or location diagrams (if helpful)
- Material test certificates/mill test reports (for reference)

10.3 Report Review and Approval

- Test reports shall be reviewed by Level III or authorized QC personnel
- Reports shall be signed by:
 - Technician who performed testing (Level II minimum)
 - Reviewer (Level III or QC Engineer)
 - Approver (QA/QC Manager or designee)
- All signatures shall include name, certification level, and date

10.4 Record Retention

- Original test reports shall be retained as per project quality requirements
- Minimum retention period: 5 years or as specified by client/code
- Electronic copies should be backed up and protected
- Records shall be readily retrievable for audits or inspections

10.5 Distribution

- Distribute test reports to:
 - Client representative
 - Project quality file
 - Construction/installation manager
 - Fabrication shop (if applicable)
 - Other stakeholders as required by project

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11.0 NON-CONFORMANCE PROCEDURES

11.1 Identification of Non-Conformance

Material does not meet acceptance criteria when:

- Identified grade does not match specified grade
- Elemental composition is outside specified range
- Material mix-up or wrong grade is detected
- Heat number does not match documentation
- Visual evidence of material substitution

11.2 Immediate Actions

Upon identification of non-conformance:

11.2.1 Notification

- Immediately notify project engineer or construction supervisor
- Notify QA/QC manager
- Notify client representative (if required)
- Stop any work on or with the non-conforming material

11.2.2 Quarantine

- Physically segregate non-conforming material
- Mark non-conforming material clearly with "HOLD" or "REJECT" tags
- Prevent inadvertent use of material
- Secure material in controlled area if possible

11.2.3 Documentation

- Prepare Non-Conformance Report (NCR) immediately
- Document complete details:
 - Description of non-conformance
 - Location and extent
 - Test results and data
 - Acceptance criteria and deviation
 - Potential impact on project
- Attach supporting documents (test reports, MTRs, photos)

11.3 Additional Testing

To confirm non-conformance:

- Perform re-test on the same location after re-preparing surface
- Perform testing on additional locations on the same component
- Test adjacent components from the same heat number
- Consider independent laboratory chemical analysis for confirmation
- Document all additional testing results

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11.4 Root Cause Investigation

Investigate the source of non-conformance:

- Review material receiving inspection records
- Check heat number traceability documentation
- Review material procurement and storage procedures
- Identify if issue is isolated or systemic
- Determine if other materials are affected

11.5 Disposition

Non-conforming material shall be dispositioned through one of the following:

11.5.1 Use-As-Is

- Material may be acceptable if:
 - Deviation is minor and does not affect fitness for purpose
 - Engineering evaluation determines acceptability
 - Client/Owner approval obtained
 - Code/specification allows deviation
- Document justification thoroughly

11.5.2 Rework/Repair

- If weld metal is non-conforming, remove and re-weld with correct filler
- Generally not applicable to base metal PMI issues

11.5.3 Return to Vendor

- Material is returned to supplier
- Supplier provides replacement material
- Verify replacement material before acceptance

11.5.4 Reject/Scrap

- Material is rejected and scrapped
- Obtain replacement from approved source
- Ensure replacement has proper documentation and testing

11.6 Corrective and Preventive Actions

Implement corrective actions to prevent recurrence:

- Improve material receiving inspection procedures
- Enhance material identification and storage methods
- Increase PMI testing frequency or sampling
- Provide additional training to personnel
- Review and improve procurement procedures
- Audit material supplier quality systems

11.7 NCR Closure

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Close NCR only after:

- Disposition is approved by authorized personnel
- Corrective actions are implemented
- Verification of effectiveness is completed
- All documentation is complete
- Client/Owner concurrence obtained (if required)

12.0 DOCUMENTATION AND RECORDS

12.1 Required Records

The following records shall be maintained and retained:

12.1.1 Procedure and Technical Documents

- This PMI testing procedure (current revision)
- Procedure revision history
- Equipment manufacturer's operation manuals
- Applicable codes, standards, and specifications

12.1.2 Equipment Records

- Equipment calibration certificates (current and historical)
- Equipment maintenance and repair records
- Daily verification check records
- Certified reference standard certificates
- Radiation safety documentation (for XRF equipment)

12.1.3 Personnel Records

- Technician qualification and certification records
- Training records (initial and continuing education)
- Annual vision examination records
- Radiation safety training records (for XRF operators)

12.1.4 Testing Records

- Completed PMI test reports
- Non-conformance reports (NCRs)
- Corrective action records
- Material test certificates/mill test reports
- Photographic documentation

12.1.5 Quality Records

- Procedure approval records
- Audit reports (internal and external)
- Client correspondence related to PMI testing

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- Deviation or waiver requests

12.2 Record Storage and Protection

- Records shall be stored in a secure, controlled environment
- Protect records from damage, deterioration, or loss
- Electronic records shall be backed up regularly
- Maintain document control and revision tracking
- Restrict access to authorized personnel

