

ALD Vacuum Technologies

High Tech is our Business

VIM 02 - VIM 100

Vacuum Induction Melting and Casting Furnaces



Vacuum Induction Melting and Casting

VIM 02 to VIM 100

Vacuum induction melting is one of the most common processes in secondary metallurgy. It makes possible the effective degassing of the melt and precise adjustment of alloy composition. The application of vacuum in the induction melting process is indispensable for the production of high purity metals that react with atmospheric oxygen. The vacuum melting process limits the formation of non-metallic oxide inclusions that are responsible for premature part failure. Particularly critical applications such as jet engine parts demand the production of alloys with a very low concentration of undesired volatile trace elements.

VIM Process Characteristics:

- High flexibility and versatility
- Fast change of programs
- High efficiency due to desoxidation
- Close compositional tolerances
- Precise temperature control
- Low dust output
- Removal of undesired elements

Vacuum induction melting enables an extremely precise adjustment of the alloy composition and melt homogenization since

- 🔳 melt temperature,
- 🖉 vacuum,
- 🔳 gas atmosphere,
- pressure and
- kinetics

can be adjusted independently. Several casting and mold treatment processes can be combined with the VIM technology.

Applications:

- Semi-finished products, like:
 - Strips and rods
 - Ingots and electrodes
 - Targets and flakes

by the following procedures:

- Mold casting
- Continuous casting
- Vacuum induction distillation
- 📕 Flake casting

in:

- 🔳 Research & development
- Electronic industry
- Dental application
- Automotive and aerospace industry
- Ferrous applications
- Non-ferrous applications
- Precious metal industry

Standard VIM Furnaces

ALD's vacuum induction melting and casting furnaces of the VIM 02 to VIM 100 product line are modular, universal standard systems endowed with a broad range of accessories to tailor them to customers' individual production needs.

Availabe for all furnaces, for example, are

- Additional coils to be used for diferent melt materials and crucible sizes
- Ingot mold turntable for pouring into several molds under identical conditions
- Facilities for charging
- Temperature measurement
- Sampling
- Mold treatment

Melting and degassing under vacuum





Observation
 of vacuum
 induction
 melting and
 casting process
 via sight glass



Temperature measurement with thermocouple and reusable protection tube



VIM 02 Laboratory furnace with 0.2 ltr. melt volume



The nomenclature of different furnace designs:

VIM 02-100 - Vacuum Induction Melting in range of 0.2 to 100 litres crucible volume, basic equipment VIM-MT - with Mold Treatment Module VIM-VCC - with Vertical Continuous Casting VIM-HCC - with Horizontal Continuous Casting VIM-DS - with Directional Solidification VIM-FC - with Flake Casting VIM-HMC/VIM-VMC - with separate Horizontal or alternatively Vertical Mold Chamber VIM-P - with Over-Pressure-Operation

VIDIST - Vacuum Induction Distillation

- The revolver on the furnace lid enables charging, temperature measurement, sampling without interrupting the furnace atmosphere Alloying with fine charger
- Charging with bulk charging basket for coarse material

Add-ons A large number of add-on components allow to adapt or retrofit any furnace model to meet special process requirements.









Vacuum Induction Melting and Casting

Various Applications

VIM Basic single chamber design



VIM 12

VIM basic equipment furnace single chamber design with melt chamber, induction coil, vacuum pump set, melt power supply, controls and accessoires

Basic system can be easily modified with special devices to produce a system tailored to individual production needs like "Vacuum Induction Distillation furnace" or "Vacuum Induction Melting furnace" with separate mold chamber for inserting molds into the melt chamber shortly before casting.



VIM FC with Flake Caster for producing metallic flakes

Two Chamber Design with Horizontal Mold

VIM HMC



VIM

with bottom purging, tundish heating and rotary mold table





VIM 50

VIM furnace with tundish heater and oxygen resp. inert gas blowing device for research and development



Chamber allows to lock in molds prior to casting without

interrupting the furnace atmosphere – this avoids

excessive temperature losses of preheated molds

Mold heater keeps the cast liquid and allows subsequent controlled solidification Casting via tundish with heater 2/3 enables filtering of undesired incluions and precise pouring stream into e.g. barstick molds

Add-ons A large number of add-on components allow to adapt or retrofit any furnace model to meet special process requirements.







Customized VIM Furnaces

VIM VCC

Vacuum Induction Melting with Vertical Continuous Casting

Continuous casting for strips and wires under inert gas atmosphere minimizes surface oxidation of the cast metal.

