Morgan
Advanced Materials

www.morganmms.com

MOLTEN
METAL
SYSTEMS

FOUNDRY
PRODUCTS CATALOGUE

INNOVATING TOMORROW'S SOLUTIONS...TODAY

ABOUT US

Morgan Advanced Materials

Over 150 years of experience in advanced material technology, We are the global leader in the manufacturing of crucibles and foundry products

Morgan Advanced Materials plc is an advanced materials technology company that provides highly engineered solutions in series of well defined markets. Morgan Advanced Materials has a global presence with operations in more than 50 countries and product deliverables in over 100 countries. Headquartered in the UK and listed on the London Stock Exchange, the company was founded in 1856.

The Molten Metal Systems business of Morgan Advanced Materials offers complete range of premium quality crucibles and accessories for the melting, holding, treatment and casting of ferrous and non-ferrous metals and metal alloys. With five international manufacturing locations each in China, Germany, Brazil and two in India and a worldwide network of sales and marketing experts supplemented by hundreds of distribution partners, our products can be found in every corner of the globe

Morgan's foundry products are available in a comprehensive range of sizes and shapes, for optimum performance in individual application such as metal flow regulation, molten metal transfer, iron sampling, iron slagging, metal degassing and refractor coatings.

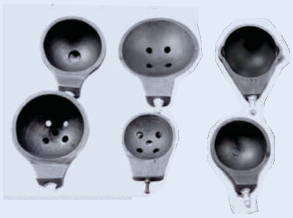
Since 1856, Morgan Molten Metal Systems (Morgan MMS) is a pioneer and a global leader in supplying technically advanced range of foundry products to the ferrous and non-ferrous foundries.

Ferrous & Non-Ferrous Foundry Products

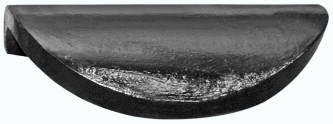
Nozzles

Stopper Rod

Morcem Cement



Skimmer Bowl



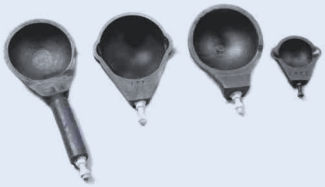
Converter Segment

Fall Chute Liner

Blue lightning

Degassing Rotor & Tubes

Launders



Ladle Bowls

Tubes & Plunger Mix

Rod, Tiles & Stirrers

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Advanced Thinking in Crucibles and Foundry Products

BLUE LIGHTNING

Morgan Advanced Materials

Morgan Blue Lightning Thermocouple Sheaths offer superior after protection, excellent service life, quick response and ease of use for aluminum and other non-ferrous melting and holding applications.

Morgan Blue Lightning Thermocouple Sheaths are available with either a ½" BSP, ¾" NPT pipe or without a pipe as a straight ceramic sheath for higher temperature copper applications. The pipe versions are also available as a complete pyrometer assembly to help speed-up installation and reduce labour costs.

DESIGN FEATURE	ADVANTAGE
Robust Design	Long Service Life
Non-Wetting Chemistry	Ease of Cleaning
	Low Dross Build -Up
	No Metal Contamination
Highly Conductive	Rapid Response Times
	Reduced Fuel Usage
	Good Thermal Shock Resistance
Simple Design	Quick Change Over
Integral Coating	No Coating Required
Assembly Available	Minimal Labor and No Downtime

Pyrometer Assembly

The pyrometer assembly comes ready for the tough foundry environment and is inspected and tested prior to shipment. They are specifically designed to provide a quick and technician free change of the existing pyrometer with no additional effort other than plugging in the new pyrometer and stainless steel sheath compensating cable.

Assembled, Tested and Includes:

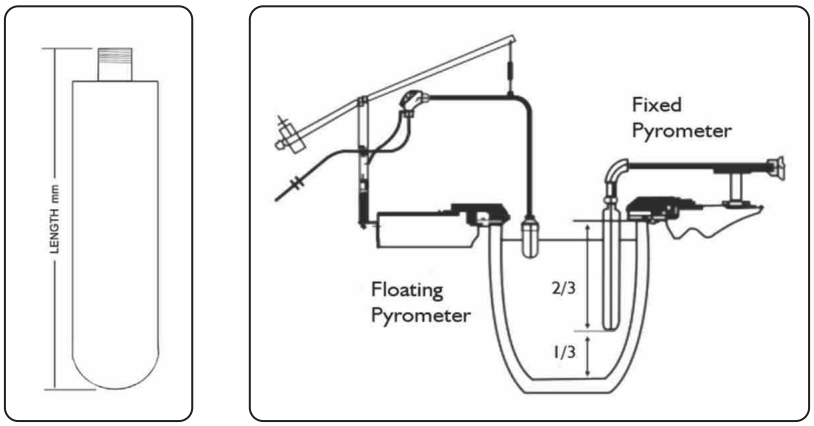
- Blue Lightning Thermocouple Sheath
- Thermocouple (Type K)
- Horizontal pipe and fittings
- Junction head and connectors
- Stainless sheathed lead(2m)
- Male connector
- Female connector(for connection to furnace)
- Calibration certificate

PYROMETER SHEATH

Choosing The Correct Length

Fixed Pyrometer - A pyrometer is normally recommended to be long enough to measure the temperature 2/3 from the top of the crucible.

Floating Pyrometer - ATS50329 Blue Lightning Thermocouples are often chosen to measure 100mm (4") from the top of the melt.



Floating and Fixed Thermocouple Sheath Mountings

PYROMETER SHEATH ONLY	COMPLETE ASSEMBLY	OUTSIDE DIAMETER (MM)	LENGTH (MM)	LENGTH (IN)	1/2" BSP PIPE	3/4" NPT PIPE	NO PIPE 25MM HOLE
ATS50232	ATS50232W A	50	232	9	✓		
ATS50329	ATS50329WA	50	329	13	✓		
ATS50486	ATS50486WA	50	486	19	✓		
ATS50639	ATS50639WA	50	639	25	✓		
ATS50791	ATS50791WA	50	791	31	✓		
ATS50879	ATS50879WA	50	879	35	✓		
ATS50943	ATS50943WA	50	943	37	✓		
ATS501096	ATS501096WA	50	1096	43	✓		
ATS501420	ATS501420WA	50	1420	56	✓		
ATC50329	ATC50329WA	50	329	13		✓	
ATC50486	ATC50486WA	50	486	19		✓	
ATC50639	ATC50639WA	50	639	25		✓	
ATC50791	ATC50791WA	50	791	31		✓	
ATC50943	ATC50943WA	50	943	37		✓	
ATC501096	ATC501096WA	50	1096	43		✓	
ATC501420	ATC501420W A	50	1420	56		✓	
VG44305	Not Available	44	305	12			✓
VG44457	Not Available	44	457	18			✓
VG44610	Not Available	44	610	24			✓
VG44762	Not Available	44	762	30			✓
VG44914	Not Available	44	914	36			✓
VG441067	Not Available	44	1067	42			✓

Above sizes are also supply in duplex type thermocouple

SiC DEGASSING ROTOR

Morgan has developed a one piece silicon carbide rotor and shaft for use in aluminium degassing. Morgan rotary degassing rotor has a high resistance to wear in service and has excellent anti oxidation properties providing a cost effective consumable for use in foundries degassing processes.

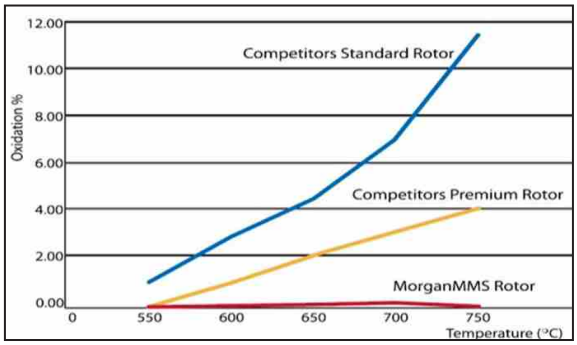
Features

- One piece shaft and rotor
- Wear resistant silicon carbide material
- Excellent oxidation resistance
- Rotor designed for effective gas dispersal
- Six vane rotor to reduce bubble size for better hydrogen removal

Advantages

- Efficient removal of hydrogen and unwanted particles
- Quick change over of rotor
- One piece construction
- Cost effective
- Long life

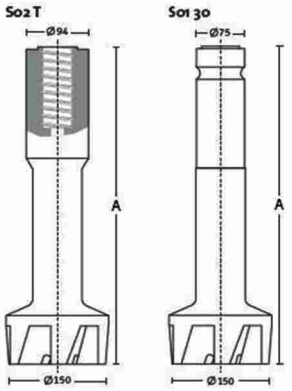
Tests show significantly lower oxidation levels at operating temperatures for the Morgan MMS silicon carbide rotor than for leading competitive products in other materials.

