



GRAIN REFINING

Effect of grain refining:

- In-situ formation of nuclei, such as TiB₂, in the melt
- In-situ nuclei are very active, effective and well distributed throughout the melt
- Fine grain structure improves the solidified structure and reduces shrinkage porosity
- Grain refining improves mechanical properties of the casting, such as elongation

Products

Tablets

TIBORAL 6 universal use, without metallic titanium

NUCLEANT* 70 universal use, contains metallic titanium

NUCLEANT 70 SS universal use, contains metallic titanium, self-sinking

ELDUCTAL 90 S titanium free

PHOSPHORAL L 12 phosphorous releasing product for hypereutectic alloys

Granulate

COVERAL* GR 2815 universal use, without metallic titanium

MODIFICATION

Effect of modification:

- Sodium is the most effective modification agent
- Improvement in hot tear resistance
- Improvement in feeding
- Reduction in shrinkage porosity
- Sodium modified melt has a lower hydrogen pickup compared to strontium modified melts

Products for sodium modification

Tablets

SIMODAL 77 universal use

COVERAL PERMA TH long-term sodium modification (> 730° C)

COVERAL PERMA N long-term sodium modification (< 740° C)

Granulate

COVERAL GR 2712 (> 740° C)

COVERAL GR 2715 (< 740° C)

Powder

COVERAL SI 3 universal use

Metallic sodium

NAVAC* individually packed

CLEANING / DEGASSING

Effect of cleaning and degassing:

- Removal of dissolved hydrogen from the melt
- Reduction of gas porosity
- Improvement of pressure-tightness of castings
- Removal of oxides and non-metallic inclusions
- Improvement of mechanical properties
- Avoidance of distortion during heat treatment (especially of HPDC castings)
- Controlled addition or removal of hydrogen from the melt (N₂-H₂ pre-mixed gas)

Chemical processes

NITRAL C 19 / NITRAL 10 Nitrogen releasing tablet

NITRAL C 19 MG / NITRAL 10 MG Nitrogen releasing tablet (Na free)

Mechanical processes

FDU Foundry Degassing Units (various designs available) for degassing with inert gases.

FDU MTS machines enable direct additions of treatment products to the melt.

Options for FDU:

- MTS 1500
- Temperature measurement system
- N₂-H₂ pre-mixed gas supply
- Treatment with chlorine gas

CLEANING, DROSSING AND COVERING FLUXES

Effect:

- Cleaning fluxes remove oxides and other non-metallic inclusions from the melt
- Drossing fluxes provide a dry dross with a low metal content
- Covering fluxes protect the melt against oxidation and hydrogen pick-up

Application

	Powder	Granulate
Cleaning < 700 °C	ALUFLUX* 3	COVERAL GR 2220
Cleaning > 700 °C	COVERAL 105	COVERAL GR 2410
Injectable cleaning flux	COVERAL 275 IN	
Covering and drossing flux for universal use	COVERAL 90	COVERAL GR 2510
Sodium free cleaning and drossing flux	COVERAL 68	COVERAL GR 6511
Sodium and calcium free cleaning and drossing flux	COVERAL 67	COVERAL GR 6512
Fluoride free cleaning and drossing flux	COVERAL 210	COVERAL GR 2002

SPECIAL APPLICATIONS

- Furnace cleaner (corundum and oxide removal) **COVERAL OR 1** Powder
- Preventive furnace cleaner (by impregnation of furnace lining) **COVERAL 88** Powder
- Recycling and remelting flux **COVERAL 912** Powder
- Mg removal **ELIMAG 3** Powder
- Na, Ca, and Li removal **COVERAL MTS 1591** Granulate
- Gassing agent (hydrogen addition) **DYCASTAL* 40** Powder, **HYDRAL 40** Tablet

