

विक्रेता कार्यशाला में
सकारात्मक सामग्री पहचान
के लिए मानक विनिर्देश

STANDARD SPECIFICATION
FOR
POSITIVE MATERIAL
IDENTIFICATION
(PMI)
AT SUPPLIER'S WORKS

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Approved by						

Abbreviations:

API	:	American Petroleum Institute
AS	:	Alloy Steel
HIC	:	Hydrogen Induced Cracking
LSTK	:	Lump Sum Turn Key
NACE	:	National Association of Corrosion Engineers
PMI	:	Positive Material Identification
RTJ	:	Ring Type Joint
Sch	:	Schedule
SS	:	Stainless Steel
TPI or TPIA	:	Third Party Inspection Agency

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1.0 SCOPE

- 1.1 This specification applies to the requirements for Positive Material Identification (PMI) to be performed at the Supplier's works on Metallic Materials procured either directly by the Owner/EIL/ LSTK contractor or indirectly through the sub-Suppliers.
- 1.2 This specification covers the procedures and methodology to be adopted to assure that the chemical composition of the material is consistent with the material specifications as specified in purchase documents using 'Alloy Analyzer' at the time of final inspection before dispatch.
- 1.3 The scope of this specification shall include but shall not be limited to Positive Material Identification (PMI) to be performed on Materials listed below:
- 1.3.1 For alloy Steel materials as below:
- Alloy Steel Pipes including Clad Pipes
 - Alloy Steel Flanges & Forgings
 - Alloy Steel Fittings including Clad Fittings
 - Alloy Steel Fasteners
 - Alloy Cast & Forged steel valves
 - Alloy Steel Instrumentation Items (Control Valves, Safety Valves etc.)
 - Longitudinal Pipe & Fittings Welds.
 - Gaskets (for Ring Type Joints)
- 1.3.2 For Carbon Steel materials as below:
- All Carbon Steel Piping items under NACE or HIC or H₂ or Wet Hydrogen Sulfide (H₂S), Hydrofluoric acid (HF), Sulfuric acid (H₂ SO₄) services etc.
 - Carbon Steel flanges and valves (Rating 900# and above)

Following items shall be excluded from scope of PMI examination.

- Gaskets other than for Ring Type Joints
 - Internal Components of Valves
- 1.4 All grades of material supplies including Stainless Steels shall be liable for PMI test at site. In case of any defective materials being found at site, the Supplier shall be responsible to effect replacement of such defective materials at project site without any delays to the satisfaction of EIL site RCM (Resident Construction Manager).

2.0 REFERENCE DOCUMENTS

- 2.1 API Recommended Practice 578 (First Edition, May 1999) - Material Verification Program for New and Existing Alloy Piping Systems.

3.0 DEFINITIONS

- 3.1 **Supplier:** Any Supplier or Manufacturer on whom an order is placed for the supply of referred items. This definition shall also include any sub-Supplier or manufacturer on whom a sub-order is placed by the Supplier.
- 3.2 **Inspection Lot:** A group of items offered for inspection covered under same size, Heat and Heat treatment lot.
- 3.3 **Alloy Material:** Any metallic material (including welding filler materials) that contains alloying elements such as Chromium, Nickel, Molybdenum or Vanadium, which are intentionally added to enhance mechanical or physical properties and/or corrosion resistance.

4.0 PMI EXAMINATION

- 4.1** The Supplier shall submit a procedure of PMI to comply with the requirements of this Specification. Approval of PMI Procedure shall be obtained from Owner / EIL / TPIA prior to commencing manufacture / inspection of product.
- 4.2** PMI examination of materials is independent of any certification, markings or colour coding that may exist and is aimed at verifying that the alloy used are as per specified grades.
- 4.3** The Supplier shall identify all incoming alloy materials and maintain full traceability of all alloy materials, including all off-cuts. Transfer of identification marks shall be undertaken prior to cutting to ensure maintenance of identification on off-cuts.
- 4.4** The Supplier shall ensure that all alloy materials are segregated and stored in separately identified locations to prevent the mix up of materials of different alloy specifications or alloy material with carbon steel. Non ferro-magnetic materials shall be segregated at all times from ferro-magnetic materials.
- 4.5** PMI examination is subject to surveillance inspection by Owner / EIL / TPIA.