12.3 Record Retrieval

- Records shall be organized for easy retrieval
- Index records by project, date, or other logical system
- Ensure records are available for:
 - Project closeout
 - Client review
 - Regulatory inspections
 - Third-party audits
 - Future reference or investigation

12.4 Retention Period

- Retain all PMI testing records for minimum 5 years after project completion
- Certain industries or clients may require longer retention periods (e.g., nuclear, aerospace)
- Follow most stringent requirement when multiple apply
- Do not destroy records without proper authorization

13.0 LIMITATIONS OF PMI TESTING

13.1 Technology Limitations

13.1.1 Light Elements

- XRF analyzers have difficulty detecting light elements (C, B, N)
- Carbon content is critical but may not be accurately measured by XRF
- OES analyzers generally provide better light element detection

13.1.2 Surface Reading

- PMI analyzes only the surface layer (approximately 0.001" to 0.010" depth)
- Surface contamination or segregation can affect results
- Does not detect internal defects or core composition

13.1.3 Coating and Plating

- Cannot analyze through coatings, paint, or plating
- Complete removal of surface layers is essential

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13.1.4 Similar Alloys

- May have difficulty distinguishing between very similar grades
- Example: Differentiating between 304 and 304L (low carbon variant)
- Requires laboratory analysis for precise carbon content

13.2 Practical Limitations

13.2.1 Access

- Requires physical contact with material surface
- May be difficult in confined spaces or on inaccessible surfaces
- Surface must be relatively flat for good probe contact

13.2.2 Surface Condition

- Rough, pitted, or corroded surfaces may give inaccurate results
- Thin materials may allow X-ray penetration to underlying materials

13.2.3 Temperature

- Extreme temperatures (very hot or cold surfaces) may affect accuracy
- Allow material to cool to near ambient temperature before testing

13.3 What PMI Cannot Do

PMI testing cannot:

- Verify mechanical properties (hardness, tensile strength, toughness)
- Detect heat treatment condition
- Identify internal defects or cracks
- Determine material thickness
- Verify weld integrity or quality
- Replace destructive testing when required by code

13.4 Complementary Testing

PMI should be supplemented with other testing methods as appropriate:

- Hardness testing for heat treatment verification
- Laboratory chemical analysis for precise composition
- Mechanical testing for property verification
- Ultrasonic or radiographic testing for weld integrity
- Ferrite measurement for duplex stainless steels

14.0 PROCEDURE REVISION HISTORY

Revision	Date	Description of Changes	Approved By
00	Jan 2023	Initial issue	Ravi Kumar Thammana, ASNT Level III,

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Revision	Date	Description of Changes	Approved By
01	Jun 2024	Added OES testing method, updated safety section	Ravi Kumar Thammana, ASNT Level III
02	Oct 20xx	Expanded acceptance criteria, added test report format	Ravi Kumar Thammana, ASNT Level III

15.0 APPROVAL AND AUTHORIZATION

This procedure has been reviewed and approved for use:

Prepared By:

Name: _____

Title: NDT Level III / QC Engineer

Signature: _____

Date: _____

Reviewed By:

Name: _____

Title: Engineering Manager

Signature: _____

Date: _____

Approved By:

Name: _____

Title: QA/QC Manager

Signature: _____

Date: _____

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ATTACHMENT A POSITIVE MATERIAL IDENTIFICATION (PMI) TEST REPORT FORMAT

Report No: _____

Page: _____ of _____

PROJECT INFORMATION

Project Name: _____ Date of Testing: _____

Client: _____ Report Date: _____

Location: _____ Drawing No.: _____

Contract/PO No.: _____ Specification: _____

EQUIPMENT DETAILS

Analyzer Make/Model: _____

Serial Number: _____

Analysis Method: XRF (X-Ray Fluorescence) OES (Optical Emission Spectroscopy)

Grade Library Used: Carbon Steel Stainless Steel Nickel Alloy Other: _____

Calibration Date: _____

Calibration Due Date: _____

Calibration Certificate No.: _____

DAILY VERIFICATION CHECK

Standard Verification Performed: Yes No

Time of Verification: _____

Standard ID	Certified Grade	Certified Elements (%)	Measured Grade	Measured Elements (%)	Status
					<input type="checkbox"/> Pass <input type="checkbox"/> Fail
					<input type="checkbox"/> Pass <input type="checkbox"/> Fail

Verification Result: Acceptable - Proceed with Testing Failed - Equipment Corrected

Remarks: _____

APPLICABLE CODES AND STANDARDS

ASME B31.3 ASME Section VIII AWS D1.1 ASTM _____

Other: _____

TEST RESULTS

S.No	Component ID / Line No.	Heat Number	Test Location	Required Grade	Identified Grade	Key Elements (%)	Accept / Reject	Remarks

