Product Catalog

Solutions for Iron, Steel and Non-ferrous Applications

ASKCHEMICALS

Content

Our wide product range comprises binders for all core manufacturing processes, coatings, additives, feeders, filters, release agents, metallurgical products including inoculants, Mg treatment wires, inoculation wires, and pre-alloys for iron casting. Core production and prototype development as well as a wide range of simulation services round off what the company has to offer.

Foundries have valued this broad product portfolio for many years. Yet the ASK Chemicals brand represents far more than its range of premium products. As a supplier of foundry chemicals it also supports foundries with services that cover the entire development and production process – developing, in close collaboration with the customer, solutions that offer real added value.

Design Services

for perfect casting results

Our Design Services team monitors the entire process from the development of the design concept and validation right up to the production of the cast part prototype. Our engineers have a wide range of experience and a clear understanding of all aspects of foundry technology and metallurgy. Our Design Services team has the right combination of design, production and simulation expertise, co-operates with external companies and service providers, and enjoys extensive industry experience. ASK Chemicals' simulation service offers wide-ranging technical knowledge and understanding combined with state-of-the-art simulation programs (MAGMA, Novacast, FLOW-3D and Arena-Flow).

Benefits

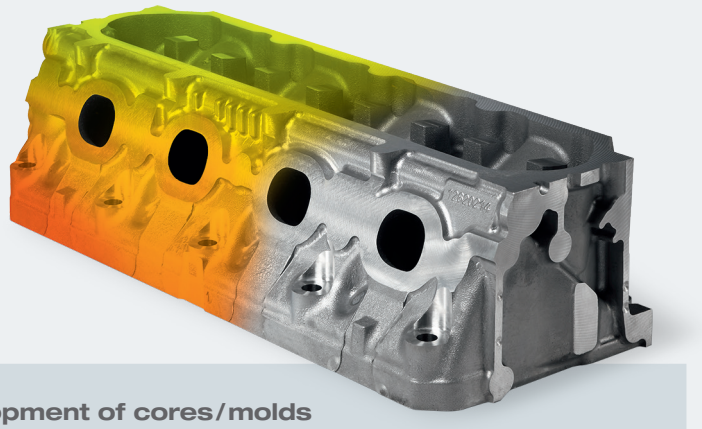
- Higher productivity and optimized catalyst consumption
- Manufacturing process design, including inorganic technology
- Calculation of optimal feed
- Optimized design and manufacture of model plates, core boxes and molds
- Less scrap
- Shorter product launch times
- Quicker time to market

Simulation services

The simulation of casting processes provides foundries with invaluable casting mold information. Specifically, this benefit allows for the optimization of gating and feeding systems, overflows, venting design and risers. Moreover, it provides critical insight into the influences and effects directly related to casting integrity, such as cooling and heating measurements, filling and solidification times.

From the idea to the prototype

ASK Chemicals supports your entire process from the concept to prototype production.



Idea » Concept » Simulation » Development of cores/molds
» Core and cast prototyping » Series production » Success

Binders

For the most demanding foundry production processes

Our tried-and-true formulations have been adopted on a global scale and trusted for decades. We design our resin systems to withstand the most demanding foundry production processes. Furthermore, our dedication to research and development ensures cutting-edge resin technology for our customers' growing demands: reduced emissions, low VOCs, higher strength properties, improved shakeout, etc.

Core Production Process	Binder Systems	Hardener / Catalysts
Cold Box binders		
Polyurethane Cold Box	ECOCURE ISOCURE	Amine catalyst ISO-FAST
Epoxy Acrylic SO_2 Cold Box	ISOSET THERMOSHIELD	SO_2 catalyst
CO_2 cured Cold Box	NOVANOL	CO_2
Hybrid amine cured epoxy acrylate Cold Box	ISOMAX	Amine catalyst
Alkaline Phenolic Cold Box	AVENOL, NOVACURE	Methy formate coreactant
No-Bake binders		
Resol-Ester No-Bake	NOVASET	NOVASET coreactant
Polyurethane No-Bake	PEP SET	PEP SET catalyst
Furan No-Bake	ASKURAN MAGNASET CHEM-REZ	ASKURAN catalyst MAGNASET catalyst CHEM-REZ catalyst
Phenolic No-Bake	BERANOL CHEM-REZ	BERANOL catalyst CHEM-REZ catalyst
Warm Box / Hot Box	KERNFIX CHEM-REZ	HOTFIX CHEM-REZ catalyst
Alkyd No-Bake	LINO-CURE	LINO-CURE coreactant
Inorganic binders		
Inorganic No-Bake	INOBAKE	INOBAKE catalyst
INOTEC	INOTEC	–

Shell sand

ASKRONING sand is available for aluminum, copper and iron applications. ASK Chemicals also offers shell sand for special applications.

