

## **PMI - Positive Material Identification**

- 1) Introduction
  - 2) Scope
  - 3) Reference Documents
  - 4) Equipment
  - 5) Surface Preparation
  - 6) Testing Procedure
  - 7) Traceability
  - 8) Acceptance Criteria
  - 9) Reporting
- APPENDIX – I (REPORT)

### **1) Introduction**

This procedure is developed to ensure that Positive Material Identification (PMI) requirements of the clients and carried out by SFC Inspection.

This procedure specifies the requirement of Quality Assurance for Identification of materials during the manufacturing process. The components to be tested are SFC valve Interlocks.

### **2) Scope**

To carry out Positive Material identification, using X-Ray Fluorescent (XRF) Technology. It is to measure the concentration of elements without causing any damage to the component being examined.

Equipment used for PMI is the Thermo Scientific Niton XL2

### **3) Reference Documents**

Operating Manual of Thermo Scientific Niton XL2

Analytical Reference Materials International Certified Reference Material  
Certificate of Analysis





**Analytical Reference Materials International**

*Provisional Certificate of Analysis*  
*Certified Reference Material*



Grade: **1¼Cr ½Mo / UNS K11572**

Part Number (Q.A. NO.): **IARM 35IN**

Certificate Date: **03/30/2010**

Certificate No.: **35IN-03302010-IARM-P**

Revision Date: **03/30/2010**

**Interpretation of Data**

1. Certified values listed below reflect analysis results submitted by qualified analytical laboratories using a combination of methods and instrumentation that emulate actual methods and instrumental techniques currently utilized in the analytical community and are reported as % wt. unless otherwise noted.
2. Any data reported and enclosed by a **parentheses ( )** is a "best estimate" and is **NOT CERTIFIED**. This data could not be quantified sufficiently for certification. It was however, reported by enough laboratories to be considered as potentially present in the matrix of the material being examined.
3. The "Inter-laboratory Analysis Program" (ILAP) utilized in the establishment of the data are an ongoing program with permanent membership. Certain elements may be selected by a consensus of the members for more extensive testing. Therefore the data in **brackets [ ]** indicates further testing is in process.
4. The "±Estimated Uncertainty" is enclosed by a **parentheses ( )** below the individual element's concentration and is based on a Confidence Interval at 95%. Included in this estimated uncertainty, are the combined effects of method imprecision, material inhomogeneity, and any bias between methods.

**Important: A "User Registration Card" accompanies all shipments. This card should be completed immediately upon receipt of materials with the appropriate user information. This is the only way in which ARMI can guarantee customer updates or possible data modifications!**

<u><b>Aluminum</b></u> [0.029] [(0.001)]	<u><b>Arsenic</b></u> [0.004] [(0.001)]	<u><b>Boron</b></u> [0.0003] [(0.0001)]	<u><b>Carbon</b></u> [0.133] [(0.002)]	<u><b>Calcium</b></u> [(0.001)]	<u><b>Cobalt</b></u> [0.013] [(0.001)]	<u><b>Chromium</b></u> [1.13] [(0.004)]	<u><b>Copper</b></u> [0.17] [(0.004)]
<u><b>Manganese</b></u> [0.54] [(0.01)]	<u><b>Molybdenum</b></u> [0.47] [(0.004)]	<u><b>Nitrogen</b></u> [0.0075] [(0.0002)]	<u><b>Niobium</b></u> [0.002] [(0.0004)]	<u><b>Nickel</b></u> [0.122] [(0.001)]	<u><b>Oxygen</b></u> [(0.001)]	<u><b>Phosphorus</b></u> [0.008] [(0.001)]	<u><b>Lead</b></u> [(0.0005)]
<u><b>Sulfur</b></u> [0.021] [(0.001)]	<u><b>Antimony</b></u> [0.0015] [(0.0004)]	<u><b>Silicon</b></u> [0.59] [(0.01)]	<u><b>Tin</b></u> [0.009] [(0.0005)]	<u><b>Titanium</b></u> [0.002] [(0.0004)]	<u><b>Vanadium</b></u> [0.004] [(0.0005)]	<u><b>Tungsten</b></u> [0.004] [(0.002)]	<u><b>Zirconium</b></u> [0.002] [(0.001)]

The laboratories participating in the "Inter-Laboratory Analysis Program" (ILAP) and certification of this material are as follows:

Anderson Laboratories, Inc. - Greendale, WI	Arrow Laboratory, Inc. - Wichita, KS
Colorado Metallurgical Services - Denver, CO	Ellwood Quality Steel - New Castle, PA
Exova - Glendale Heights, IL	Exova - Portland, OR
Exova - Riverside Park, Middlesbrough, UK	Laboratory Testing, Inc. - Hatfield, PA
MSI Testing & Engineering, Inc. - Melrose Park, IL	Severstal North America, Inc. - Mingo Junction, OH
Special Metals IncoTest - Hereford, UK	The Timken Company - Canton, OH