Therefore, vacuum melting technology combined with modern continuous casting technology in one system results in high quality end products. Consistent high quality at low operating costs yield cost effective production.

Vacuum provides an extremely low gas content in the melt and avoids oxidation of sensitive alloy elements. Backfilling with inert gas after meltingin guarantees that the purity of the melt which is a result of the vacuum treatment is preserved. Continuous casting allows intensive cooling of the poured metal and an exact range of solidification. That prevents segregation.

▲ VIM 12 VCC

Vacuum Induction Melting with Vertical Continuous Casting for precious metal application alp

Control Systems

Control and process display

- Manually via manual valve
- With buttons for pumps, gas-inlet valves with LED display
- By operator control with recipe management and cleartext display
- Programmability for diverse melt recipes
- Automatic system for melting down and casting
- Display on mosaic mimic diagram or video screen

Control with colour TFT display in swivable operator control box





VIM P

Vacuum Induction Melting furnace designed for melt treatment in the overpressure range up to 100 bar

VIM 70 VMC

Furnace with separate Vertical Mold Chamber for ferrous and nonferrous alloys (in combination with mold treatment directional solidification is possible)

- Vacuum system a wide 1/2 range of pumping systems tailored to every need, including dust filters, enables processing under vacuum
- 3 Induction melting and casting need melt power supply, coaxial power leadthrough and tiltable coil

Add-ons A large number of add-on components allow to adapt or retrofit any furnace model to meet special process requirements.









Technical Data		VIM 02	VIM 05	VIM 2	VIM 4	VIM 6	VIM 12	VIM 20	VIM 50	VIM 70	VIM 100
Crucible Nom. capacity (fromto) Nom. capacity, max. (g St.=7.2 g/cm ³) Hydraulic assisted tilting	[l] (kg)	0.1–0.2 1.5	0.04-0.5 4	0.5–1.95 14	1.95-3.5 25	3.5-5.8 40 X	5.5–12 85 X	12-21.4 150 X	21.4–50 350 X	50-70 500 X	80–100 1200 X
Max. Size/Mold Setup Diameter Height	(mm) (mm)	100 180	180 220	180 360	220 400	320 440	380 480	500 750	550 1000	1000 1100	1500 1100
Vacuum Equipment Medium-vacuum pumping system Nominal pumping speed	(mbar) (m³/h)	2x10 ⁻³ 150	2x10 ⁻³ 150	2x10 ⁻³ 500	2x10 ⁻³ 500	2x10 ⁻³ 1000	2x10 ⁻³ 1000	2x10 ⁻³ 2050	2x10 ⁻³ 5500	2x10 ⁻³ 5500	2x10 ⁻³ 7000
pumping system Nominal pumping speed	(mbar) (lxs ⁻¹)	1x10⁻⁵ 1100	1x10⁻⁵ 1010	1x10⁻⁵ 3000	1x10⁻⁵ 3000	1x10⁻⁵ 6000	1x10⁻⁵ 6000	1x10⁻⁵ 12000	1x10⁻⁵ 12000	1x10⁻⁵ 17000	1x10⁻⁵ 17000
Recommanded Power Supply for Melting MF power at 250 V Frequency Coil voltage	(kW) (KHz) (V)	6 20 250	20 10 250	40 4 250	60 4 250	80 4 250	120 4 250	180 2 250	250 1 400	450 1 400	530 0.5 400
Electr. connected Loads incl. High-Vacuum Pumping Unit Line-voltage data	(kVA) (V/Hz)	20 3x400/50	40 3x400/50	60 3x400/50	100 3x400/50	120 3x400/50	190 3x400/50	320 3x400/50	460 3x400/50	650 3x400/50	800 3x400/50
Cooling-Water Consumption Cooling-water	(l/min)	20	60	80	120	150	200	290	400	700	1200
Compressed Air Pressure	(bar)	6	6	6	6	6	6	6	6	6	6
Space Requirement System height, with options	(mxm) (m)	1.1x1.1 2.0	1x2.7 3.0	1x2.9 3.1	1.4x3 3.2	2.7x3.4 3.5	3.4x3.7 3.9	4.8x4.8 5.3	5.6x6.7 5.9	8.0x9.0 6.4	8.0x9.0 6.4
Total Weights (approx.) Weight of furnace	(kg)	475	1500	1750	1900	3150	4000	7000	11500	15200	39000
Weight of MF power supply (approx.)	(kg)	25	600	700	700	750	1200	1800	2000	2200	4000

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