Core production

Our range of products includes the production of cores and core packages as from a weight of 0.01 kg. We manufacture cores and core packages not only by Cold Box, Hot Box and Shell sand process, but also by inorganic method. Our modern technical equipment is designed for the production of prototypes and series. Thanks to our design-to-manufacture process, we are also happy to supply you with complete solutions from concept to completion.

Additives

More efficiency and better casting quality

Our additives are used to prevent casting defects or (partly) replace expensive special sands. In addition, technologically advanced additives facilitate uncoated casting. The latter offers potential for further productivity increases, especially in the area of Cold Box production.

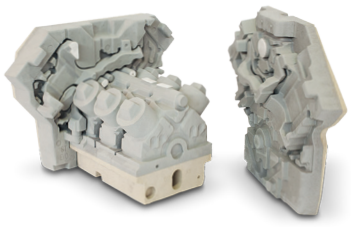
Product	Binder application			Metal application					Recommended segments												Effects							
	Warm Box	No-Bake	Cold Box	Steel	CGI	DI	GI	SiMo	Turbo charger	Exhaust manifold	Truck cylinder head	Car engine block	Railway casting	Water jacket	Oil gallery core	Ventilated brake disk	Axle housing	General housings	Pumps	Hydraulic castings	Veining suppression	Penetration protection	Scabbing protection	Clean surface	Good shakeout with MF cores	Coating-free casting	Against tension cracks; insulating properties	Other
Organic and 100 % renewable additives																												
VEINO 4312			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■			
VEINO 4086			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
VEINO 4048			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO W 39			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■			
Environmentally friendly additives																												
ISOSEAL 14000 F			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
ISOSEAL 14000			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
ISOSEAL STL 210		■	■	■	■	■	■	■																			■	
High-performance hybrid additives																												
VEINO ULTRA 4618			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO ULTRA 4595 / 19			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO ULTRA 3010			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO ULTRA 4273			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■			
VEINO ULTRA 4230 / 2			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
VEINO ULTRA 3895			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO ULTRA RS 4			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
VEINO ULTRA RS 2	■				■	■	■	■	■	■	■	■		■	■	■	■	■			■	■		■				

■ = suitable, ■ = highly suitable

Coatings

No casting defects, but instead perfect surfaces and important additional benefits

Our coatings are much more than a simple barrier between sand and metal. They are high-tech systems that play a significant role in determining the surface quality of the casting and systematically eliminate typical surface defects.