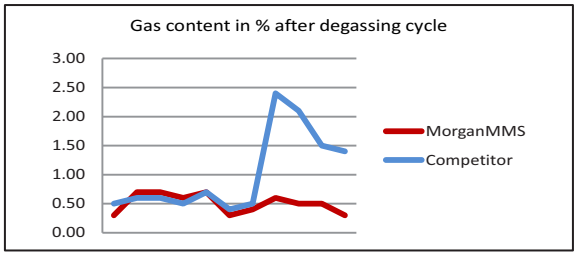


Product Dimensions:

Secondary DGR

Model	A (MM)
DGRU- 220	600 to 800
DGRU- 150-SO2T2	upto 1200
DGRU- 150 -SO130	upto 1200
DGRU- 180-SO2T2	upto 1200
DGRU- 180-SO130	upto 1200





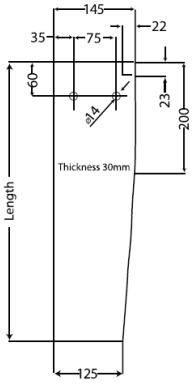
Primary DGR

Model	A (MM)
DGR-102	350-500
DGR-116	350-500

Anti Vortex Plate

To complement our degassing rotor, Morgan MMS also produces a clay graphite anti vortex plate. This plate is manufactured in a proven wear and oxidation resistant material. It will help stop the reintroduction of hydrogen and aluminium oxide particles into the treated molten aluminium by reducing the circular metal flow caused by the rotation of the degassing rotor.

BAFFLE PLATE	LENGTH	THICKNESS	TOP WIDTH	BOTTOM WIDTH
N25/600	600	25	125	140
N25/900	900	25	150	70
N25/900A	900	25	150	120
N25/500	500	25	145	125
N23/710	710	23	120	70
N25/440	440	25	110	90
N30/554	554	30	110	80



All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

DEGASSING SOLUTION

Degassing Machines

- Morgan offers Rotary Degassing System - a complete solution to degassing needs of foundries.
- The machine can be trolley/pillar mounted or hoist-able. The machine operation is easily controlled using a Human-Machine Interface (HMI) touch screen interface.
- The various interlocks provided in the machine and the variable speed drive to control shaft rotation& ensure total operation safety.
- These machines can be supplied with automated flux-feeders and baffle plate movement attachments.

Reduced Pressure Testing

The Reduced Pressure Tester has been developed solely for the purpose of giving a visual indication of the gas content in the aluminum melt. RPT ensures cooling of a molten aluminum sample in a reduced pressure atmosphere. The key purpose of RPT is making samples for visual inspection of excessive gas entrapment and check Density / Density Index.

Acceptable Level
(No Porosity)

Unacceptable Level
(Porosity Result)

Density Index Unit

- We offer a solution to measure the purity of metal after degassing. The unit consists of weighing pan assembly, stainless steel base for glass beaker, optional sinker for testing materials that have density less than that of water and software for density and density index determination.
- Our DI Unit offers stability up to a resolution of 6 million counts.
- We can configure the density of a liquid other than water for DI calculation.
- The calculations and readings are stored on a computer that is connected to the DI Unit, thus ensuring hassle-free data recording and storage.

PLUNGER MIXTURES

Morgan Advanced Materials

Plunger mixtures are used for plunging of degassing or treatment tablets into aluminium or for stirring ferro alloy additions into cast iron. They are available with or without a steel reinforcing rod for additional strength.

PATTERN	PART DESCRIPTION	LENGTH (MM)	HANDLE DIA. (MM)	HEAD O.D. (MM)	HEAD I.D. (MM)	COMMENTS	APPLICATION METAL	CRUCIBLE CAPACITY	HOLES
VM86	Plunger mixer	318	32	64	38	Solid Handle	Al,Cu,Fe	up to 45kg	3
VM244	Plunger mixer	432	32	102	38	Solid Handle	Al,Cu,Fe	45-160Kg	3
VM286	Plunger mixer	610	51	120	69		Al,Cu,Fe	188kg	3
VM286A	Plunger mixer	610	51	120	69	16mm dia steel reinforcing rod	Al,Cu,Fe	180kg	3
VM293	Plunger mixer	762	51	120	69		Al,Cu,Fe	270kg	3
VM293A	Plunger mixer	762	51	120	69	16mm dia steel reinforcing rod	Al,Cu,Fe	270kg	3
VM915	Plunger mixer	870	51	115	65		Al,Cu,Fe	450kg	3
VM915A	Plunger mixer	870	51	115	65	16mm dia steel reinforcing rod	Al,Cu,Fe	450kg	3
VM305	Plunger mixer	915	51	120	69		Al,Cu,Fe	450kg	3
VM305A	Plunger mixer	915	51	120	69	16mm dia steel reinforcing rod	Al,Cu,Fe	450kg	3
VM1350A	Plunging Bell	1350	50	130	105	5/8" BSW steel reinforcing rod	Al,Cu,Fe	450kg	3
VM1700A	Plunging Bell	1735	140	327	265	60mm dia steel reinforcing rod.	Al,Cu,Fe	450kg	4-150x45

These products perform best at temperatures below 1600° C

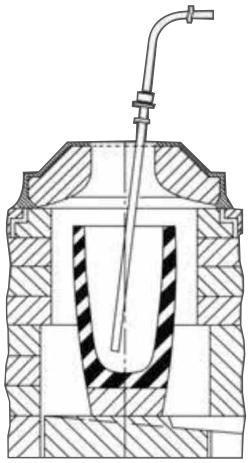
DEGASSING TUBES

Morgan Advanced Materials

A simple and convenient tool specifically designed to meet the requirements of refiners and foundry men for manual nitrogen degassing.

Flushing the molten metal with nitrogen is a simple and inexpensive way to ensure that the melt is gas-free and helps ensure against gas porosity.

Morgan Degassing Tubes are supplied with porous plugs also, which disperses small gas bubbles & ensures uniform gas distribution. Threaded variants are available to facilitate required extension.



