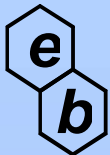


Product Data Sheet

BINAL[®]

Additive for Aluminium casting



Dr. Bilger Umweltconsulting GmbH

PHYSICAL and CHEMICAL PROPERTIES OF SODIUM

Table 1

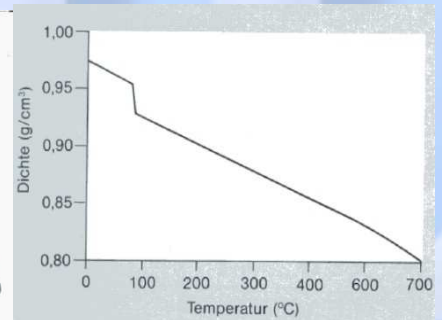
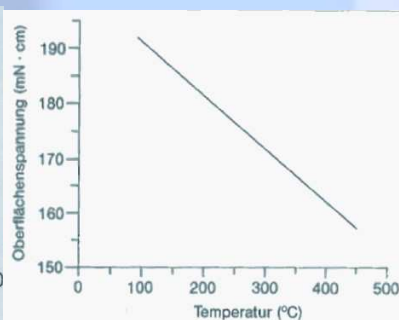
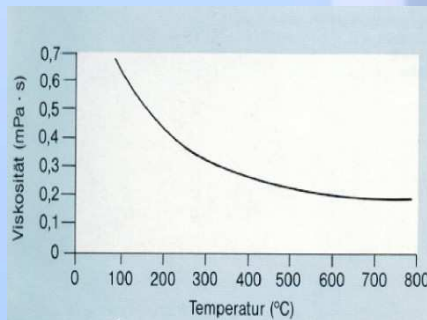
Order number	11
Atomic weight	22.99
Melting point	97.82
Boiling point	881.4
Crit. Temperature/ pressure	approx 2460/413 bar
Volumn enhancement at melting point	2.70%
Heat of fusion	113 J/g

Table 2

Physical Data of Sodium in different states of matter

Property (Unit)	Solid		Liquid				
	20°C	97.82°C	97.82°C	100°C	400°C	550°C	881.4°C
Density(g/cm ³)	0.968	0.51	0.927	0.927	0.857	0.821	0.74
dyn. Viscosity (mPa.s)	n.a.	n.a.	n.a.	0.68	0.284	0.225	0.149
Surface tension (mN/cm)	n.a.	n.a.	1.92	n.a.	1.61	1.46	1.13
Spec. Resistance (μΩ.cm)	4.88	6.6	9.64	9.67	22.14	29.91	52.87
Heat conductivity (W/mK)	132.3	87	87	n.a.	72.2	64.8	48.6
spez. Wärme(J/gK)	1.22	1.34	1.38	1.28	1.26	1.285	2.721

n.a. : not available



Quality, Sizes, Application

Dr. Bilger Umweltconsulting GmbH offers **BINAL**[®] in the following constant high standard quality:

Content	Unit	min.	max.
Sodium	%	99.8	
K	ppm		300
Ca	ppm		400

Our high standard quality may be purchased either in form of ingots or – more convenient in the application – sealed individually in gastight aluminium composite film.

The extrusion technology as applied at Dr. Bilger Umweltconsulting GmbH enables delivery of rods in different sizes, offering several advantages:

- High flexibility with regard to weight.

Standard sizes are pieces of 12.5 g, 25 g, 50 g, 100 g, 145 g and 500 g. Upon request it is possible to manufacture other sizes.

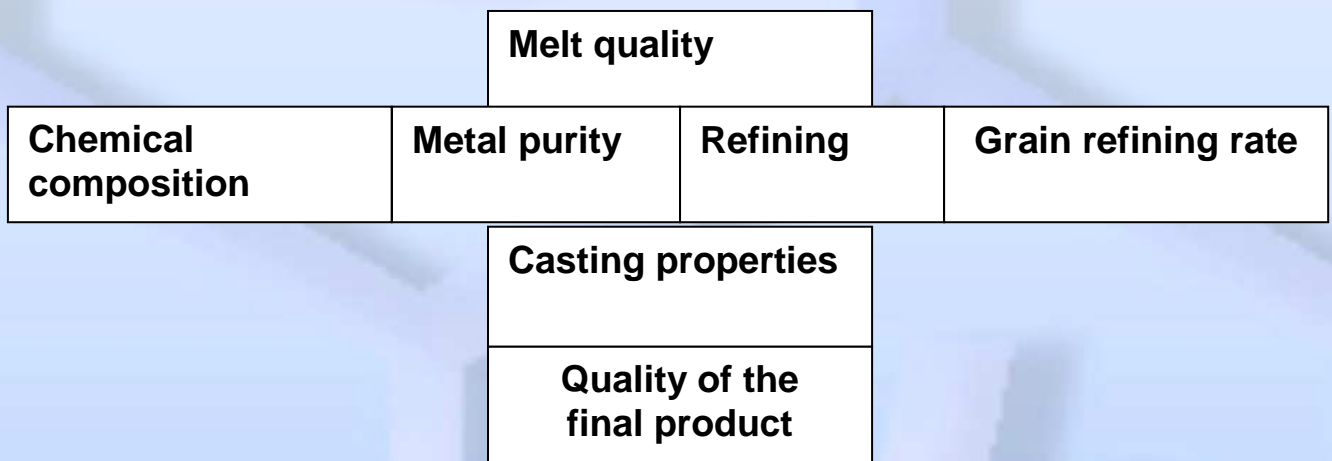
- Exact dosage to achieve desired finishing grade
- Highest security due to tear-proof and robust aluminium composite film
- No inclusion of gas due to vacuum sealing.
- High flexibility with respect to packaging:
 - Single packed pieces gross weighting between 6.25 kg and 20 kg/ box
or 100 kg / barrel
 - Ingots of 2 kg, up to 150 kg / barrel
- Completely clean barrels as ingots are packed in polyethylene-bags