Courtesy of Eisenwerk Brühl

Water-based coatings

Product	Color	Application				Binder					Metals						Application	Properties							
		Dipping	Flowcoating	Spraying	Brushing	Epoxy-SO_2	Cold Box	Hot Curing System	Silicate/Resol-CO_2	No-Bake	Steel	Manganese steel	GI	DI	Copper	Aluminium	Typical application	Solvent	Veining suppression	Metallization protection	High gas permeability	High layerforming possible	Matting time	Special effects	Density (undiluted) g/cm³
CERAMCOTE FS 402		■	■	■	■								■	■			Full Mould and Lost Foam Process	W	■	■	■	■	•	Excellent application properties	1.7
CERAMCOTE FS 503		■	■	■	■						■	■	■	■			Full Mould and Lost Foam Process	W	■	■	■	■	•	Excellent application properties	1.8
MIRATEC AC 503		■		■			■	■								■	Aluminium casting (e.g. engine blocks)	W					••	Excellent release properties	1.5
MIRATEC BD 509		■					■							■			Automotive casting (e.g. brake disks)	W	■	■	■	■	•	Short matting time	1.3
MIRATEC DH 401		■					■	■						■			Automotive casting (e.g. differential housings)	W	■	■			•	Short matting time	1.4
MIRATEC DH 402		■	■				■	■						■			Universal coating (e.g. housing elements)	W	■	■	■	■	•	Enhanced refractoriness	1.4
MIRATEC GH 401		■					■	■						■			Universal coating (e.g. gearbox housings)	W	■	■			•		1.4
MIRATEC GH 403		■	■	■	■		■	■	■	■	■		■	■			Universal coating (e.g. gearbox housings)	W	■	■	■		•	Fast drying, for inorganic binder systems	1.4
MIRATEC HC 501		■					■	■						■			Automotive casting (e.g. engine blocks & hydraulics castings)	W	■	■			○		1.4
MIRATEC HY-Series		■				■	■	■	■	■			■	■		□	Automotive casting (e.g. cylinder heads, engine blocks)	W	■	■	■	■	•	Alcohol-dilutable	
MIRATEC MB 501		■					■	■						■			Automotive casting (e.g. cylinder heads, engine blocks)	W	■	■		■	•		1.4
MIRATEC TS-Series		■					■	■						■			Automotive casting (e.g. cylinder heads, engine blocks)	W	■	■	■	■	••	Reduced retaining dust in casting	1.3
SOLITEC AD-Series				■	■											■	Aluminium - permanent die casting	W						Long life of die; clean casting surfaces	
SOLITEC CC-Series				■	■				■	□	■	■		■	■		Centrifugal casting	W		■	■	■		Different insulating properties are adjustable	1.8
SOLITEC DI-Series		■	■	■	■	■			■	■	■	□	■	■	■		Steel- & Heavy casting (e.g. wind power rotor hubs, water- and steam-operated turbines)	W	□	■			○	Zirconium-free, Dryingindicator visualises incomplete drying	
SOLITEC HI 703		□	■	■	■	■			■	■			■	■	■		Heavy casting (e.g. wind power rotor hubs, water- and steam-operated turbines)	W		■			•	High degree of refractoriness; disables grafite degeneration; zircon-free	1.8
SOLITEC HY-Series			■	■	■	■	■	■	■	■			■	■		□	Universal coating (e.g. machine housings)	W	■	■			○	Alcohol-dilutable	
SOLITEC IM 702		■	■	■	■	■	■	□	■	■	■	■	■	■	■		Steel- & Heavy casting (e.g. machine platforms, naval diesel engines)	W		■			••	Impregnating coating; zircon-free	1.9
SOLITEC MS-Series		■	■	■	■								■	■	■		Ladle and pouring spoon	W						Reduces slag adherence	
SOLITEC ST 701			■	■	■		■	■	■	■	■	□	■	■	■		Heavy casting (e.g. wind power rotor hubs)	W	□	■			○		2.6
SOLITEC ST 801		■	■	■	■					■	■	□	■	■	■		Heavy & steel casting (e.g. pump housings)	W	□	■			○	Zircon-free	2.0
SOLITEC WP 401			■	■	■		■	■	■	■			■	■		□	Heavy casting (e.g. wind power rotor hubs, water- and stream-operated turbines)	W	■	■			○	Patented refractory system; disables grafite degeneration; zircon-free	1.5

E = ethanol, I = isopropyl, W = water, □ = partly suitable, ■ = suitable, ■ = particularly suitable, •• very slow, • slow, ○ medium, • fast, •• very fast

