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|------------------------|--|-------------------|----------|
| <b>No.</b> QW-7.5.4-01 | The Newdell Company  | <b>Issue Date</b> | 10/08/07 |
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## **1.0 Purpose**

The purpose of this procedure is to establish criteria for identifying materials to ensure they meet customer and specification standards and requirements.

## **2.0 Scope**

This work instruction describes methods for Positive Material Identification of alloyed metals by the use of an Arc-Met 8000 Alloy Analyzer.

## **3.0 Responsibility**

This equipment is operated by trained personnel only. Formal training was conducted and certified by Oxford Instruments.

## **4.0 Procedure**

### **4.1 Calibration**

4.1.1 A certified standard will be burned prior to PMI; if out of tolerance per certified standard standardization must be performed per Arc-Met 8000 operating instructions.

### **4.2 Test Area Preparation**

4.2.1 A flat or rounded clean surface is desirable for an accurate reading. The surface must be free of paint, grease or any other contaminants.

4.2.2 To achieve the highest level of accuracy a small layer (approximately 1 by 1 inch) should be removed from the base metal. This should be done by grinding the surface.

### **4.3 Material Verification Process**

4.3.1 View libraries menu on the Arc-Met 8000 Series Alloy Analyzer.

### **4.4 Alloy Analysis Results**

4.4.1 Form QF-7.5.4-01 shall have the Customer name, Purchase Order number, Work Order number, Date, and the material specification of grade of the alloy to be tested.

4.4.2 The results of the analysis of each alloy shall have the essential elements as listed on Table 1 of this procedure and shall be recorded on QF-7.5.4-01

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- 4.4.3 The inspector shall accept or reject the material based on the results of the analysis, using the acceptance criteria as listed in the following section.
- 4.4.4 Material which is accepted shall be stamped "PMI" to show alloy verification has been performed. A permanent dye or paint can be used on welds, bolts, or tubing, which stamping is not practical.
- 4.4.5 Material which is rejected shall be tagged to show "PMI REJECT".
- 4.4.6 The inspector performing shall sign [QF-7.5.4-01](#)
- 4.5 **Acceptance Criteria**
  - 4.5.1 The alloy shall be accepted or rejected based on the results of the analysis given by the Arc-Met 8000 and verified to the applicable ASTM standard. If element falls with the allowed range listed in the ASTM standard the material is considered to be accepted.
  - 4.5.2 If the results are outside the ranges listed in the manual the material is to be rejected, but before final rejection the material should be given two more readings at different locations, to assure the discrepancy is not a localized problem.
  - 4.5.3 If the results fall outside the listed range, but by adding or subtracting the standard deviation for the element puts the element within the acceptable range, the alloy may be accepted.

**TABLE 1**

| <b>ESSENTIAL ELEMENTS</b> |                           |
|---------------------------|---------------------------|
| <b>MATERIAL</b>           | <b>ESSENTIAL ELEMENTS</b> |
| C - ½ Mo                  | Mo                        |
| 1 Cr - ½ Mo               | Cr, Mo                    |
| 1 ¼ Cr – 1 Mo             | Cr, Mo                    |
| 2 ¼ Cr – 1 Mo             | Cr, Mo                    |
| 5 Cr – 1 Mo               | Cr, Mo                    |
| 7 Cr - ½ Mo               | Cr, Mo                    |
| 9 Cr – 1 Mo               | Cr, Mo                    |
| 12 Cr (Type 405/410S)     | C, Cr                     |
| 12 Cr (Type 410)          | Cr                        |
| 17 Cr (Type 430)          | Cr                        |
| 25 Cr (Type 446)          | Cr                        |
| 304                       | Cr, Ni                    |
| 304L                      | C, Cr, Ni                 |
| 304H                      | C, Cr, Ni                 |
| 309L                      | C, Cr, Ni                 |
| 309CbL                    | C,Cr, Ni, Cb              |
| 310                       | Cr, Ni                    |
| 316                       | C,Cr, Ni, Mo              |
| 316L                      | C, Cr, Ni, Mo             |
| 317                       | C,Cr, Ni, Mo              |
| 321                       | Cr, Ni, Ti                |
| 347                       | C,Cr, Ni, Cb              |
| Alloy 20Cb-3              | C,Cr,Ni,Mo,Cb,Cu          |
| Brass, Admiralty          | Sn                        |
| Brass, Naval              | Sn                        |
| 90/10/Cu/Ni               | Cu, Ni                    |
| 70/30 Cu/Ni               | Cu, Ni                    |
| Monel                     | Ni, Cu                    |
| Titanium                  | Ti                        |
| Grade 12 Ti               | Ti, Mo, Ni                |
| Inconel 182               | Ni, Cr                    |
| Inconel 600               | Ni, Cr                    |
| Inconel 625               | Ni, Cr, Mo, Cb, Ti        |
| Inconel 800               | Ni, Cr, Al, Ti            |
| Inconel 825               | Ni, Cr, Mo, Cu, Ti        |
| Uns S17400 (17-4 PH)      | Cr, Ni, Cu                |
| Hast C                    | Cr, Ni, Mo, W             |
| Hast B                    | Cr, Ni, Mo                |

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## 5.0 Records

All records generated as a result of this procedure are filed in accordance with the QMS Records Matrix QF-4.2.4-01

## 6.0 References

[QF-7.5.4-01](#) Positive Material Identification Report

[QF-4.2.4-01](#) QMS Records Matrix

Operating Instructions Manual for Arc-Met 8000 Alloy Analyze.

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**Revision Record**

| Rev. | Date       | Change by      | Description of Change |
|------|------------|----------------|-----------------------|
| 0    | 10/08/2007 | Richard Butler | Initial Release       |
|      |            |                |                       |

**Approved by:**

| Signature | Date |
|-----------|------|
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