



NORTHSTAR

1. Scope

This specification provides the typical limits and tolerances on chemical, metallurgical and physical quality of **VICALUME PLUS**, Northstar Metals alloy T- Bar products.

Table 1: Product combinations covered by this specification

Alloy	T-Bar size (mm)	T-Bar Weight (kg)
NMP-001	480x840x1465 (+/-26)	1400+/-25

2. Chemical Composition limits

Chemical composition is specified by the alloy code with defined composition limits as detailed below. Furnace charges are sampled and analysed according to methods based on ASTM Standards E716 and E1251.

Table 2: Chemical composition limits (in weight percent)

Element	NMP-001		
	Minimum	Maximum	Nominal
Silicon	2.6	3.1	2.8
Iron		0.2	0.15
Copper		0.03	
Manganese		0.03	
Calcium		0.002	
Strontium	0.001	0.005	0.003
Lead		0.01	
Cadmium		0.01	
Titanium		0.01	
Boron		0.003	
Sodium		0.003	
Others each		0.03	
Others total		0.15	

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3. Metallurgical Quality

The metal shall not contain any grain refining materials such as titanium boride.

4. Physical Quality

T-Bars shall be supplied with butts and heads uncropped. Head shrinkage depth shall be 80 mm maximum as measured from the T-Bar edge (reference to Figure 1 in Appendix 1).

T-Bars shall be free from internal defects such as pores, cavities and cracks. The side surfaces should contain no excessive folding and tears (reference to Figure 2 in Appendix 1) or surface imperfections greater than 20mm in depth (reference to Figure 3 in Appendix 1). T-bar surfaces shall also be free from adhered refractory coating material, corrosion product and contaminants such as powders and hydrocarbons.

5. Documentation

On delivery of the T-Bars, NM shall provide a manifest with the following items:

- Alloy
- Lot and cast number
- Chemical composition
- Total number and weight of bundles

6. Packing and Marking

- 6.1. T-Bars shall be fastened in a bundle with steel straps for bulk shipment or as individual T-bars for container shipment. The package shall be suitable for handling by forklift.
- 6.2. The alloy code and cast number will be marked on each T-Bar using metal stamps or self-adhesive labels.

Details of the product are shown in the attached product drawings (see Appendix 2)

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