Alcohol-based coatings

Product	Color	Application				Binder					Metals						Application	Properties							
		Dipping	Flowcoating	Spraying	Brushing	Epoxy-SO_2	Cold Box	Hot Curing System	Silicate / Resol-CO_2	No-Bake	Steel	Manganese steel	GI	DI	Copper	Aluminium	Typical application	Solvent	Veining suppression	Metallization protection	High gas permeability	High layerforming possible	Matting time	Special effects	Density (undiluted) g/cm³
VELVACOAT AC 501		■	■			■	■		■					■		■	Aluminium casting (e.g. housing elements)	E	■	■			••	Retarded flaming	1.1
VELVACOAT CC 601		■	■	■	■	■	■	■	■					■			Universal coating (e.g. socket cores)	E		■			•	Excellent release properties	1.2
VELVACOAT GH 501		■	■	■	□	■	■	■	■	■				■	□	□	Pump housings, counterweights, gearbox housings	I	■	■			••	Cold box universal coating	1.2
VELVACOAT GH 701		■	■			■			■	■				■			Electric motor housings	I		■	■		••	Excellent gas permeability	1.1
VELVACOAT HI 502		■	■	■	□	■	■	■	■	■				■			Universal coating (e.g. medium-sized gearbox housings, pump housings)	I	■	■			••	No-Bake universal coating	1.4
VELVACOAT HI 602			■	■	■				■	■			■	■			Universal coating (e.g. counter weights, wind power roto hubs, gearbox housings)	E	■	■			•	High yield	1.5
VELVACOAT HI 707		■	■	■	■	■	■	■	■	■				■			Universal coating (e.g. medium-sized gearbox housings, pump housings)	I/E	■	■			•	Improved remixing; less setting property	1.5
VELVACOAT HI 733		■	■	■	■	■	■	■	■	■			■	■	□		Heavy casting (e.g. wind power rotor hubs, water- and steam-operated turbines)	I		■			•	High degree of refractoriness; diables grafite degeneration; zircon-free	1.6
VELVACOAT IM 701			■	■	■	■	■	■	■	■	■	□	■	■	■	■	Universal coating (e.g. medium-sized gearbox housings, pump housings)	I		■			•	Impregnating coating; zircon-free	1.8
VELVACOAT IM 801		■	■	■	■	■	■	■	■	■	■		■	■	■	■	Universal coating	I		■			•	Impregnating coating	1.8
VELVACOAT IM 801 (DOSE)		■	■	■	■	■	■	■	■	■	■		■	■	■	■	Ready to use in spray can	I		■			•	Impregnating coating	1.8
VELVACOAT ST 606		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Heavy & steel casting (e.g. pump housings)	I		■			○	Excellent flooding properties	1.7
VELVACOAT ST 702		■	■	■	■	■	■	■	■	■	■		■	■	■		Heavy & steel casting (e.g. pump housings)	I		■			○	Excellent flooding properties; water-free system	1.9
VELVACOAT ST 707			■	■	■	■	■	■	■	■	■		■	■	■		Heavy & steel casting (e.g. water- and steam-operated turbines)	I		■			•	High degree of refractoriness	2.2
VELVACOAT ST 801		■	■	■	■	■			■	■	■	■	■	■	■		Heavy & steel casting (railroad switches, mill work parts)	I		■			○	Manganese steel / universal; water-free system	1.8

E = ethanol, I = isopropyl, W = water, □ = partly suitable, ■ = suitable, ■ = particularly suitable, •• very slow, • slow, ○ medium, • fast, •• very fast

Auxiliary product overview

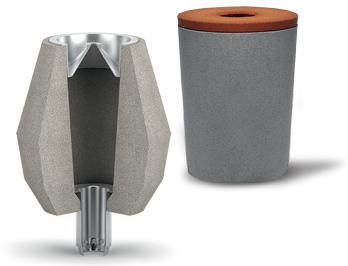
		Product
Release agents	Cold Box processes	ECOPART FR, ECOPART 756, ECOPART 56 (D), ZIP SLIP 157 H
	No-Bake processes	ECOPART LP 89, ECOPART 80 S, ECOPART 84 S, ECOPART 102 C
	Hot-curing processes	ECOPART H1-350, ECOPART H2-350
	Green sand processes	BENTOGLISS*
Cleaners		ZIP-CLEAN 800, ZIP-CLEAN 2000
Adhesives		ASKOBOND
Core putty fillers		ASKOPASTE
Cope seals		ASKOROPE
Vents		ISOVENTS

* BENTOGLISS is a registered trademark of CLARIANT AG.

Mini-risers and feeder caps

Highest quality and process reliability

Mini-risers and feeder caps from ASK Chemicals represent maximum quality and process reliability in the foundry industry. Our patented exothermic technology is uniquely effective – an industry-leader even combined with productivity-boosting enhancements. Our products are available as both inorganic and Cold Box variants.



