

	TEKNİK ŞARTNAME/ TECHNICAL SPECIFICATION	Döküman No Document No : TS.013
	GRAIN REFINER (Ti5:B0,2 and Ti5:B1)	İlk Yayın Tarihi Publish Date : - Rev. Tarihi Rev.Date : 18.09.2013 Rev. No: : 06 Sayfa/Page : 1 / 1

REVİZYON TARİHÇESİ/REVISION HISTORY

Rev. No	Revizyon Tarihi Revision Date	Revizyon Açıklaması Revision Explanation	Değişen Sayfa Changed Page	Revize Eden Revised By
1	***** ***	*****		
	***** ***	*****		
3	05.05.2009	Acceptance criteria for % Boron value has been updated.		
4	14.10.2011	Change of people responsible with the issuing of this document does not change the acceptance criteria.		
5	22.11.2011	Responsibility part has been updated.		
6	18.09.2013	General Revision	All	M.Dündar

1.0. KAPSAM/SCOPE

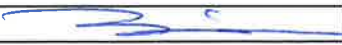
This specification identifies the physical, chemical and metallographical characteristics of the grain refiner employed in the continuous casting operation of aluminum alloys to achieve desired grain size in the as-cast stock.

2.0. MALZEME TANIMI VE ÖZELLİKLERİ/ PRODUCT DESCRIPTION AND SPECIFICATIONS

The materials to be delivered shall meet the qualities stipulated in this specification.

2.1. Chemical Composition

By mass	5/1 TiBor	5/0,2 TiBor
Ti	% 4.50 - 5.50	4.50 – 5.50
B	% 0.9 - 1.10	0.18 – 0,25
Fe	max. % 0.30	max. % 0.30
Si	max. % 0.30	max. % 0.30
V	max. % 0.25	max. % 0.25

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Each of the remaining max. % 0.04 max. % 0.04
Others, total max. % 0.10 max. % 0.10
(Base Metal Primary Alüminyum)

2.2. Physical Properties

Wire diameter 9.7 mm $\pm$ 0.3 mm
Coil inside diameter 360 mm $\pm$ 10 mm
Coil weight 180 Kg $\pm$ % 10

The lot number should be printed on the Grain refiner wire with certain intervals of the wire.
The coils should be wrapped with bands at least three points to prevent uncoiling.
Color codes must be used to identify different grain refiner agents having different Ti:B ratios.

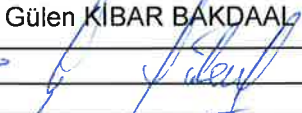
2.3 Metallographical characteristics for Ti5:B0,2

2.3.1. Al_3Ti particles

Particle size: Size of Al_3Ti particles must be between 20 μ m - 50 μ m. Particles having size greater than 50 μ m should be detected more frequently, contrary to those greater than 100 μ m.

Clusters of Al_3Ti particles should be categorized according to a imaginary area encircling them. There are five categories; "0" the best, "5" the worst.

Categories	Number of $TiAl_3$ clusters	Size of $TiAl_3$ cluster	Ok or NOK for use
0	1 or 2	cluster<100 μ m	OK
1	3 or more	cluster<100 μ m	OK
2	1 or more	100 μ m<cluster<150 μ m	OK
3	1 or 2	150 μ m< cluster <200 μ m	OK
4	3 or more	150 μ m< cluster <200 μ m	NOK
5	1 or 2	cluster >200 μ m	NOK

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2.3.2 TiB₂ particles

Particle size: Size of TiB₂ particles should be between boyutları 1µm - 2µm.