PATTERN	PART DESCRIPTION	OUTSIDE DIAMETER (MM)	INSIDE DIAMETER (MM)	LENGTH (MM)	COMMENTS	APP METAL	ATTACHMENT THREAD	TUBE TYPE
VGI50450RI	Porous plug Degassing Tube	50	13	450		Al,Cu	1/4 BSP Steel tube	Porous plug
VGT394	Degassing Tube	38	13	457	Available unthreaded	Al,Cu	1.0" BSP	Open end
VGT449	Degassing Tube	38	13	610	Available unthreaded	Al,Cu	1.0" BSP	Open end
VGT392	Degassing Tube	51	13	700	Available unthreaded	Al,Cu	1.5" BSP	Open end
VGT750RI	Porous plug Degassing Tube	65	10	730		Al,Cu	½" X 4 BSP	Porous plug
VGT600RI	Porous plug Degassing Tube	51	13	600		Al,Cu	½" X 4 BSP	Porous plug
VGT700RI	Porous plug Degassing Tube	51	13	700		Al,Cu	3/8 BSP Steel tube	Porous plug
VGT55750	Degassing Tube	55	23	750	Available unthreaded	Al,Cu	French thread	Closed end
VGT800	Degassing Tube	48	13	800	Available unthreaded	Al,Cu	1.5" BSP	Closed end
VGT461	Degassing Tube	51	13	914	Available unthreaded	Al,Cu	1.5" BSP	Open end
VGT914	Degassing Tube	48	13	914	Available unthreaded	Al,Cu	1.5" BSP	125MM Bell
VGT950	Degassing Tube	51	13	950	Available unthreaded	Al,Cu	1.5" BSP	Closed end
VGT51950	Degassing Tube	51	13	950	Available unthreaded	Al,Cu	1.5" BSP	Closed end
VGT1000RI	Porous plug Degassing Tube	51	13	1000	Available unthreaded	Al,Cu	1.5" BSP	Porous plug
VGT1200RI	Porous plug Degassing Tube	51	13	1200	Available unthreaded	Al,Cu	1.5" BSP	Porous plug
VGT1200	Degassing Tube	51	13	1200	Available unthreaded	Al,Cu	1.5" BSP	Closed end
VGT51200	Degassing Tube	51	20	1200	Available unthreaded	Al,Cu	1.5" BSP	Threaded end
VGT462	Degassing Tube	51	13	1220	Available unthreaded	Al,Cu	1.5" BSP	Open end
VGT1400RI	Porous plug Degassing Tube	51	13	1400	Available unthreaded	Al,Cu	1.5" BSP	Porous plug
VGT1400	Degassing Tube	51	13	1400	Available unthreaded	Al,Cu	1.5" BSP	Open end
VGT 225RI	Porous plug Degassing Tube	51	13	225	Available unthreaded	Al,Cu	1.5" BSP	Porous plug
VGT 450RI	Porous plug Degassing Tube	51	13	450	Available unthreaded	Al,Cu	1.5" BSP	Porous plug

These products perform best at temperatures below 1600° C

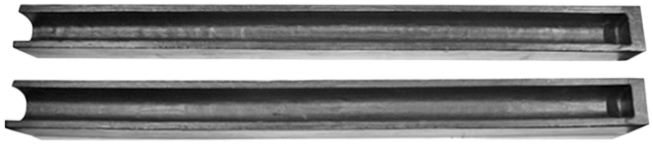
All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

LAUNDERS

Morgan Advanced Materials

Pre-fired shapes for the transfer of ferrous and non-ferrous metals from furnace to furnace or from furnace to ladle. Launders provide a metal transfer system that has a high resistance to erosion and is virtually maintenance-free when installed properly. Available in many sizes to suit most runner systems. Also suitable for use as spouts in:

- Teapot Casting Ladles
- Induction Furnaces
- Electric Resistance Furnaces



PATTERN	WIDTH (MM)	DEPTH (MM)	LENGTH (MM)	APPLICATION METAL	CHANNEL (MM)
N3/152	152	44.5	521	Al,Cu,Fe	89x44.5
N3/201	201	75	470	Al,Cu,Fe	147X75
N3/140	140	175	445	Al,Cu,Fe	80X175
N3/400	400	250	600	Al,Cu,Fe	320X250
N3/700	240	100	700	Al,Cu,Fe	180X100
N3/580	160	80	1040	Al,Cu,Fe	98X80
N3/330	330	110	1200	Al,Cu,Fe	250X110
N3/180	180	67	700	Al,Cu,Fe	140X67
N3/190	240	90	1220	Al,Cu,Fe	190X90
N3/150	140	100	500	Al,Cu,Fe	100X100
N3/500	280	230	500	Al,Cu,Fe	196X230
N3/1200	200	110	1200	Al,Cu,Fe	140X110
N3/2110	160	110	2110	Al,Cu,Fe	100X110
N3/470	240	90	470	Al,Cu,Fe	190X90
N3/8	405	203	1020	Al,Cu,Fe	305X203
N3/6K	254	51	300	Al,Cu,Fe	160X51
N3/6H	268	103	179	Al,Cu,Fe	180X103
N3/100	100	54	457	Al,Cu,Fe	54X54
N3/780	100	54	780	Al,Cu,Fe	54X54
N3/915	100	54	915	Al,Cu,Fe	54X54
N3/200	100	54	1000	Al,Cu,Fe	54X54
N3/1150	100	54	1150	Al,Cu,Fe	54X54
N3/378	162	67	305	Al,Cu,Fe	102X67

These products perform best at temperatures below 1600° C

Morgan Advanced Materials

PATTERN	WIDTH (MM)	DEPTH (MM)	LENGTH (MM)	APPLICATION METAL	CHANNEL (MM)
N3/350	162	67	350	Al,Cu,Fe	102X67
N3/375	162	67	405	Al,Cu,Fe	102X67
N3/50A	162	67	540	Al,Cu,Fe	102X67
N3/377	162	67	560	Al,Cu,Fe	102X67
N3/376	162	67	570	Al,Cu,Fe	102X67
N3/379	162	67	700	Al,Cu,Fe	102X67
N3/372	162	67	840	Al,Cu,Fe	102X67
N3/50	162	67	1000	Al,Cu,Fe	102X67
N3/371	162	67	1100	Al,Cu,Fe	102X67
N3/373	162	67	1145	Al,Cu,Fe	102X67
N3/374	162	67	1220	Al,Cu,Fe	102X67
N3/380	162	67	1370	Al,Cu,Fe	102X67
N3/51	162	67	1500	Al,Cu,Fe	102X67
N3/52	162	67	1600	Al,Cu,Fe	102X67
N3/53	162	67	1325	Al,Cu,Fe	102X67
N3/667	162	117	610	Al,Cu,Fe	108X117
N3/665	162	117	840	Al,Cu,Fe	108X117
N3/660	162	117	1000	Al,Cu,Fe	108X117
N3/666	162	117	1145	Al,Cu,Fe	108X117
N3/668	162	117	2135	Al,Cu,Fe	108X117
N3/643	268	164	430	Al,Cu,Fe	188X164
N3/676	268	164	760	Al,Cu,Fe	188X164
N3/685	268	164	850	Al,Cu,Fe	188X164
N3/6100	268	164	1000	Al,Cu,Fe	188X164
N3/6	268	164	1219	Al,Cu,Fe	188X164
N3/6140	268	164	1400	Al,Cu,Fe	188X164
N3/47A	114	82	610	Al,Cu,Fe	76X82

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LADLE LINERS

Morgan Advanced Materials

Introduction & Application

These are clay graphite products used for replacing the transfer ladle and holding ladle refractory lining. They have non-wetting property which provides longer lining life. They are available with baffle plates. Any other specific customization request can be worked upon. They provide best performance below 1600 ^{0}C. A few of their characteristics include high erosion resistance, quick pre-heating, very high thermal shock resistance and ability to maintain temperature for a long time. They are easy to replace and repair there by reducing downtime and labor cost.

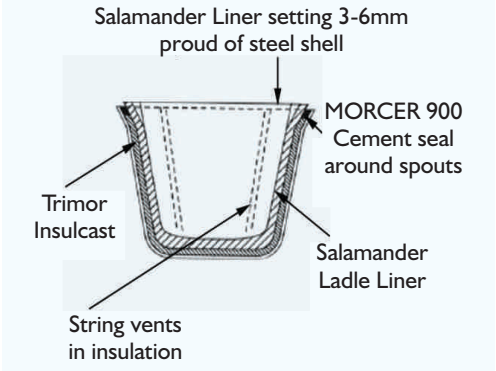
Venting the Ladle

- Ladle shells should be vented to ensure the release of moisture from the Insulcast. Shells with a capacity less than 150 Kg should have four 6mm holes in the base (Including one in the centre) and four around the side, well-spaced out. Shells with a capacity above 150Kg should have five 6mm holes in the base and six around the side.
- The setting material should be vented using two lengths of string or "spun yarn" tied vertically around the liners so as to make four vents, or for liners over 150 Kg capacity, three lengths to make six vents.

Assembly of Liners
in Steel Ladles

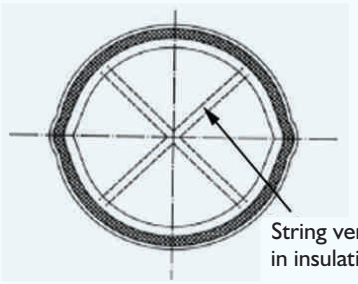
Installing the Liner

- Place a thick layer of Insulcast in the bottom of the shell.
- Bed the liner down firmly, squeezing the setting material up the sides until the liner is level with the bottom of the shell.
- Ram more Insulcast down from the top all around, so that the liner is firmly supported. The liner will rise during ramming, and should finish up 3 – 6mm above the top of the shell.