Cast material	Molding process	Application	EXACTCAST mini risers								EXACTCAST caps and tubes				
			ADS and KMV	ADS and KMV with breaker core	FDS	KMV Q T	BKS and KMV Q M	KIM	KIM Q M	OPTIMA KL and KMV CC	KP	KP with breaker core	KI	KI with breaker core	KT (insulating)
GI	Machine molding	put on mold	■	■	■	■	■	□	■	■	■	■	■	■	□
		insert in mold						■			■	■	■	■	□
	Hand molding	put on mold	■	■		■		■			■	■	■	■	□
		insert in mold						■			■	■	■	■	□
DI	Machine molding	put on mold	■	■	■	■	■	□	■	■	■	■	■	■	□
		insert in mold						■			■	■	■	■	□
	Hand molding	put on mold	■	■		■		■			■	■	■	■	□
		insert in mold						■			■	■	■	■	□
CGI	Machine molding	put on mold	■	■	■	■	■	□	■	■	■	■	■	■	□
		insert in mold						■			■	■	■	■	□
	Hand molding	put on mold	■	■		■		■			■	■	■	■	□
		insert in mold						■			■	■	■	■	□
GS	Machine molding	put on mold	■[1]	□	□	□	□	□	□	□	■	■	■	■	□
		insert in mold						■			■	■	■	■	□
	Hand molding	put on mold	■[1]	□		□		■			■	■	■	■	□
		insert in mold						■			■	■	■	■	□
Non-ferrous	Machine molding	put on mold	□	□	□[2]						■	■	■	■	■
		insert in mold									■	■	■	■	■
	Hand molding	put on mold	□	□							■	■	■	■	■
		insert in mold									■	■	■	■	■

□ = partially suitable, ■ = suitable, ■ = recommended

1 = the big KMV risers are particularly suitable, 2 = FDS risers in a special version for Al are possible

Filters

Efficient filtration technology

With UDICELL and EXACTFLO filters, foundries use an efficient filtration technology that guarantees the highest casting quality thanks to cleaner cast metals. Our filters are recommended for steel and iron casting as well as for non-ferrous metals.

Rough classification	Materials	Molding process / alloy	Typical filter qualities used	UDICELL			EXACTFLO		
				UDICELL PSZT	UDICELL PSZM	UDICELL CB	EXACTFLO SiC	EXACTFLO Alumina	EXACTFLO P
Ferrous and steel casting	Gray cast iron	Machine molding	Silicon carbide (SiC), pressed filter				■		▪
		Machine molding / large castings	Silicon carbide (SiC), pressed filter	▪	▪		■		▪
	Ductile iron	Machine molding	Silicon carbide (SiC)				■		□
		Machine molding / large castings	Silicon carbide (SiC), pressed filter Zirconia filter, carbon bonded filter	▪	■	▪	▪		□
	Vermicular cast iron	Machine molding	Silicon carbide (SiC), pressed filter				▪		▪
		Machine molding / large castings	Zirconia filter, carbon bonded filter	▪	■	▪	▪		□
	Cast steel	Carbon- and low alloyed steel	Zirconia filter, carbon bonded filter	■	▪	■			□
		Stainless steel	Zirconia filter	▪	■	□			□
Non-ferrous casting	Light metals	Casting	Silicon carbide (SiC), alumina filter				■	■	□
		Primary / sec. smelting plants	Alumina filter	□				■	
	Heavy metals	Casting	Silicon carbide (SiC), zirconia filter	▪	□	□	■	□	
		Primary / sec. smelting plants	Silicon carbide (SiC), zirconia filter	▪	■	□	▪		
Investment casting	Ferrous- and non-ferrous metals	Lost wax process	Zirconia filter, alumina possible too	▪	■			□	
		Ceramic mold	Alumina filter, zirconia possible too	▪	▪			■	

□ = partially suitable, ▪ = suitable, ■ = recommended

Metallurgical Products

Greater process safety

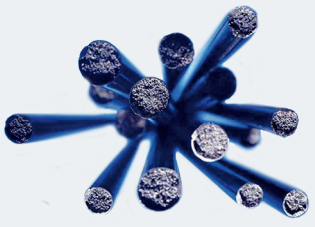
ASK Chemicals supplies and manufactures high-quality metallurgical products for global foundry production. From furnace-based applications to late inoculation inputs, our holistic products for iron casting provide guaranteed and consistent results.

Product overview

Melting shop	Melt preparation	SiC, FeMn, FeSi
	Pre-conditioning	DISPERSIT, cerium misch metal (CerMM), VL (Ce) 2
	Mg treatment	FeSiMg – master alloy, NiMg – master alloy INFORM – Mg treatment wires
Melt treatment	Inoculation	Ladle inoculants, cored wire, in-stream inoculants, mold inoculants GERMALLOY, OPTIGRAN, SMW insert
	Melt cleaning	REMMOS, DISPERSIT
	Specialties	CerMM, FeS, mold powder, CaC_2

Cored wires

This offers flexibility with regard to changing initial conditions such as the sulfur content, treatment temperature, and iron quantity. Additionally, relatively constant Mg values can be achieved despite different initial sulfur values and treatment temperatures. Lastly, handling and treatment costs can be reduced. Environmentally friendly thanks to targeted exhausting. Our INFORM inoculation wires are availabe with the same elements as our mold and granular inoculants.