Clusters of Al₃Ti particles should be categorized according to a imaginary area encircling them. There are five categories; "0" the best, "5" the worst

Categories	Number of TiB ₂ clusters	Cluster size of TiB ₂	Ok or NOK for use
0	1 or 2	cluster<20 µm	OK
1	3 or more	cluster <20 µm	OK
2	1 or 2	20µm< cluster <50 µm	OK
3	3 or more	20µm< cluster <50 µm	OK
4	1 or 2	cluster >50 µm	NOK
5	3 or more	cluster >50 µm	NOK

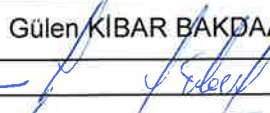
2.4 Metallographical characteristics forTi5:B1

2.4.1. Al₃Ti particles

Particle size: Size of Al₃Ti particles should be between 20µm - 50µm. Particle gretaer than 50µm should be frequently less.

Clusters of Al₃Ti particles should be categorized according to a imaginary area encircling them. There are five categories; "0" the best, "5" the worst.

Categories	Numebr of TiAl ₃ clusters	Size of TiAl ₃ cluster	OK or Nok for use
0	1 or 2	cluster<100 µm	OK
1	3 or more	cluster <100 µm	OK
2	1 or 2	100µm< cluster <150 µm	OK
3	3 or more	100µm< cluster <150 µm	NOK
4	1 or 2	cluster >150 µm	NOK
5	3 or more	cluster >150 µm	NOK

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2.4.2. TiB_2 particles

Particle size: Size of TiB_2 particles must be between $1\mu m$ - $2\mu m$.

Clusters of Al_3Ti particles should be categorized according to a imaginary area encircling them. There are five categories; "0" the best, "5" the worst.

Categories	Number of TiB_2 clusters	Size of TiB_2 cluster	OK or NOK for use
0	1 or 2	cluster < $50\mu m$	OK
1	3 or more	cluster < $50\mu m$	OK
2	1 or 2	$50\mu m < \text{cluster} < 100\mu m$	OK
3	3 or more	$50\mu m < \text{cluster} < 100\mu m$	NOK
4	1 or 2	cluster > $100\mu m$	NOK
5	3 or more	cluster > $100\mu m$	NOK

3.0. TEST SERTİFİKASI VE / VEYA KOŞULLARI/ TEST CERTIFICATE AND/OR CONDITIONS

The supplier must provide a test certificate for each material delivered. It must involve chemical composition of each production lot (if more than one lot), metallographic analysis of each production lot and its details according to item 2.3 and 2.4 The following information should also be included in the certificate:

Supplier's Name
Assan Order Number
Product Name (and code)
Lot number
Chemical composition
Results of metallographical analysis

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4.0. TESLİMAT ŞEKLİ/ DELIVERY CONDITIONS

4.1. Packaging

Shall be packed into coiled wires in max. of 2500 kg packages. Each package must be secured and fastened with at least five (5) plastic straps.

4.2. Labeling

The following information should be shown on the label prepared for each skid:

Supplier's Name

Material Name

Net Weight

Shipping date

Production lot no:

5.0. YÜKÜMLÜLÜK/ OBLIGATION

The supplier is obliged to meet the requirements indicated in this specification for each lot of materials delivered. The materials that do not meet with the requirements specified shall be returned. If failure in the grain refinement performance or other problems related with the grain refiner itself is encountered, proven and documented with well accepted methods with ASSAN Aluminum, all the losses including metal and processing cost so far incurred and any charges endorsed by the customer of ASSAN with the use of end product will be charged to the supplier. In case of any discrepancy related to the resolution of the quality issue violating the specification, the investigation conducted and reported by the local research institutes, TUBİTAK or universities İTÜ, ODTÜ, YTÜ will be employed for resolution.

6.0. SORUMLULUK/ RESPONSIBILITIES

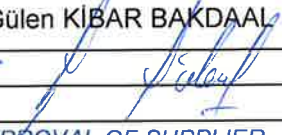
The Product and Process Development Department is responsible from checking of certificate provided by the supplier for compliance with the specification. The Cast shop is responsible from checking physical properties and the proper use of the material in prescribed practices.

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7.0. DİĞER HUSUSLAR/ OTHER

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