RECOMMENDATIONS FOR TYPICAL ALUMINIUM FOUNDRY ALLOYS

Alloy	GRAIN REFINING	MODIFICATION	CLEANING	CLEANING, DROSSING, AND COVERING FLUXES
Al-Si (3-8% Si)	Grain refining is very effective due to a high proportion of alpha primary aluminium.	Influences the Al-Si eutectic. Recommended especially for sand castings and die castings with heavy wall thicknesses.	Chemical: NITRAL C 19 / NITRAL 10 Mechanical: FDU / MTS 1500	Covering and drossing fluxes are recommended for all alloys and casting procedures and processes. The choice of flux is dependent upon the alloy, melt temperature, and furnace type.
Al-Si (9-13% Si)	The proportion of primary aluminium decreases with increasing proportions of Al-Si eutectic. Grain refining gives an improvement in structure especially for castings with difficulties in feeding.	High proportion of Al-Si eutectic requires a modification of the melt. Modification is needed for almost all casting procedures and wall thicknesses.	Chemical: NITRAL C 19 / NITRAL 10 Mechanical: FDU / MTS 1500	Covering and drossing fluxes are recommended for all alloys and casting procedures and processes. The choice of flux is dependent upon the alloy, melt temperature, and furnace type.
Al-Si (>13% Si)	A phosphorous addition influences the solidification of primary silicon. Evenly dispersed primary silicon plates throughout the casting improve the mechanical properties and wear resistance.	Not applicable	Chemical: NITRAL C 19 MG / NITRAL 10 MG Mechanical: FDU / MTS 1500	Covering and drossing fluxes need to be sodium and calcium free to avoid negative influences on the structure of castings.
Al-Mg (3-10%)	Grain refining is very effective due to a high proportion of alpha primary aluminium. Grain refinement is needed for almost all casting procedures and wall thicknesses.	Not applicable	Chemical: NITRAL C 19 MG / NITRAL 10 MG Mechanical: FDU / MTS 1500	Covering and drossing fluxes need to be sodium free to avoid negative influences on the surface structure.

GRAPHITE CONSUMABLES

XSR Rotor

FDR Rotor

XSR YYY.70 (suitable for BKF 75/XXX.70, DSK 75/XXX.70, BKF 95/XXX.70, DSK 95/XXX.70)

Diameter: YYY = 140, 175, 190, 220, 250 mm

Shafts with 75 mm diameter are available in length XXX from 600 to 1200 mm.

Shafts with 95 mm diameter are available in length XXX from 1500 to 2300 mm.

45 mm Diameter BKF 45/700

75 mm Diameter BKF 75/XXX.70

75 mm Diameter DSK 75/XXX.70

95 mm Diameter BKF 95/XXX.70

95 mm Diameter DSK 95/XXX.70

INSURAL* BAFFLE PLATES

PL 04.500.1 PL 04.500.2 PL 04.660.1 PL 04.700.1

FDU OVERVIEW

FDU MARK 10

For treatment in transport ladles or furnaces, the FDU MARK 10 is easily manoeuvred into the correct position.

FDU ROTODRIVE

The unit can be driven with an electrical drive and is recommended for larger foundries.

FDU ROTOSTATIV

Permanently located on a stand, the arm can swivelled by hand (optional).

FDU ROTOSCHWENK

The arm can be swivelled by an electrical motor; different treatment positions can be set automatically.

FDU MINIDEGASSER

The minidegasser can be positioned by crane or fork lift truck over a transport ladle or furnace.

HOW MTS WORKS

The MTS 1500 is based upon the FDU rotary degassing technology but with the additional capability of injecting a range of metal treatment products. The addition of these treatment products uses a unique method, whereby the fluxes are fed from a dispensing unit into a vortex deliberately created by the spinning rotor. This vortex is carefully controlled to effect a very efficient mixing of the treatment products.

Product	Application
COVERAL MTS 1524	Cleaning / Drossing
COVERAL MTS 1560	Cleaning / Drossing Na free
COVERAL MTS 1565	Cleaning / Drossing Na and Ca free
COVERAL MTS 1572	Sodium Modification
COVERAL MTS 1576	Sodium Modification
COVERAL MTS 1582	Grain Refining
COVERAL MTS 1591	Cleaning / Na and Ca Elimination