

## ***NORTH STAR BLUESCOPE STEEL LLC* Material Specification**

|                                                 |                          |
|-------------------------------------------------|--------------------------|
| Process Area: LMF                               | Number: AL 41.08         |
| Material: Ferrocolumbium (FeCb) (Ferro Niobium) | Effective Date: 01/16/18 |
| Authorized By: Jim Fox                          | Review Date: 01/16/19    |

### **1.0 Application:**

Ladle addition for alloying purposes.

### **2.0 Chemical Analysis and Material Properties:**

| <b>Element</b> | <b>Absolute min.</b> | <b>Preferred min.</b> | <b>Preferred max.</b> | <b>Absolute max.</b> |
|----------------|----------------------|-----------------------|-----------------------|----------------------|
| Columbium      | 60.0%                |                       |                       | 70.0%                |
| Tantalum       |                      |                       |                       | 2.0%                 |
| Carbon         |                      |                       |                       | 0.3%                 |
| Manganese      |                      |                       |                       | 2.0%                 |
| Silicon        |                      |                       |                       | 3.5%                 |
| Aluminum       |                      |                       |                       | 2.0%                 |
| Tin            |                      |                       |                       | 0.15%                |
| Phosphorous    |                      |                       |                       | 0.15%                |
| Sulfur         |                      |                       |                       | 0.08%                |

### **3.0 Packaging:**

- 3.1 10 lb. contained Cb in cans - or bags when cans not available - (all sizing / forms for manual additions), in wooden crates or banded to winged pallets that have horizontal slats extending beyond the vertical 2x4 main members (wings) to facilitate lifting via pallet chain / bar lifting rig. Packages must be stenciled with the North Star BlueScope Raw Materials Number (AL41), contained Cb weight (lbs) per package, and material name (abbreviated) when ordered this way.
- 3.2 3000 – 4400 lb bulk weight supersacks (all sizing and forms approved for bulk addition use) polymesh sacks with lifting loops at top 4 corners and no bottom spout (flat bottom) packages must be stenciled with North Star BlueScope Raw Materials Number (AL41), bulk weight per package, and material name (abbreviated) when ordered this way
- 3.3 The North Star BlueScope Steel Raw Material Number must appear on all shipping and billing paperwork.
- 3.4 Prefer shipped on flatbed but can take specified for tailgate delivery from van

### **4.0 Sizing:**

- 4.1 2 inch x down – approved for manual or bulk addition

### **5.0 Certification and Control:**

- 5.1 Each lot received to include statements of conformity and certification. These documents must be handed in at the scales and include:
  - Certification for lbs Columbium contained per bag, Tantalum, Silicon and Aluminum.
  - Quantity
  - Name of material
  - Lot number
  - North Star BlueScope Steel Material Number
- 5.1 All chemical constituents not expressed but are contained in the subject material may not exceed 0.5% collectively. Any material lot exceeding 0.5% must have prior approval by purchasing before shipment is made and analysis included on certification.
- 5.2 Material is subject to inspection at North Star BlueScope Steel to test adherence to specification.
- 5.3 All material supplied to this specification must be equivalent in all respects to the material on which approval was originally granted.

### **6.0 Relevant Industry Standards (e.g. ASTM):**

ASTM A 550

|                         |             |
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| Prepared by: Jim Nevins | Page 1 of 2 |
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### **7.0 Hazardous Material:**

If this material is hazardous or requires special handling or storage, this information must be clearly labeled on containers and shipping documents. MSDS Sheets must also be sent to purchasing manager for new materials.

### **8.0 Attachments/Reference Documents:**

N/A

| <b>Rev.</b> | <b>Date</b> | <b>Description of change</b>                                                                                 | <b>Reason for change:</b>           |
|-------------|-------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------|
|             | 12/14/12    | Reviewed and reauthorized                                                                                    | Annual review                       |
|             | 12/17/13    | Reviewed and reauthorized                                                                                    | Annual review                       |
|             | 11/20/14    | Reviewed and reauthorized                                                                                    | Annual review                       |
|             | 10/22/15    | Reviewed and reauthorized                                                                                    | Annual review                       |
| 08          | 01/19/16    | Changed structure to make uniform with other specs and modify packaging to for use in new micro alloy system | Accommodate use in new alloy system |
|             | 01/04/17    | Reviewed and reauthorized                                                                                    | Annual review                       |
|             | 01/16/18    | Reviewed and reauthorized                                                                                    | Annual review                       |