

GP 18-12-01	Positive Material Identification	March 2009
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Positive Material Identification

GP 18-12-01

Scope

- 1) **[I]** This Global Practice (GP) applies to metallic alloy materials purchased for use either directly by Owner or indirectly through Vendors, Fabricators, or Subcontractors. It includes the supply, fabrication, and erection of these materials.
- 2) **[I]** This GP covers the procedures and methods to ensure that the nominal chemical composition of alloy materials is in accordance with purchase specifications, and that such materials are properly analyzed and marked to indicate the alloy.
- 3) **[I]** Carbon steels are not within the Scope of this GP.

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1. Required References

This Section lists the Practices, codes, standards, specifications, and publications that shall be used with this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 18-07-01	Welding Procedures
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1.2. ExxonMobil Data Sheets

T181201C01	Positive Material Identification - Analysis Mode Data Sheet
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1.3. API–American Petroleum Institute

API RP 578	Material Verification Program for New and Existing Alloy Piping Systems
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1.4. ASME–American Society of Mechanical Engineers

ASME SEC II A INTRO	Section II A Ferrous Material Specifications (Beginning to SA-450)
ASME SEC II B INTRO	Section II B Nonferrous Material Specifications
ASME SEC II C INTRO	Section II C Specifications for Welding Rods, Electrodes, and Filler Metals
ASME SEC V B SD-129	SD-129 Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)
ASME SEC V B SD-808	SD-808 Standard Test Method for Chlorine in New and Used Petroleum Products (Bomb Method)

1.5. ASTM–American Society for Testing and Materials

ASTM A 193/A 193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A 751	Standard Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
ASTM E 353	Standard Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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ASTM E 354	Standard Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys
	Other ASTM and National Standards, as applicable

2. Definitions

Term	[I] Definition
100% Positive Material Identification	Each individual component and weld is tested.
Check (Instrument Performance)	A test carried out on a known standard alloy to verify the performance of the instrument.
Inspection Lot	With the exception of bolting, an inspection lot is a group of components from the same heat number or heat treatment batch, from which a sample is drawn. For bolting, a lot is a group of similar components in terms of alloy type and size.
PMI Program	A detailed set of instructions defining the order of precedence to be followed for the successful execution of a Positive Material Identification (PMI) Plan. The program shall include the structure, process, and procedure to control operations, manage change, and define how, when and where Positive Material Identification (PMI) is to be employed for compliance with the program objectives.
PMI Procedure	A procedure is defined as a specified series of actions, acts, or operations that have to be implemented in a specific order to continuously obtain the same Positive Material Identification (PMI) results under the same circumstances. It shall include a sequence of activities, tasks, steps, decisions, calculations and processes, that when undertaken in the sequence prescribed will produce the desired PMI analysis.
PMIV (PMI Verified) AV (Alloy Verified)	Markings used to identify components which have been tested and confirmed to be acceptable.
Positive Materials Identification (PMI)	A procedure used to ensure that specified metallic alloy materials are: properly identified as to alloy type, marked according to Owner's procedures, installed as intended.

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Term	[I] Definition
Representative Sampling	PMI testing of a sample, which consists of one or more pieces (components), selected at random from an inspection lot, which will be examined to determine acceptability of the inspection lot. The size of the representative sample, and the maximum number of defective parts allowed, shall provide 90 percent confidence that not more than 5 percent of the entire lot is defective, with the following minimum sample sizes satisfying this requirement if no defective parts are found: 100 percent for a lot of 28 pieces or less; 28 pieces for a lot of 50 pieces or less, 38 pieces for a lot of 150 pieces or less, and 45 pieces for a lot of 3,000 or less.
Traceable Mill Certificate	A document that permits each component to be identified according to the original heat or material from which it was produced.

3. Specific Applicability

- 1) [S] [R] The following metallic-alloy-material items require 100 percent Positive Material Identification (PMI):
 - a) All pressure-containing welds. For double welded joints, both weld caps, inside and outside, when accessible. On internally clad or overlaid vessels, the inside weld cap shall be PMI'd before back cladding and the result recorded on an as built and mapped vessel drawing.
 - b) All Pressure-containing piping components, including the following:
 - i) Thermowells
 - ii) Instrument manifolds
 - iii) [*] Braided alloy-reinforced hoses in the service of hazardous or corrosive materials as designated by the Owner's Engineer
 - c) Pressure-containing components of heat exchangers (to include the plates for plate and frame heat exchangers, except components per Section 3, Item (2)) and other pressure vessels.
 - d) Plate material used as Pressure-containing components.
 - e) Pressure-containing machinery components (e.g., pump casings, compressors, and process expansion drivers).
 - f) Pressure-containing instrument housings in alloy piping circuits that cannot be isolated from the process environment, or housings with a design pressure above 900 psig (e.g., gauge glass housings, orifice meter tubes).
 - g) External valve components (body, flanges, bonnet, plugs, and vents, and associated welds).
 - h) Expansion joints and bellows in Pressure-containing service.
 - i) Pressure-containing tubing which cannot be isolated from the process environment [except as excluded in Section 3, Items (2) and (4)].
 - j) Fired heater coils including all welds on alloy tubes and air-cooled heat exchanger tubes (air fin tubes).

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