Drying the Ladle

- The refractory materials should be allowed to air-set over night.
- Dry thoroughly for several hours, by torch or in an oven or by firing wood inside.
- Seal the joint between ladle and liner around the pouring spouts only, with 12mm depth of Salamander Morcem 900 mixed with water to a putty consistency. Do not seal the vents.
- Thoroughly pre-heat cold ladles, as usual, before use.



Warning

It is dangerous to pour molten metal into a newly lined ladle, which has not been properly dried. New ladles should not be filled until all emission of steam has ceased and the liner should be sufficiently hot to char a piece of paper

These products perform best at temperatures below 1600° C

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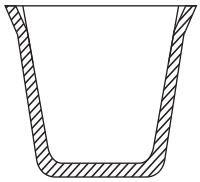
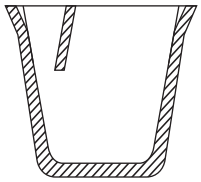
Salamander Super clay graphite ladle liners are available in the following sizes and can also be supplied with bottom pour arrangement (riser tube and cover plate).

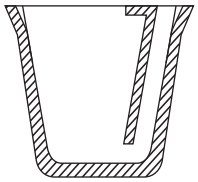
SALAMANDER CLAY GRAPHITE	TOD (MM)	HEIGHT (MM)	BOD (MM)	BRASS CAPACITY (KG)	BRIMFUL CAPACITY (WATER LITRES)
L415	181	187	130	19	2.4
L417	241	257	162	46	5.8
L457	305	241	214	76	9.7
L266	314	266	214	89	11.3
L458	324	289	214	91	11.6



Standard



With riser tube



With riser tube and cover plate

The following sizes are available as Excel silicon carbide ladle liners and also with bottom pour arrangement (riser tube and cover plate).

SALAMANDER EXCEL SILICON CARBIDE	TOD (MM)	HEIGHT (MM)	BOD (MM)	BRASS CAPACITY (KG)	BRIMFUL CAPACITY (WATER LITRES)
LX441	340	329	221	121	15.4
LX482	360	385	214	147	18.7
LX456	432	442	311	284	35.8
LX483	466	541	386	441	56.1
LX481	565	578	474	725	92.0
LX751	626	692	556	1100	140.8

Notes:

- Pattern L is Salamander Super clay graphite
- Pattern LX, LBX & LTX are Salamander Excel carbon bonded silicon carbide
- Working capacity is calculated as 90% of the brimful capacity when melting brass, specific gravity 8.75

These products perform best at temperatures below 1600° C

STOPPER ROD

Morgan Advanced Materials

Introduction & Application

Morgan Molten Metal Systems has developed its new product range of stopper rods (or monoblock stoppers) for ferrous applications. After conducting various laboratory trials to select the right materials and optimum process parameters, Morgan has launched its stopper rods for the ferrous foundry application.

These stoppers are mainly used in auto-pour applications i.e. unheated tundish systems as well as press-pour systems. Morgan's stopper rods are based on alumina-graphite compositions which are primarily for grey and ductile iron applications. The ceramic-bonded stopper rods have a refractoriness of 1600-1700°C with significant strength and erosion resistance. Morgan's advanced technology of material processing results in homogeneous structure, which further yields excellent performance at customers' applications. Morgan can prepare the open and closed stopper rods for iron foundries. The open stopper rods are for ductile iron applications where plunging and purging of the nozzle is needed to ensure continuous flow of molten metal. The closed stopper rod is for grey iron applications where there is no purging or plunging. For every length and diameter, Morgan can prepare closed or open ended stopper rods.

Stopper Rod in Operation

3-D view of Stopper Rod

Physical Properties

Apparent Porosity	15 % - 17 %
Bulk Density	2.2 - 2.3 gm/cc
C.C.S.	20 - 24 MPa

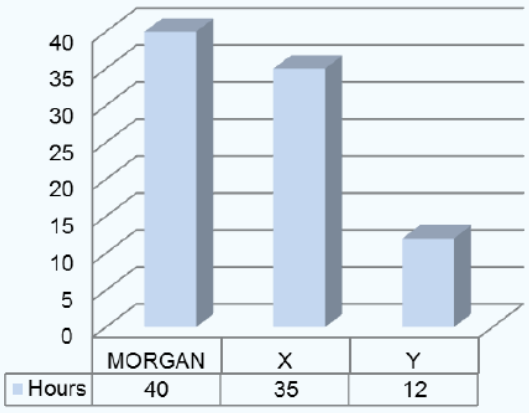
Chemical Composition

Carbon	32 % - 36 %
Al_2O_3	12 % - 16 %
SiO_2	33 % - 37 %
Si	04 % - 06 %
Na_20, K_20, Fe_2O_3, B_2O_3 & others	08 % - 10 %

Proven Success

Morgan stopper rods have been tested at various global sites. Foundries have appreciated the robustness of the product and its consistency in quality. An Asian foundry has reported the performance, in terms of casting hours of suppliers 'X' and 'Y' in order to compare with Morgan's stopper rod. Morgan provided 3 samples for trial and the stopper rods showed a consistent performance of 40 casting hours. However, 'X' performed for 35 casting hours and 'Y' lasted for 12 casting hours with inconsistencies. Morgan's performance has reduced the changeover time, thereby reducing labour costs and production downtime as well as reduced metal loss. The performances of the stopper rods at the foundry are shown, adjacently.

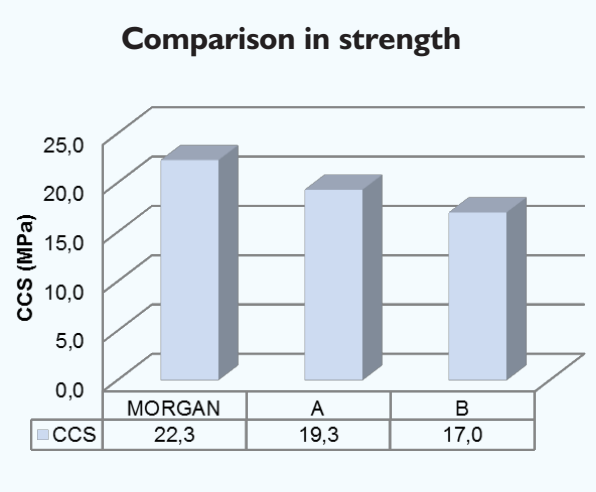
Performance at Foundry



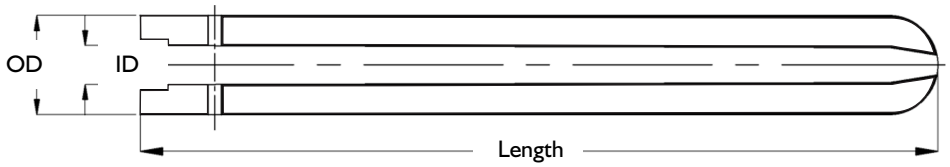
All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

Strength: A Measure of Performance

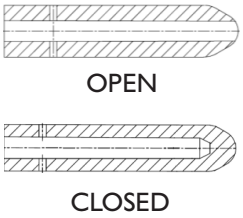
As we carried out several laboratory trials before launching the product, our customers informed us that the strength is the top parameter for this product range due to its high stress application. Pouring application is controlled by the continuous lifting and dropping of the stopper rod, where the nose (curved region) is striking against the nozzle. Therefore Morgan carried out some Cold Compression Strength (CCS) tests in order to determine the right mix and create a comparison with the competition. It can be observed in the graph below that the Morgan stopper rod exhibits a 14-24% increase in strength in comparison to 'A' and 'B', which are samples taken from other suppliers, which implies less damage to the stopper rod leading to consistent metal flow during casting.