Active elements of the inoculants and recommended field of application

<table>
<tr><th>Active elements</th><th colspan="2">Ductile iron and gray iron</th><th colspan="2">Ductile iron</th><th>Gray iron</th><th>Compacted graphite iron</th></tr>
<tr><td>Al</td><td colspan="2" rowspan="2">Inogen 75</td><td colspan="2">VP 216/116, GERMALLOY</td><td>–</td><td rowspan="2">Inogen 75</td></tr>
<tr><td>Ca</td><td colspan="2">–</td><td>–</td><td>–</td></tr>
<tr><td>Ba</td><td>SB 5</td><td rowspan="2">Inoculoy 63</td><td colspan="2">–</td><td>–</td><td>–</td></tr>
<tr><td>Mn</td><td rowspan="2">ZM 6</td><td colspan="2">–</td><td>VP 316, OPTIGRAN</td><td rowspan="2">–</td></tr>
<tr><td>Zr</td><td rowspan="2">OPTINOC Z</td><td colspan="2">–</td><td>–</td></tr>
<tr><td>Ca</td><td>–</td><td rowspan="3">SMW 605,
SMW insert type 1</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>Bi</td><td>–</td><td>–</td><td rowspan="3">SAW 304,
SMW insert type 2</td><td>–</td><td>–</td></tr>
<tr><td>CerMM</td><td>–</td><td>CSF 10</td><td>–</td><td>–</td></tr>
<tr><td>Al</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>La</td><td>–</td><td>LSF 2</td><td colspan="2">–</td><td>–</td><td>–</td></tr>
<tr><td>Sr</td><td>SRF 75</td><td>–</td><td colspan="2">–</td><td>–</td><td>SRF 75</td></tr>
<tr><td>Ti</td><td>–</td><td>–</td><td colspan="2">–</td><td>LC Graphidox</td><td>LC Graphidox</td></tr>
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Master alloys

FeSiMg type*	Typical composition				
	% by weight				
	Mg	CA	CerMM	Si	La
VL 63 (M)	6.0–6.5**	1.9	0.7	45	–
VL 63 (O)	6.0–6.5**	1.9	–	45	–
VL 63 (M) TC	6.4–7.0	1.3	0.7	45	–
VL 63 (M) 3	6.0–6.5**	1.9	0.3	45	–
VL 63 EGT	6.0–6.5	1.9	0.15	45	–
VL 63 (M) T	6.0–6.5	3.0	1.0	45	–
VL 63 LA	6.2–6.8	1.8	–	45	0.5
VL 73 (M)	7.0–7.6	2.5	2.5	45	–
VL 73 (O)	7.0–7.6	2.5	–	45	–
VL 73 (E)	6.7–8.0	2.5	1.3	45	–
VL 53 (M)	9.0–11.0	2.0	0.7	44	–
VL 53 (O)	9.0–11.0	2.0	–	44	–
VL 53 (S)	8.0–9.5	3.0	3.5	43	–
VL 50 (M)	5.0–5.5	1.9	0.7	45	–
VL 50 (O)	5.0–5.5	1.9	–	45	–
DENODUL 5	5.0–6.0	1.5	2.5	45	–
NODULOY 3	3.8–4.3	0.7	1.3	45	–

* Separate analyses on request

** Exception for grain size 0.125–1 mm: 5.4–6.0 % Mg

NiMg type*	Typical composition						Lumpiness
	% by weight						
	Mg	C	Si	Fe	MM	Ni	mm
VL 1 (LC)	15–17.5	0.1 max.	2.0 max.	1.0 max.	–	Remainder	12–50 150 max.
VL 1 (M)	15–17.5	2.0 max.	2.0 max.	1.0 max.	1.0	Remainder	150 max.
VL 4 (M)	4.5–6.0	2.5 max.	2.5 max.	32–37	1.0	Remainder	Ingots 2.5 kg or 0.8 kg
VL 4 (O)	4.5–6.0	2.5 max.	2.5 max.	32–37	–	Remainder	

* other VL types on request

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