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STANDARD FOR
POSITIVE MATERIAL IDENTIFICATION OF
PIPING COMPONENTS USING PORTABLE X-RAY
EMISSION TYPE TEST EQUIPMENT

Prepared by
Pipe Fabrication Institute Engineering Committee



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USA
666 Fifth Ave., #325
New York, NY 10103

CANADA
655, 32nd Ave., suite 201
Lachine, QC H8T 3G6

WEB SITE
www.pfi-institute.org

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STANDARD FOR POSITIVE MATERIAL IDENTIFICATION OF
PIPING COMPONENTS USING PORTABLE X-RAY EMISSION
TYPE TEST EQUIPMENT

1. SCOPE

- 1.1 This standard establishes basic requirements for conducting Positive Material Identification (PMI) tests on ferrous and nonferrous metal alloy materials using portable x-ray emission type equipment, which is currently available for production shop and construction site verification of these materials.
- 1.1.1 X-ray emission instruments are not capable of determining the carbon content of an alloy. Therefore, utilization of these instruments will not identify or confirm low-or high-carbon austenitic stainless steel ('L'-and 'H'-type) alloy grades. Other methods must be used if such identification is required.
- 1.2 This standard does not address material verification by methods other than usage of portable x-ray emission analysis equipment, nor is it intended to supplant the use of laboratory type testing methods as contained in ASTM A751, ASTM E353 and ASTM E354, if such level of accuracy is required.
- 1.3 This standard covers the verification of alloys in the form of pipe, flanges, fittings, forgings, bar, castings, plate, valves, welds, pressure retaining and supporting components of an assembly or any other components or materials specifically designated for PMI.
- 1.4 This standard does not establish the extent of PMI verification. When PMI is required, the purchaser specifications or purchase order, or other agreement between the purchaser and the contractor, should establish the requirement for, and the extent of the PMI testing. Definition should be given of the items to be verified by PMI and the percentage of each lot to receive PMI.
- 1.5 This standard does not address the safety factors associated with use of portable x-ray emission analysis equipment. It is the responsibility of the user of this standard to establish appropriate safety and health

practices and to determine the applicability of regulatory limitations prior to use.

2. PURPOSE OF POSITIVE
MATERIAL IDENTIFICATION

- 2.1 The purpose of PMI is to ensure that the nominal composition (i.e. type/grade) of the material specified has been correctly supplied and/or installed. PMI is not intended to establish certification of a material to a particular ASME/ASTM specification. PMI is not considered a substitute for required material test reports listing chemical composition. Material test reports are not to be considered PMI verification.

3. REFERENCES

- 3.1 The following publications are referenced in this standard. Unless otherwise specified herein, the latest edition shall be used:
- A. ASTM (American Society of Testing and Materials) Standard Test Methods.
- B. ASME Boiler and Pressure Vessel Code: Section II, Material Specifications (Parts A, B and C).
- C. PFI (Pipe Fabrication Institute), Recommended Practice for Color Coding of Piping Materials (ES-22).

4. DEFINITIONS

- 4.1 Alloy material - Any material whose specification contains measurable quantities of alloying elements other than carbon, manganese, silicon, and niobium or vanadium. Steels are not considered alloy steels if they contain only carbon (up to 2 percent), silicon (usually limited to 0.60 percent), and manganese (to approximately 1.65 percent).
- 4.2 Positive Material Identification (PMI) (for x-ray emission type testing) - The process of determining the nominal composition of an alloy component. Positive Material Identification is a semi-quantitative analysis

Table 1
Essential Elements for Positive Material Identification

Material	UNS No.	Cr	Ni	Mo	Cb	Ti	Cu	W	Al	V	Fe
1-1/4 Cr, 1/2 Mo	K11597	X		X							
2-1/4 Cr, 1 Mo	K21590	X		X							
5 Cr, 1/2 Mo	K41545	X		X							
9 Cr, 1 Mo	K90941	X		X							
9 Cr, 1 Mo, 0.2V	K90901	X		X						X	
9 Cr, 1/2 Mo, 0.2V 2W	K92460	X		X				X		X	
12 Cr, 4 Ni	S41500	X	X								
304	S30400	X	X	X							
308	S30800	X	X	X							
309	S30900	X	X	X							
310	S31000	X	X	X							
316	S31600	X	X	X							
317	S31700	X	X	X							
321	S32100	X	X	X		X					
347	S34700	X	X	X	X						
2205 (“Duplex”)	S31803	X	X	X							
Alloy B-2	N10665		X	X							
Alloy C-22	N06022	X	X	X				X			X
Alloy C-276	N10276	X	X	X				X			
Alloy 20	N08020	X	X	X	X		X				
Alloy 600	N06600	X	X	X							
Alloy 625	N06625	X	X	X	X	X					
Alloy 800	N08800	X	X			X	X		X		
Alloy 825	N08825	X	X	X			X				
Alloy 400	N04400		X				X				
AL-6XN	N08367	X	X	X							
904L	N08904	X	X	X			X				
90/10 CuNi	C70600		X				X				
70/30 CuNi	C71500		X				X				