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Document Identification

Title: Molybdenum Metal Powder

Originator: Timothy M Reeser
Approver: Sam Chen/ISA, Timothy M Reeser/ISA

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ISO Elements: Process Control

Categories: Specifications

Online Distribution List
 Amy Meyers/ISA

Paper Distribution List
 Quality

Required Distribution: Amy Meyers

Significance of Rev. Changes: Minor

Revision History

| Rev. | Reason for Change | Approved By | Effective |
|------|--|------------------------------------|------------|
| 2 | Para C.2.d. - added requirement to notify ISA of non compliant material; Para C.6. - Added record retention requirements for suppliers | Sam Chen/ISA; Timothy M Reeser/ISA | 10/10/2003 |
| 1 | New | Sam Chen/ISA | 05/18/2001 |

SECTION I

A. Scope

This specification describes the requirements for the purchase of the raw material listed above.

B. Packaging

Material shall be shipped in steel drums with ring and bolt closure and palletized unless otherwise directed by ISA Purchasing personnel.

C. Certification

1. A Certificate of Analysis (COA) shall accompany (or precede) each shipment of material.
2. The COA shall include the following when required by Purchase Order.
 - a. Name of supplied material
 - b. ISA Purchase Order Number
 - c. Pertinent chemical and/or size analysis of material
 - d. A Statement of Compliance to correct revision of ISA specification. ISA must be notified if material is non compliant
 - e. Supplier's lot number (if applicable)
3. When required by Purchase Order, the supplier must provide a fixed practice for the manufacture of this product. ISA must be notified in writing of any significant changes to the method of manufacture of this product before shipment. ISA reserves the right to reject any material when proper change notification is not received.

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4. The supplier shall maintain a Quality Assurance System capable of consistently producing material of a uniform nature.
5. The supplier must allow periodic on site audit of production facilities by ISA personnel. ISA customers may accompany ISA personnel if required by contract.
6. Suppliers are required to maintain production records for materials shipped to ISA. Production records may include, but are not limited to batch lot numbers, testing records, final inspection records, and quality assurance documents. These documents shall be available for review during ISA audits.

D. Incoming Inspection

Incoming raw materials will be subject to chemical and particle size evaluations as outlined by ISA procedures

E. Additional Requirements for Aerospace Applications

NOTE: The ISA Purchase Order will indicate if this section is applicable to this purchase.

1. Raw Materials will be rejected if they are suspected to contain contaminants known to cause high density inclusions in titanium alloys. Some examples of such contaminants are (but not limited to): tungsten carbide, tungsten metal, niobium metal, molybdenum metal, and tantalum metal.
2. Wherever possible, materials shall be processed in equipment dedicated to the production of the specific material. If dedicated equipment is not practical, the producer must have controls in place to prevent cross contamination of materials. Producers are required to impose similar restrictions on subcontractors.
3. The producer shall insure that auditable controls are in place to avoid contamination from common sources of tungsten containing material - for example:
 - a. Protective covers over lighting containing tungsten filaments
 - b. Written procedures to document changing and disposal of light bulbs
 - c. Isolation of all TIG welded equipment until such equipment has been inspected for tungsten inclusions in the weld.
 - d. Procedures for issue, control, and disposal of tungsten containing tools. Some examples are (but not limited to):
 - TIG welding equipment
 - Tungsten drill bits or tool inserts
 - Hard faced weld rods
 - Tungsten used in the laboratory , such as in LECO C/S analyzers
4. If material is packaged in drums, all drums must be either new, or undergo a reconditioning process approved by the ISA quality department.

F. Source Approval

ISA will only purchase raw materials from suppliers listed on ISA's Approved Supplier List

SECTION II - Requirements

Chemical Requirements:

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| ELEMENT | SPECIFICATION |
|----------------|----------------------|
| | |
| Molybdenum | 99.80% Min |
| | |
| Carbon | 0.02% Max |
| Iron | 0.02% Max |
| Nitrogen | 0.01% Max |
| Oxygen | 0.10% Max |
| Sulfur | 0.006% Max |

Size Requirements:

Size requirements:

Material shall be 100% minus 100 mesh powder

---> Timothy M Reeser/ISA, 10-Oct-2003, Draft:

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---> Timothy M Reeser/ISA, 10-Oct-2003, Final Approval:

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