Salamander Super "Iso pressed" Stopper Rod



Stopper Rod schematics



PATTERN	NOSE TYPE	LENGTH	OD	TOP ID	BORE ID
Stopper rod 400x90	Closed	400	90	42	
Stopper rod 403x90	Closed	403	90	42	
Stopper rod 403x90	Open	403	90	42	30
stopper rod 450x90	Closed	450	90	42	
stopper rod 475x90	Closed	475	90	20	
stopper rod 475x105	Open	475	105	42	40
Stopper rod 500x90	Closed	500	90	42	
Stopper rod 500x90	Open	500	90	42	38
Stopper rod 635x108	Closed	635	108	37	
Stopper rod 710x105	Closed	710	105	43	
Stopper rod 858x106	Closed	858	106	42	21
Stopper rod 900x105	Closed	900	105	35	35
Stopper rod 1168x114	Open	1168	114	37	32
Stopper rod 1168x120	Open	1148	120	38	34

NOZZLE

Introduction & Application

Nozzles are ideal for bottom pour ladles and auto pour systems providing good casting quality, higher productivity and increased safety in the plant environment. The refractory, clay graphite materials used for making these nozzles have been thoroughly researched and experimented upon to provide enhanced life in extremely tough environment.

Perfect seating radius without metal leakage over multiple openings at high operating temperatures, along with excellent erosion resistence, form the primary characteristics of Morgan Nozzles. We can provide reverse tapered nozzles (RT) as well as oblique nozzles (O).

Refractory Nozzle

Clay Graphite Nozzle

Physical Properties

Apparent Porosity	18 % - 22 %
Bulk Density	2 - 2.3 gm/cc

Chemical Composition

Carbon	Not present
Al_2O_3	51 % - 53 %
SiO_2	40 % - 42 %
SiC	Not present
Others	06 % - 09 %

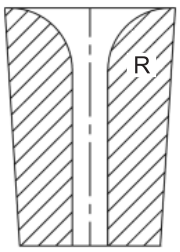
Physical Properties

Apparent Porosity	20 % - 28 %
Bulk Density	2.1 - 2.3 gm/cc
C.C.S.	200 - 300 Kg/cm^2
P.C.E.	35 - 37 Orton Cone

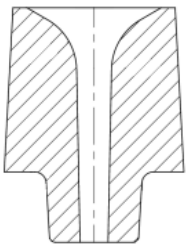
Chemical Composition

Carbon	12 % - 14 %
Al_2O_3	52 % - 54 %
SiO_2	25 % - 27 %
Others	05 % - 10 %

PATTERN	NOSE TYPE	LENGTH	OD	TOP ID	BORE ID
NOZZLE 475	139	76	165	50	22,28
Nozzle 517	140	110	155	40	20,35,50
Nozzle 474	108	76	165	32	20,22,25,28,35,38,45
Nozzle -503	120	90	160	50	24,30,55
Nozzle 469	107	73	224	50	20,25,29,34,40,45
Nozzle 447	120	90	129	50	25,35,40
Nozzle 505	120	90	200	50	30,38
Nozzle 502	140	100	210	50	70
Nozzle 469.1	108	73	228	50	20,25,29,35,40
Nozzle NZS1	139	99	200	50	16,18,20,25,30,35,38, 40,45,50,55,60,60,70
Nozzle 494	139	77	200	50	22,24



Oblique Nozzle schematic



Reverse Tapered Nozzle schematic

Both reverse tapered & oblique nozzles are available in refractory as well as clay graphite materials.

All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

STOPPER HEAD

Morgan Advanced Materials

A complete range of Salamander™ Plumbago stoppers for bottom pour ladles is available in a range of sizes and designs. Morgan stopper rod ends are used by attaching to a steel rod, which is sheathed with refractory tubes for protection from the molten metal.

Our stoppers do not stick to the ladle nozzle when lifted and consistently reseal without leaks when closed off. Multiple openings while pouring a single ladle, without any leakage or nose erosion/ sticking are primary characteristics of Morgan stoppers.

Physical Properties

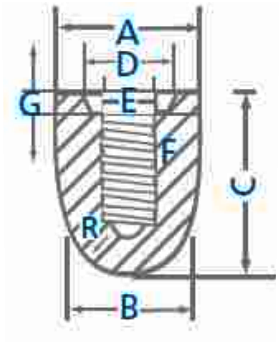
Apparent Porosity	20 % - 28 %
Bulk Density	2.1 - 2.3 gm/cc
C.C.S.	200 - 300 Kg/cm^2
P.C.E.	35 - 37 Orton Cone

Chemical Composition

Carbon	12 % - 14 %
Al_2O_3	52 % - 54 %
SiO_2	25 % - 27 %
Others	05 % - 10 %

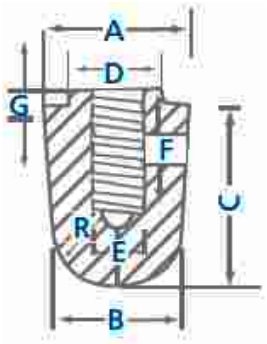
Salamander Super Stopper Head S Type

NOMINAL DIA	PATTERN NO	A	B	C	D		E	F	G	R	P
90	S.0	90	80	120	68	62	33.5 / 23.5	13	12	40	6
105	S.1	105	90	130	78	72	38.5 / 28.5	13	12	45	6
120	S.2	120	110	125	86	72	38.5 / 28.5	13	12	55	6
140	S.3	140	120	145	86	72	38.5 / 28.5	13	12	60	6
155	S.4/2	155	130	155	97	82	38.5 / 28.5	13	12	65	6
170	S.5	170	130	170	115	97	38.5 / 28.5	13	12	65	6



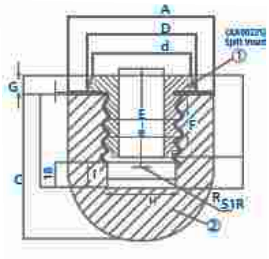
Salamander Super Stopper Head RS Type

NOMINAL DIA	PATTERN NO	A	B	C	D	E	F	G	R	P
89	Rs22	89	86	114	57/56	29/21	13	10	43	6
100	RS23	100	88	120	64/62	40/30	13	10	44	6
115	RS24	115	106	145	70/68	38/28	12	10	54	6
130	RS26	130	110	120	72/70	40/30	12	10	55	6
125	M10	125	108	140	81/71	40/30	12	14	58	6



Salamander Super RS Stopper Head and Screw

NOMINAL DIA	PATTERN NO	A	B	C	D	E			F	G	R	P
90	RS395	90	84	105	64	63	58	50	12	10	44	4
102	RS431	102	100	103	57	47.5	48	47	12	12	51	4
102	RS442	102	100	109.5	57	47.5	41.5	40.5	12	9.5	51	4
102	RS439	102	100	103	57	47.5	48	47	12	12	51	4
115	RS415	114.5	111	108	57	47.5	47.5	47.5	12	24	55.5	4
152.5	RS414	152.5	150	149	101.5	92	85.5	85.5	12	28	38	4
115	RS441	114.5	111	108	57	47.5	55	45.5	12	12	56	4
120	RS438	120	104	125	69	59.5	54	53	12	9.5	55	4
100	RS23 Roto	100	88	130	64	63	58	50	12	10	44	4
115	RS24 Roto	115	102	145	64	63	58	50	12	10	51	4
130	RS26 Roto	130	110	120	64	63	58	50	12	10	55	4
155	RS4/2 Roto	155	130	155	99	92	90	56	12	10	65	4



All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

SKIMMERS

Morgan Advanced Materials

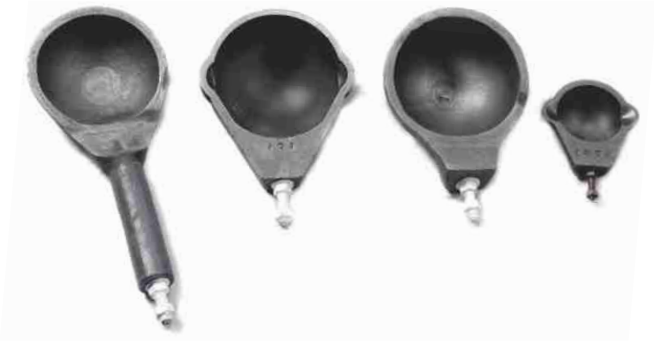
Clay Graphite skimmers are designed for easy and efficient removal of dross and dirt from all types of molten metal. They are supplied with a threaded bolt for easy attachment to a handle and have holes for draining the molten metal back into the furnace, reducing waste. Excellent erosion resistance & non wettability by slag or molten metal imparts excellent life & ease of operations to the product