**Traceability:** All members of the "Inter-Laboratory Analysis Program" (ILAP) listed above validate test methods and instrument performance utilizing SRMs produced by the National Institute of Standards and Technology, (NIST) as well as other CRMs and RMs produced by recognized Certifying Bodies from around the world. The specific SRMs, CRMs and RMs applicable to the material covered by this certificate are: NIST 1262B, 1765, IARM 35H, 305A, BS 45, 45A, ALPHA AR657, AR890, AR1653, NIST 72, 72F, 3101A, 3102A, 3103A, 3105A, 3107, 3109A, 3113, 3128, 3131A, 3137, 3139A, 3149, 3155, 3161A, 3162A, 3163, 3165, 3168, 3169, ALPHA AR511, AR660, LECO 501-503, NIST 5M, 20G, 33E, 82B, 160B, 291, 293, 342A, 362, 363, 364, LECO 501-503, 501-677, BCS 405/1, 409, 410, 456/1, 460/1, 460/1, ES 096-1, IH RR98-1, LECO 501-644, 502-060, NIST 293, 337A, 361, 1160, 1161, 1162, 1163, 1164, 1754, 1761, 1762, 1763, 1764, 1765, 1766, 1767, BAS 401/1, 402/1, 403/1, 404/1, 405/1, 406/1, 407/2, 408/1, 409/1, 410/2, JSS ST01, IARM 31D, LECO 501-510, 501-645, NIST 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, NIST 361, 362, 363, 364, IARM 24B, 35C, 35E, 35F, LECO 501-503, 501-644, BS CA-3, 14A, 50B, 64B, 68B, 169D, 170H, BCS 351, 406, 454/1, 455, 458/2, 462/1, IH R5657, LECO 501-551, 502-102, NIST 342, 361, 362, 363, 1761, 1762, 1763, BS 59B

A specific line of traceability is established to NIST and other Certifying Bodies for those elements that are noted as "Certified Values" on the Certificates of Analyses referenced above.

**See Reverse Side for Statistical Data and Additional Information Regarding this Material.**

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#### **4) Equipment**

The equipment used is Thermo Scientific Niton XL2 for verification of elements composition in various types of materials. The instrument is a fully portable analyzer with an integrated PDA (Personal Digital Assistance) computer, within the Thermo Scientific Niton XL2 analysis program for display / view spectra and save data.

General Metals Analysis can measure 24 elements between Ti-Bi regardless of concentration.

Calibrated measurement of customized element ranges

Speed of analysis

- Grade ID in 2-5 seconds
- Full assay in 5 -10 seconds

#### **5 Surface Preparations**

The surface shall be free from oil, dirt, paint, scale etc that affects the result. Usually a light grinding or power brush is sufficient in probe seating area if not bare metal.

Suitable for all weather conditions: -15 to +50 degrees centigrade.

#### **6 Testing Procedure**

Instrument Calibration

Instrument should have valid annual calibration certificate. Prior to analysis, the Instrument shall be calibrated to a known standard reference and representative to the alloy type to be tested and confirmed. The standard reference alloy composition is provided by the equipment manufacturer.

Select the System Check Icon on the Main Menu to perform a system check. Thermo Scientific recommends that a system check is performed once every working day, as part of your normal start-up procedure, after allowing a minute or so for the analyzer to warm up.





## Instrument Operation

Turn "ON" the instrument

Select Analyze on the Main Menu screen

If a simple yes/no answer is required proceed to initiate testing when Ready to Test appears. If the sample details are required please input them now using the Data Entry screen.

## Measurements

Place probe on the material / sample to be tested and press the trigger keeping the probe on the sample / material during the entire measurement. The measurement on the test / sample will indicate with the time and the elapsed measurement time on completion of the analyzing of the test item.

The display will indicate the composition on each element in percentage with deviation and also the common alloy detected, i.e. 316/ 304/ etc. Measurements will be stored in the Instrument memory. Stored measurement data can be printed for evaluation and reporting.

## 7 Traceability

Spot or area tested should be identified and marked by marker or as per client specification.

## 8 Acceptance Criteria

The minimum elements to be tested for each type of alloy shall be as per material reference specification.

S/S Stainless Steel Ni, Cr, Mo, Fe

The element shall meet the requirement of applicable material specification to determine acceptance. If any disposition required, Client's acceptance deemed to be final approval.



## **9 Reporting**

All tests shall be in the company standard inspection report format. See attached appendix I.

To Include:-

Equipment make and Serial Number

Reading Number

Duration of test

Alloy ID

Sample ID

Signatory



Appendix I

Certificate of Verification

XL2-55415

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Reading No            18  
 Mode                    General Metals  
 Time                    2010-09-03 19:17  
 Duration               5.75  
 Units                    %  
 Sigma Value           2  
 Sequence               Final  
 Alloy1                  SS-316 : 1.87  
 Flags  
 SAMPLE                1  
 HEAT                    adapter  
 LOT                      fdc02406  
 BATCH  
 MISC  
 NOTE

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	%	±	Error
Mo	2.291	±	0.109
Ni	10.409	±	0.487
Fe	70.322	±	0.670
Cr	15.659	±	0.371

Supervised By: \_\_\_\_\_