5.0 ACCEPTABLE METHODS FOR PMI

- 5.1** The method used for PMI examination shall provide a quantitative determination of the alloying elements like Chromium, Nickel, Molybdenum or Vanadium in Alloy Steel items.
- 5.2** Instruments or methods used for PMI examination shall be able to provide quantitative, recordable, elemental composition results for positive identification of alloying elements present.
- 5.3** The acceptable instruments for alloy analyzer shall be either "Portable X-Ray fluorescence" or "Optical Emission" type each capable of verifying the percentage of alloy elements within specified range.
- 5.4** Chemical spot testing, magnets, alloy sorters and other methods using eddy current or triboelectric testing methods are not acceptable for PMI examination.
- 5.5** The PMI instrument used shall have the sensitivity to detect the alloying elements in the specified range.
- 5.6** All PMI instruments shall have been serviced within a 6 month period of the time of use to verify the suitability of batteries, sources etc., and the data of the last service shall be stated on the PMI Report Form (Sample enclosed).
- 5.7** Each analyzer must be calibrated according to the manufacturer's specification at the beginning and end of each shift. Instrument must be checked against known standard for each alloy type to be inspected during the shift.
- 5.8** Certified samples, with full traceability, of a known alloy materials shall be available for use as a random spot check on the instrument calibration.
- 5.9** The surfaces to be examined shall be prepared by light grinding or abrasive paper and solvent cleaner. Evidence of Arc burn resulting from examination shall be removed by light grinding or abrasive paper. No permanent marks, which are injurious to the usage of product in service, are acceptable.

- 5.10** Alloy Steel ring type joint Gaskets shall be inspected by using portable X-Ray fluorescence instrument.
- 5.11** Testing shall be done as per the procedures outlined by the manufactures of alloy analyzer being used. Modification of these procedures if any must be approved by Owner/EIL.
- 5.12** The persons performing PMI shall demonstrate their capabilities to the satisfaction of Owner/EIL/TPIA visiting engineer. If the Supplier has qualified operator on their rolls, he may perform the examination. Otherwise PMI examination shall be sub-contracted to an independent testing agency approved by EIL.
- 5.13** Whenever material is identified as not meeting requirements by the visiting engineer a rejection note shall be issued.

6.0 EXTENT OF PMI EXAMINATION

Following sampling plans shall be applicable for PMI examination of various items.

A.	Flanges, Fittings Valves, RTJ Gaskets	-	100%
B.	Pipes	-	100% (for pipes procured from traders). 2 random samples drawn from each Size/Heat/Lot (for pipes procured directly from mills)
C.	Fasteners	-	
	<u>Lot Size</u>		<u>Sample Size</u>
	Upto 100		2% (Min 2)
	101 to 500		1% (Min 3)
	501 and above		0.5% (Min 5)

Note:

- a. For Welded Pipes and Fittings, PMI shall be performed on Base Metal as well as weldments.

7.0 ACCEPTANCE CRITERIA

7.1 Base Metal

PMI test results showing presence of characteristic elements upto 10% less than the minimum specified value in the material specification and upto 10% more than the maximum specified value in the material specification shall be acceptable.

7.2 Deposited Weld Metal

For deposited weld metal using welding consumables matching with base metals, the recorded presence of characteristic elements upto 12.5% less than the minimum specified value in the welding consumable specification and upto 12.5% more than the maximum specified value in the welding consumable specification shall be acceptable.

8.0 REJECTION CRITERIA

- 8.1 If PMI test results fall outside the acceptable range as specified in 7.0 above, the supplier shall obtain a quantitative check analysis performed by a laboratory acceptable to Owner / EIL / TPIA for a complete chemical analysis. Alternatively, the item can be tested with a spark analyser for verification. Results of this analysis shall be submitted to Owner / EIL / TPIA for final decision.

Decision of Owner / EIL / TPIA shall be final in this regard.

- 8.2 If any sample drawn to PMI test on the basis of percentage selection as per 6.0 above, fails to meet specification requirements, 100% of items of lot shall be tested for PMI by supplier. Any failure thereafter during sample check shall mean rejection of whole lot.

9.0 RECORDING AND DOCUMENTATION

The results of PMI examination shall be recorded in a Report Format as enclosed with this specification.

10.0 MARKING

- 10.1 All alloy materials tested by PMI shall be identified using either of the following methods by indicating "PMI OK"
- a) Bar Code/Hologram Sticker
 - b) A low stress stamp marking

POSITIVE MATERIAL IDENTIFICATION REPORT BULK MATERIALS							Page	of
Project:	Client					Job No.		
PMI Report No.	Supplier/Sub-Supplier							
Purchase Order No.	Testing Agency							
Purchase Requisition No:	PMI Location							
Bulk Item Type (as per Requisition)								
Material Specification/Grade								
Number of items in Lot								
Requisition Item No./ Description	Major content, Weight Percent						Remarks Accept/Reject	
Element	Cr	Ni	Mo	V	Ti*	Cb / Nb **		
Specified Range								
Actual observations								
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
Instrument Type / ID								
Last Service Date	Inspection Agency					Witnessed By		

* To be reported in case of SS321 Material

** To be reported in case of SS347 Material