PATTERN	PART DESCRIPTION	DIAMETER (MM)	LENGTH (MM)	CAPACITY (CC)	COMMENTS	APP METAL	BOLT THREAD	DRAIN HOLES
Vk85	Flat Skimmer	64	305	0	Skimming Aluminium dross	Al,Cu	N/A	19 x 64 mm flat Skimmer
VK18	Flat Skimmer	75	460	0	Skimming Aluminium dross	Al,Cu	N/A	75 x 25 mm Flat Skimmer
N25/305	Flat Skimmer	127	254	0	Slagging Lge Induction Fnces	Fe	10mm	127 x 51 mm Flat Skimmer
VB18/1A	Skimmer Bowl	130	160	260	Slagging small ladles	Cu,Fe	10mm	1 x 40 mm Hole
VB18/2A	Skimmer Bowl	130	160	260	Slagging small ladles	Cu,Fe	10mm	1 x 20 mm Hole
VB18/3A	Skimmer Bowl	130	160	260	Slagging small ladles	Cu,Fe	10mm	3 x 12 mm Hole
NB28/5	Skimmer Spoon	150	209	0	Removing dross and slag	Al,Cu,Fe	10mm	5 Holes
NB28/5A	Skimmer Spoon	150	209	0	As NB28/5 with scraper	Al,Cu,Fe	10mm	5 holes+Scraper
NB31	Skimmer Bowl	207	279	2000	Removing dross and slag	Al,Cu,Fe	16mm	1 Hole
VB8/2A	Skimmer Bowl	220	260	1800	Slagging large ladles	Cu,Fe	16mm	6 Holes
VB8/4A	Skimmer Bowl	220	260	1800	Slagging Induction Fnces.	Fe	16mm	1 Hole
VB8/6A	Skimmer Bowl	220	260	1800	Slagging Induction Fnces.	Fe	16mm	1 Hole
VB8/8A	Skimmer Bowl	220	260	1800	Slagging Induction Fnces.	Fe	16mm	1 Hole
VB8/5A	Skimmer Bowl	230	260	1800	Slagging Induction Fnces.	Fe	16mm	1 Hole
NB32/1	Skimmer Spoon	250	320	0	Slagging Induction Fnces.	Cu,Fe	16mm	1 Hole
NB32/4	Skimmer Spoon	250	320	0	Slagging Induction Fnces.	Cu,Fe	16mm	4 Holes
VB28/1	Skimmer Bowl	220	260	1800	Slagging Induction Fnces.	Fe	16mm	1 Hole
VB31/5	Skimmer Bowl	207	279	1800	Slagging Induction Fnces.	Fe	16mm	5 Hole
VB20/1A	Skimmer Bowl	110	180	0	Slagging Induction Fnces.	Fe	10mm	1 Hole
NB8/7A	Skimmer Spoon	190	260	0	Slagging Induction Fnces.	Cu,Fe	16mm	1 Hole
VB5AEXT	Skimmer Spoon	180	250	0	Slagging Induction Fnces.	Cu,Fe	16mm	1Hole

These products perform best at temperatures below 1600° C

LADLE BOWLS

The best method of taking molten metal samples and for skimming slag from induction furnaces and ladles. The products are supplied in a range of sizes from 275 cm^3 to 2000 cm^3 capacity, and are designed for obtaining samples for spectrographic analysis, test bars and thermal analysis samples. Molten metal samples can be retrieved in a cost efficient way, free from contamination of dirt, which is close to the temperature of the bulk metal being sampled (important for thermal analysis).



TYPE	APPROXIMATE CAPACITY (cc)	APPROXIMATE CAPACITY (kgs iron)	MAIN USES
NB10	275cc	1.8	Taking molten metal samples for analysis
NB20	1100cc	7.5	Casting test bars and small castings
NB30	2000cc	14.0	Molten metal transfer and small castings
VB18A	260cc	1.8	Taking molten metal samples for analysis
VB4A	295cc	2.0	Taking molten metal samples for analysis
VB5A	510cc	3.6	Casting test bars and small castings
VB8A	1800cc	13.75	Metal transfer and small castings
VB25A	3170cc	22.0	Molten metal transfer
VB271 A	4000cc	28.0	Molten metal transfer
VB180 EXT	2000cc	15.72	Casting test bars and small castings
VB8A EXT	2000cc	15.72	Metal transfer and small castings
VB175 EXT	1500cc	11.79	Molten metal transfer

SAMPLING SPOONS

Sampling spoons with an integral handle for taking small samples of molten metal for analysis or for removing dirt and dross from small crucibles.

PATTERN	DIAMETER (MM)	LENGTH (MM)	CAPACITY (CC)	COMMENTS	APPLICATION METAL	CAPACITY (KG) AL
VB56	44	241	10	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.023
VB35	60	335	10	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.023
VB66	51	356	30	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.075
VB394	30	394	5	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.012
VB316	44	457	10	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.023
VB590	30	590	5	Al,Au,Ag sampling	Al,Cu,Ag,Au	0.012

These products perform best at temperatures below 1600° C

MORCEM 900

Morgan Advanced Materials

Morcem 900 is a high quality carbonaceous refractory cement which is supplied dry and merely requires mixing with water to be ready for use. It is extensively used in foundries and steelworks for many applications associated with jointing carbon or graphite-based materials, and can also be used for providing a protective coating for refractories in contact with molten metal.

Working Instructions

Mixing

The material readily lends itself to mixing manually in any convenient container. Water should always be added to the powder, the amount being dependent upon the intended application. As a general guide, when the material is to be used as cement, water should be added in the ratio of 1:4 by volume. In applications where it is essential to obtain a strong air set joint prior to firing, the material must be mixed with boiling water. If green strength is not important, cold water may be used.

Jointing

The surfaces to be joined should be brushed or blown free of dust and then 'wetted' but not soaked. This is particularly important where porous and unglazed surfaces are to be cemented. A thin layer of cement is then applied to both surfaces and the pieces squeezed together. Excess material which has exuded from the joint should be removed and the cement allowed to set. Care should be exercised in preventing the jointed parts from moving during the air setting period. This will vary from 1/2 hour for material mixed with hot water, to several hours for material mixed with cold water.

Drying

It is dangerous to permit molten metal to come into contact with any refractory material which has not been thoroughly dried, therefore cemented articles must be subject to a drying procedure. Ideally, where time and facilities are available, the cemented assemblies should be left to air dry overnight and then heated moderately in an oven or with a gas torch until they dry. Less effective alternatives are to dry the joint with a gas torch immediately or stand the pieces in a warm place for a prolonged period. Whichever method is adopted, the first heating of the joint to 'red heat' should be done as slowly as possible.

Firing

The joint only attains its maximum strength after firing to temperature of about 1200°C. Therefore, care should be taken not to stress the joint until this temperature has been reached.

Properties

Morcem 900 is a plumbago based material with added silicon carbide, providing a high strength refractory cement with excellent resistance to oxidation, metal penetration and slag attack. To achieve optimum results the material must be mixed and applied according to the 'Working Instructions'.

The following figures are based on average data obtained from current production quality control tests on the material.

Storage

It is recommended that the material is stored in a cool, dry place and that partially used sacks are resealed to prevent moisture pick up. Morcem 900 is a stock item and is supplied in 25kg paper sacks (Morcem 900D) and 7kg plastic buckets (Morcem 900E).

