

Changes shown by ↗

## SCOPE

- I 1.1 This practice applies to metallic alloy materials purchased for use either directly by the Owner or indirectly through vendors, fabricators, or sub-contractors and includes the supply, fabrication, and erection of these materials.
- I 1.2 This practice covers the procedures and methods to be used to assure that the chemical composition of alloy materials is as specified in purchase documents and that the materials are properly analyzed and marked to indicate the alloy.
- I 1.3 **Carbon steels** are not in the scope of this practice.
- I 1.4 **An asterisk (\*)** indicates that a decision by the Owner is required, or that additional information is furnished by the Owner.

## SUMMARY OF ADDITIONAL REQUIREMENTS

- C 2.1 **Table 1** lists the practices, code, and standards which shall be used with this practice.

TABLE 1

| PRACTICES                                    |                                             |
|----------------------------------------------|---------------------------------------------|
| IP 19-2-1                                    | Weld Overlay and Integrally Bonded Cladding |
| IP 20-1-1                                    | Inspection of Equipment and Materials       |
| CODE AND STANDARDS                           |                                             |
| <b>ASME Code</b>                             |                                             |
| Section II A, B, C, Materials Specifications |                                             |
| <b>ASTM and Other National Standards</b>     |                                             |
| As Applicable                                |                                             |

## DEFINITIONS

- I 3.1 **Positive Materials Identification** is a procedure used to assure that specified metallic alloy materials are properly identified as to their alloy type, are marked according to Owner's procedures and are installed as intended.
- I 3.2 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.
- I ↗ 3.3 **Representative sampling is PMI** testing of a sample, consisting of one or more pieces (components) selected at random from an inspection lot, which will be examined to determine acceptability of the inspection lot.
  - a. The representative sample shall be 100% for a lot of five (5) pieces or less; the greater of five (5) pieces or 5% for a lot of five (5) to two hundred (200) pieces, and the greater of ten (10) pieces or 3% for a lot greater than two hundred (200) pieces.
  - b. If any piece from a representative sample is found to be unacceptable, each piece of the lot shall be examined.
  - c. When a lot is found to contain unacceptable pieces, 100% of the next two lots from the same supplier shall be examined. If both lots are acceptable, or when two successive lots are acceptable, the sampling procedure given in (a) above may be resumed.
  - d. Materials with no alloy type identification (i.e, permanent marking) cannot be PMI inspected on a representative basis (except for bolting as allowed by **Par. 4.2**).
- I 3.4 A **traceable mill certificate** is a document that permits each component to be identified according to the original heat or material from which it was produced.

### SPECIFIC APPLICABILITY

- R ♦ \* 4.1 The following metallic-alloy-material items require 100% Positive Material Identification (PMI):
- All pressure-containing welds.
  - All pressure-containing piping components (includes thermowells, instrument manifolds, etc.)
  - Pressure-containing components of heat exchangers (including plates for plate and frame heat exchangers, except components as per **Par. 4.2**) and other pressure vessels.
  - Plate material used as pressure containing components.
  - Pressure-containing machinery components such as: casings for pumps, compressors, and process expander drivers.
  - Pressure-containing instrument housings in alloy piping circuits which cannot be isolated from the process environment, **or** housings with a design pressure above 900 psig (e.g., gauge glass housings, orifice meter tubes).
  - External valve components (body, flanges, bonnet, plugs, vents and associated welds).
  - Expansion joints and bellows in pressure containing service.
  - Pressure containing tubing which cannot be isolated from the process environment (except as excluded in **Par. 4.2** and **4.4**).
  - Fired heater coils and air-cooled heat exchanger tubes (airfin tubes).
  - Any other components or materials specifically designated for PMI on the purchase specification.
- R ♦ \* 4.2 The following items require PMI on a representative sampling basis as a minimum, unless specifically exempted on the purchase specification:
- Tubular products used in the fabrication of equipment such as heat exchangers and boilers, provided traceable mill certification is available.
  - Fired heater, heat exchanger and boiler internals (tube hangers, tube supports, and tubesheets).
  - All ASTM A193 Grade B16 and alloy stud bolting, except as excluded in **Par. 4.4I**.
  - Ring joint flange and clamp type (e.g., Grayloc) connector flange gaskets.
- R 4.3 Internal metallic lining/cladding and weld overlay used for protection against corrosive environments shall be tested as follows:
- Integral Cladding - 100%
  - Weld overlay and backcladding as specified in **IP 19-2-1**.
- C ♦ 4.4 **The following items are exempted** unless specifically designated for PMI on the purchase order:
- Alloy components where the alloy is installed for product purity consideration only. The Owner will specify PMI requirements if special alloy requirements are needed for additional environmental concerns.
  - Internal machinery parts.
  - Internal instruments parts, including orifice plates.
  - Internal non pressure-containing baffles, trays, tray clips, supports, pall-rings, support rings, etc.
  - Electrical components.
  - Non pressure-containing welds.
  - Internal valve components.
  - Stainless steel instrument tubing and copper tubing with an outside diameter of 3/4 in. and less, when properly identified by paint stencil (exchanger tubing is not included in this exemption).
  - Stainless steel instruments installed in carbon steel piping circuits.
  - Compression-type ferrules fittings and components (e.g., valves, filters, etc.) for use with 3/4 in. outside diameter and smaller tubing.
  - Steam tracing, instrument air, and hydraulic tubing.
  - All ASTM A193 Grade B7 bolting.
  - All gaskets (except as required by **4.2.d**).