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S.No	Component ID / Line No.	Heat Number	Test Location	Required Grade	Identified Grade	Key Elements (%)	Accept / Reject	Remarks
1							<input type="checkbox"/> A <input type="checkbox"/> R	
2							<input type="checkbox"/> A <input type="checkbox"/> R	
3							<input type="checkbox"/> A <input type="checkbox"/> R	
4							<input type="checkbox"/> A <input type="checkbox"/> R	
5							<input type="checkbox"/> A <input type="checkbox"/> R	
6							<input type="checkbox"/> A <input type="checkbox"/> R	
7							<input type="checkbox"/> A <input type="checkbox"/> R	
8							<input type="checkbox"/> A <input type="checkbox"/> R	
9							<input type="checkbox"/> A <input type="checkbox"/> R	
10							<input type="checkbox"/> A <input type="checkbox"/> R	

Continuation Sheet: Yes - Sheet No. _____ No

DETAILED ELEMENTAL COMPOSITION (If Required)

Sample ID: _____ Component: _____ Required Grade: _____

Element	Specified Range (%)	Measured Value (%)	Status
Carbon (C)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Silicon (Si)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Manganese (Mn)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Phosphorus (P)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Sulfur (S)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Chromium (Cr)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Nickel (Ni)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Molybdenum (Mo)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Copper (Cu)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Vanadium (V)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Niobium (Nb)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Titanium (Ti)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Aluminum (Al)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Cobalt (Co)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Tungsten (W)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail
Iron (Fe)			<input type="checkbox"/> Pass <input type="checkbox"/> Fail

WELD TESTING DETAILS (If Applicable)

Weld ID Joint No. Base Metal 1 Grade Base Metal 2 Grade Weld Metal Grade Acceptance

Accept Reject

Accept Reject

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Weld ID Joint No. Base Metal 1 Grade Base Metal 2 Grade Weld Metal Grade Acceptance

Accept Reject

Weld Filler Material Specified: _____

Filler Material Compatibility: Verified Not Applicable

OBSERVATIONS AND REMARKS

Surface Condition: Good Fair Poor (required additional preparation)

Surface Preparation Method: Wire Brush Grinding Abrasive Pad

Weather Conditions: Clear Overcast Rain Temperature: _____°F/°C

General Observations:

Special Notes/Deviations from Procedure:

NON-CONFORMANCE REPORT (If Applicable)

Non-Conformance Identified: Yes No

If Yes:

NCR Number: _____

Description of Non-Conformance:

Components Affected:

Immediate Actions Taken:

Disposition: Pending Use-As-Is Rework Return Reject/Scrap

TEST SUMMARY

Total Number of Tests Performed: _____

Number of Tests Accepted: _____

Number of Tests Rejected: _____

Acceptance Rate: _____%

CONCLUSION

All tested materials conform to specified requirements and are acceptable for use.

Non-conformance(s) identified. Refer to NCR No. _____ for details and disposition.

Testing incomplete. Continuation required on additional areas.

Hold for review. Engineering evaluation required for: _____

Additional Comments:

ATTACHMENTS

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- Equipment Calibration Certificate
- Certified Reference Standard Certificates
- Material Test Certificates / Mill Test Reports
- Photographs of Test Locations
- Location Sketches/Diagrams
- Non-Conformance Report (NCR)
- Other: _____

CERTIFICATION AND APPROVAL

Tested By:

Name: _____

NDT Level: Level I Level II Level III

Certification No.: _____

Certifying Agency: ASNT ISO 9712 Other: _____

Certification Expiry Date: _____

Signature: _____

Date: _____

Reviewed By:

Name: _____

Title: NDT Level III QC Engineer QC Inspector

Signature: _____

Date: _____

Approved By:

Name: _____

Title: QA/QC Manager Project Manager Client Representative

Signature: _____

Date: _____

DISTRIBUTION LIST

- Client/Owner
- Project File
- Construction Manager
- Engineering Department
- Fabrication Shop
- Inspection Records
- Other: _____

END OF REPORT

NOTES FOR COMPLETING THIS REPORT:

1. Complete all sections legibly in ink or electronically
2. Use N/A for non-applicable sections
3. Attach continuation sheets if more space is required for test results
4. Include all required attachments before submission
5. Ensure all signatures and dates are complete
6. Make copies as per distribution list before filing original
7. For electronic reports, use digital signatures where permitted

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8. Report shall be reviewed and approved before distribution
9. Maintain confidentiality of project information
10. File original report in project quality records

REPORT PREPARED IN ACCORDANCE WITH:

Procedure No.: NDT-PMI-001

Revision: 02

Date: October 20xx

This report contains ___ pages including attachments.

CONTROLLED DOCUMENT - DO NOT COPY WITHOUT AUTHORIZATION

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