Cold Crushing Strength Measured on 25mm Cube

Dried to	212°F	1112°F	1832°F	2192°F
kg/cm^2	123	125	179	506
P.S.I	1750	1820	2540	7251

Nominal Chemical Analysis

	%		%
SiO_2	15	Fe_2O_3	6
SiC	30	B_2O_3	1.5
C	29	Na_2O	0.4
Si	13	K_2O	0.3
Al_2O_3	4	MgO	0.2
		CaO	0.6

MORCEM 2C/3C

MORCEM 2 is a two part, thermally conductive, high performance cement, specially developed by Morgan Molten Metal Systems for applications involving contact with liquid metals and slags. When mixed, a chemical hardening takes place, which does not need any additional drying or heating. There is a slight expansion and the hardened cement reaches a very high mechanical strength. It is suitable for applications where the temperature does not exceed 1650 C . MORCEM 2 cement is supplied in two parts, MCM2 a dry powder and MCM3 a liquid component.

Advantages

- Quick preparation of only a few minutes.
- Cold setting without drying and heating.
- Slight expansion of 1 %.
- Very strong crushing strength, high refractory & high thermal conductivity
- Very high resistance to erosion by molten metals & liquid slags.
- Very high resistance to corrosive atmospheres.

Preparation

- Ensure that the surfaces where MORCEM 2 cement will be applied are dry and free from any dust or solid particles.
- Place the MORCEM MCM3 in a suitable plastic container.
- Brush a coating of MCM3 onto the surfaces to be joined. This will accelerate the chemical setting of MORCEM 2 cement.
- Mix the MCM2 powder with the liquid MCM3 left. The use of an electric mixer fitted with a centrifugal turbine wheel is recommended. (Rotation speed of 1000 rev/minute, to obtain a good mixture of MCM2 and MCM3).
- The MORCEM 2 cement is now ready to use. Use the cement immediately.
- Cold setting of the MORCEM 2 cement begins as soon as the mixture is ready. Use within 10 minutes of mixing for best results.
- Keep the cement dry and vibration free for 24 hours to ensure maximum strength and properties.
- MORCEM 2 cement can be used without drying or preheating.

Applications

MORCEM 2 cement can be used in many applications, especially in the iron and steel, non-ferrous and ceramic industries. These include:

- Jointing refractories with each other
- Coating for old refractories to protect them against attack by molten metals & fluxes. It also protects graphite pieces in the refractory against oxidation.
- Sticking of refractories to metals, sealing of thermocouple sheaths to steel tubes & also sticking refractories to refractories, refractories to ceramics & fibres to metals
- Coating by brushing or spraying on refractories, iron and steel. MCM3 can be used by itself for this application but gas firing is necessary to obtain a superficial hardening

Composition of MORCEM 2 cement before cold setting

Composition Before Cold Setting

	Dry Powder	Wet Mix
SiC	43-45%	30%
Si	19-20%	13%
Al_2O_3	14-15%	10-15%
SiO_2	11-12%	8%
Alkali	2%	1.5%
P_2O_5	-	20-30%
	+ferrous and titanium oxides	+ferrous and titanium oxides

Typical conductivity values:
0.020 - 0.023 cal/cm/co/sec

Packing

MORCEM MCM2 cement is supplied in watertight pla stic bags and the

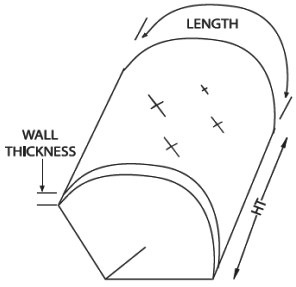
MORCEM MCM3 liquid hardener in plastic drums.

Packing

	Packing No 1	Packing No 2
Morcem MCM2 Cement	15 KGs	5 KGs
Morcem MCM3 Liquid	4.5 Litre	1.5 Litre

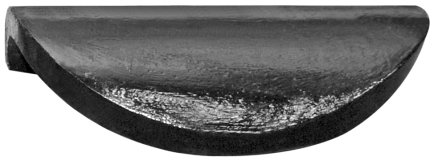
GF CONVERTER SEGMENTS

Morgan Converter segments offer an economic alternative consumable for foundries converting cast iron to ductile iron using the George Fischer process. Produced in clay graphite under quality controlled conditions, Morgan converter segments are manufactured in a range of sizes to suit customers' requirements.



Application

The segments are placed in bottom of the George Fischer converter vessel to form a chamber into which magnesium is placed from outside the vessel. When the vessel is rotated, the molten iron is introduced into the chamber in a controlled manner through holes in the segment plate. The magnesium is then vaporised by the iron and de-sulphuries and nodularises the cast iron, producing ductile cast iron.



Advantages:

- Consistent performance and zero failures reported in last 8 years
- Low erosion due to high product density, offering longer product life. Some of our customers reuse the product after 200 plus cycles by careful removal of slag.
- Resistant to iron and slag adhesion - stays cleaner
- High thermal shock resistance

Red Diamond Alpha G.F. Converter Segment

MODEL NO.	LENGTH (MM)	HEIGHT (MM)	WALL THICKNESS (MM)	CAPACITY (TONNES)
SEGMENT 421	658	840	65	3
SEGMENT 422	720	830	50	2.2
SEGMENT 432	901	1020	70	4 & 5
SEGMENT 434	820	695	65	2.5
SEGMENT 464	815	710	75	2.2
SEGMENT 464.1	815	710	60	2.8

Red Diamond Sigma Isostatic Press G.F. Converter Segment

MODEL NO.	LENGTH (MM)	HEIGHT (MM)	WALL THICKNESS (MM)	CAPACITY (TONNES)
SEGMENT-ISO-434	820	695	55	2.5
SEGMENT-ISO-432	901	1020	60	4 & 5

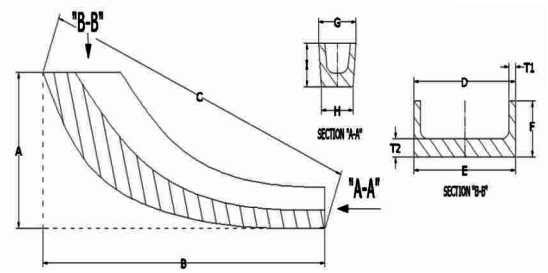
Segment Plate(chamber Plate)

MODEL NO.	LENGTH (MM)	HEIGHT (MM)	WALL THICKNESS (MM)	CAPACITY (TONNES)
SEGMENT-ISO-434	820	695	55	2.5
SEGMENT-ISO-432	901	1020	60	4 & 5

These products perform best at temperatures below 1600° C

FALL CHUTE LINERS

Morgan liners are moulded in rigid forms in order to ensure dimensional repeatability and product consistency. The liners offers excellent service life due to superior erosion resistance in the critical areas where the metal contacts the liner and changes direction. High erosion at this point otherwise leads to excessive turbulence in the flow of molten metal and, in turn, increases the likelihood of quality issues in the finished pipe.



Application

The fall chute liners are used in centrifugal pipe casting foundries to transfers molten metal from the ladle or furnace into the spinning pipe mould.

Features:

- Non-wetting clay graphite material
- Accurate dimensional stability
- Many different sizes and configurations available
- Suitable for temperatures up to 1600°C

Advantages:

- Consistent performance
- Low erosion – longer life
- Resistant to iron and slag adhesion - stays cleaner
- Very high thermal shock resistance
- Easily repaired with Morgan Morcem 900 cement
- Easy to install - one piece design