Processing the melt of aluminium and alloys of aluminium with BINAL[®]

General information

In almost all areas of the industry (automotive, construction of machinery and installations, railway, building, etc.), and of daily life aluminum and its alloys have proven in recent years as a key material. This success is due to excellent chemical and physical properties of aluminum.

The expansion of fields of application of aluminum castings leads to increased quality requirements. To meet these requirements and regardless of the method used for molding parts (sand casting, permanent mold casting, die casting) the quality of fusion has a decisive and direct influence on the quality of the casting (see graph):



For Al-Si - alloys with silicon content greater than 5% a refinement is necessary. For the finishing product there is a choice between strontium and sodium. When finishing with strontium (already available in the raw material) it is a long-term refining process. Sodium is added in metallic form or in the form of sodium salt just before melting.

For the treatment of the melt there are three important points:

- Cleaning of the melt
- Refining the grain
- Refining -----> with **BINAL[®]**

Grain refinement

The molten aluminum is subjected to a refining treatment of the grain, for example by adding foreign seed in finely dispersed form.

Refinement

The initially lamellar microstructure of Al-Si alloys is transformed by the addition of sodium or strontium into a finely grained, refined microstructure with clearly improved properties for the casting.

BINAL[®] (sodium packed in aluminum compound foil) improves the aluminum alloy by reacting with the aluminum in the melt. It should be noted that in this reaction there is **no** bath agitation (occurrence of bubbles). In most foundries adding sodium from about 50 to 100 ppm in the melt is indicated; this depends, however, on the sodium content of the raw material.

In foundries the treatment temperature varies between 680° C and 810° C. It should be noted that the reactivity of **BINAL[®]** increases with temperature. Therefore, **BINAL[®]** should be placed on a layer of salt and immersed as quickly as possible.

It is possible to verify the degree of refinement through thermal analysis.

Sodium transfer*	
Addition: 0,008% by weight of metal	from 50 to 60 ppm
Addition: 0,015% by weight of metal	from 80 to 100 ppm

* These data are based on experience (although it should be noted that these values depend on the speed of immersion: the faster the immersion the better the sodium transfer).

The benefits of refinement with **BINAL[®]**:

- Adjustable refining by a variety of sizes, delivery of special sizes on request
- Refining with low dust and smoke, no unnecessary nuisance for workers
- Little or no bath agitation, therefore no inclusion of oxides
- Better handling and ease of polishing

BINAL (Sodium in aluminium-composite film)

Dosage recommendation*

Quantity of Aluminium melt in kg	Quantity Sodium at 0.006% Content	Quantity Sodium at 0.008% Content	Quantity Sodium at 0.01% Content	Quantity Sodium at 0.02% Content
1000	60 g	80 g	100 g	200 g
600	36 g	48 g	60 g	120 g
200	12 g	16 g	20 g	40 g
175	10.5 g	14 g	17.5 g	35 g
150	9 g	12 g	15 g	30 g
125	7.5 g	10 g	12.5 g	25 g
100	6 g	8 g	10 g	20 g

* these are theoretical values

Advice for technical security

For safe handling of sodium the staff has to be skilled and follow to internal training.

This is required by the authorities due to the fact that sodium is regarded as a dangerous good.

On the basis of long lasting experience of Dr. Bilger Umweltconsulting GmbH in handling of sodium and offers assistance in the training of the staff.

This may be delivered as a seminar in our offices or directly at the customer`s premises.

For further onformation call +49-(0)-6051-9166951 or send a message by e-mail: info@bilgergmbh.de



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