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Quality Standard for Positive Material Identification of Metal Valves, Flanges, Fittings, and Other Piping Components

Standard Practice
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> Substantive changes in this 2013 edition are "flagged" by parallel bars as shown on the margins of this paragraph. The specific detail of the change may be determined by comparing the material flagged with that in the previous edition.

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QUALITY STANDARD FOR POSITIVE MATERIAL IDENTIFICATION OF VALVES, FLANGES, FITTINGS, AND OTHER PIPING COMPONENTS

1. SCOPE

1.1 This Standard Practice provides methods and acceptance standards for Positive Material Identification (PMI) of metal flanges, fittings, valves, pressure boundary parts of valves, and other piping components.

1.2 The instrumentation used for PMI testing covered by this Standard Practice shall be optical spectroscopy or X-ray fluorescence.

1.3 This Standard Practice is applicable to the identification process, at point of final inspection or in-process inspection during manufacturing.

1.4 The PMI test is for material grade identification only and does not substitute for a manufacturer's test report or a laboratory's chemical analysis.

2. DEFINITIONS

2.1 ***Material Test Report (MTR)*** A certified report from the manufacturer showing the chemical composition, mechanical properties, heat treatment, and testing required on the material for compliance with the requirements of the purchase order or the applicable industry standard that governs the material, or both.

2.2 ***Positive Material Identification (PMI)*** An examination procedure used to verify material grade type and nominal chemistry of the alloying elements.

2.3 ***Optical Spectroscopy*** A method of positive material identification that detects and quantifies the presence of specific elements in a material. It utilizes the fact that each element has a different unique atomic structure that when subjected to the addition of energy, will emit a pattern of light colors or wavelengths along the spectrum. Since no two elements emit the same pattern of spectral lines, they can be differentiated. Since the intensity of the light is proportional to the quantity of the element in the material, the concentration of the element can be measured and the material identified.

2.4 ***X-Ray Fluorescence*** A method of positive material identification that detects the energy strength level of X-rays being emitted from the material. Each element in the material emits a different X-ray energy strength level. These different X-ray strength levels are measured and compared to the known energy levels for each element in the material. The instrumentation makes an analysis of the different X-ray energy levels and identifies each alloy in the material being tested as well as the percent concentration of each element in the material. This identification of the various elements can then be compared to a known standard and the particular grade of material identified.

2.5 ***Semi-Quantitative Analysis*** A term used to describe the method of positive material identification. This term is used to point out the fact that, while the field use of PMI instrumentation is capable of precision analysis, the measurements are not being carried out under controlled environmental conditions, and therefore, are not certifiable.

2.6 ***Reference Standard*** A material sample that has been certified by a laboratory with instrumentation that is qualified in accordance with ASTM International.

2.7 ***Like Items*** These are items being of the same material, size, pressure class, and type.

2.8 ***Assembled Items*** These are items previously assembled that are selected from existing inventory.

2.9 ***Disassembled Items*** These are component parts (manufactured or selected from existing inventory) that have not yet been assembled.