Fall Chute Liner Sizes

MODEL NO.	FALL CHUTE SIZE	A	B	C	D	E	F	G	H	I	T1	T2
Liner 335	DN80-200	579	700	908	310	355	117	110	110	116	25	39
Liner 356	DN250-400	640	1010	1196	356	356	142	130	110	110	23	35
Liner 360	DN350-750	552	1058	1191	360	300	142	155	95	142	25/16	30
Liner 395	DN350-750	567	978	1130	396	330	100	131	7	100	18	25
Liner 400	DN350-750	567	1078	1218	396	330	100	131	7	100	18	25
Liner 459	DN 100-200	500	1077	1200	260	240	170	120	93	110	25	25
Liner 462	DN-250-300	475	1160	1253	290	270	170	100	90	110	25	35
Liner 465	DN250-400	675	1040	1240	302	156	179	120	110	122	25	42-38
Liner470	DN 250-600	555	1068	1100	343	140	279	140	127	160	32	50
Liner 300	DN350-750	580	942	1106	300	240	150	140	80	120	25	30
Liner 380	DN350-750	800	1150	1401	380	290	115	200	110	150	25	35
Liner 150	DN 100-200	595	1055	1211	360	280	150	155	75	150	15	28
Liner 480	DN-250-300	575	1111	1251	480	420	145	140	80	145	25	30
Liner 475	DN250-400	395	1125	1192	136	124	100	128	116	100	20	44
Liner 465.2	DN 250-600	655	1069	1277	302	156	179	120	110	122	25	38
Liner 350	-	585	909	1081	350	250	157	148	48	125	25	35
Liner 410	-	692	1062	1268	410	410	144	150	150	115	25	30
Liner 466	-	663	1062	1054	302	302	144	120	120	115	25	40
Liner 351	-	483	1100	1201	350	350	125	135	135	110	25	30
Liner 260	-	450	960	1060	280	280	150	145	145	105	25	30
Liner 375	-	480	1000	1110	290	290	150	130	130	125	30	30
Liner 595	-	667	1299	1460	595	595	170	210	210	110	32	40
Liner 302	-	481	908	1027	302	302	155	120	120	118	25	38

These products perform best at temperatures below 1600° C

All dimensions are subject to normal manufacturing tolerances. Morgan reserves the right to change specifications at any time

SOLID RODS

Clay Graphite rods can be used for stirring additions into all types of molten metal ensuring good distribution of the additions in the melt. These have very high erosion resistance ensuring long product lives. Almost no inclusion is observed in the melt, thereby maintaining metal properties. They can be supplied with Threaded End or MS screw fixed joint to facilitate extention.

PATTERN	OUTSIDE DIAMETER (MM)	LENGTH (MM)	APPLICATION METAL
Vr80175	80	175	Al,Cu,Au,Ag,Fe
VR20305	20	305	Al,Cu,Au,Ag,Fe
VR83	51	305	Al,Cu,Au,Ag,Fe
VR42	38	355	Al,Cu,Au,Ag,Fe
VR50375G	50	375	Al,Cu,Au,Ag,Fe
VR400	38	400	Al,Cu,Au,Ag,Fe
VR38460	38	460	Al,Cu,Au,Ag,Fe
VR84	25	508	Al,Cu,Au,Ag,Fe
VR50533G	50	533	Al,Cu,Au,Ag,Fe
VR20610	20	610	Al,Cu,Au,Ag,Fe
VR32	32	610	Al,Cu,Au,Ag,Fe
VR610	50	610	Al,Cu,Au,Ag,Fe
VR610G	50	610	Al,Cu,Au,Ag,Fe
VR700G	70	700	Al,Cu,Au,Ag,Fe
VR920	70	920	Al,Cu,Au,Ag,Fe
VR920G	70	920	Al,Cu,Au,Ag,Fe
VR950	51	950	Al,Cu,Au,Ag,Fe
VR451100	45	1100	Al,Cu,Au,Ag,Fe
VR451200	45	1200	Al,Cu,Au,Ag,Fe
VR511200	51	1200	Al,Cu,Au,Ag,Fe
VR1270G	64	1270	Al,Cu,Au,Ag,Fe
VR451400	45	1400	Al,Cu,Au,Ag,Fe
VR50780	50	780	Al,Cu,Au,Ag,Fe
VR50900	50	900	Al,Cu,Au,Ag,Fe
VR511050	51	1050	Al,Cu,Au,Ag,Fe
VR70800	70	800	Al,Cu,Au,Ag,Fe
Vr75680	75	680	Al,Cu,Au,Ag,Fe

These products perform best at temperatures below 1600° C

TILES

Clay Graphite tiles are used as hot surface refractory lining. Being graphite based products, they offer high non-wetting characteristics. This results in lower inclusion rejection and prolongs lining life.

PATTERN	PART DESCRIPTION	THICKNESS (MM)	LENGTH (MM)	WIDTH (MM)	APPLICATION METAL
N27/1	TAP HOLE BLOCK	76	114	114	Al,Cu,Fe
N25/350	TILE	30	350	50	Al,Cu,Fe
N25/94A	TILE	50	685	228	Al,Cu,Fe
N25/178A	TILE	25	130	95	Al,Cu,Fe
N25/152	SKIMMER BLOCK	35	152	102	Al,Cu,Fe
N25/73	TILE	25	152	152	Al,Cu,Fe
N25/178	SKIMMER BLOCK	25	178	95	Al,Cu,Fe
N25/69	SLAB	102	457	102	Al,Cu,Fe
N25/91	TILE	12	165	140	Al,Cu,Fe
N25/290	TILE	25	290	260	Al,Cu,Fe
N25/94	TILE	25	685	228	Al,Cu,Fe
N25/500	BLOCK	100	500	500	Al,Cu,Fe
N25/243	Tile	25	243	206	Al,Cu,Fe

STIRRERS

Clay Graphite stirrers can be used for mixing additions into all types of molten metal, ensuring good distribution of the additions in the melt. They can also be used to remove any dirt or oxides from the surface of the molten metal. They can be supplied with Threaded End or MS screw fixed joint to facilitate extension.

PATTERN	OUTSIDE DIAMETER (MM)	LENGTH (MM)	NOSE (MM)	APPLICATION METAL
VS6	22	152	44	Al,Cu,Au,Ag,Fe
VS8	22	203	44	Al,Cu,Au,Ag,Fe
VS12	29	305	57	Al,Cu,Au,Ag,Fe
VS18	38	457	83	Al,Cu,Au,Ag,Fe
VS24	51	610	102	Al,Cu,Au,Ag,Fe
VS26	51	750	150	Al,Cu,Au,Ag,Fe
VS30	51	750	102	Al,Cu,Au,Ag,Fe
VS16	35	406	70	Al,Cu,Fe

These products perform best at temperatures below 1600° C

TUBES

Morgan Advanced Materials

For "Teapot" pour ladles, cupola receiver entries and spouts, cupola slagging box syphons, or for any metal transfer application

Clay graphite tubes are available in a range of sizes from 25 to 250mm diameter and lengths up to 1400mm (large diameter tubes, over 200mm OD, can be manufactured up to 1900mm long).

PATTERN	PART DESCRIPTION	OUTSIDE DIA (MM)	INSIDE DIA (MM)	LENGTH (MM)	WALL (MM)	APPLICATION METAL
N12/56	TUBE	143	108	200	17.5	Al,Cu,Fe
VG255	TUBE	34	19	255	7.5	Al,Cu,Fe
VG267	TUBE	178	127	267	25.5	Al,Cu,Fe
VG269	TUBE	180	122	267	29	Al,Cu,Fe
N12/79	TUBE	100	38	300	31	Al,Cu,Fe
VG350	TUBE	68	45	350	11.5	Al,Cu,Fe
VG1547	TUBE	170	133	368	18.5	Al,Cu,Fe
N12/68	TUBE	100	51	400	24.5	Al,Cu,Fe
VG1590	TUBE	125	85	406	20	Al,Cu,Fe
N12/64	TAP HOLE TUBE	89	60	425	14.5	Al,Cu,Fe
N12/38	TUBE	100	51	457	24.5	Al,Cu,Fe
N12/34	TUBE	200	150	500	25	Al,Cu,Fe
N12/70	TUBE	58	38	500	10	Al,Cu,Fe
N12/31	TUBE	143	108	508	17.5	Al,Cu,Fe
N12/51	TUBE	89	60	508	14.5	Al,Cu,Fe
N12/75	TUBE + 45 END	146	89	508	28.5	Al,Cu,Fe
N12/71	TUBE	77	45	600	16	Al,Cu,Fe
N12/66	TUBE	114	89	610	12.5	Al,Cu,Fe
N12/30	TUBE	100	51	632	24.5	Al,Cu,Fe
N12/63	TAP HOLE TUBE	175	110	650	32.5	Al,Cu,Fe
N12/29	TUBE	89	60	762	14.5	Al,Cu,Fe
N12/32C	TUBE	143	108	762	17.5	Al,Cu,Fe
N12/90	TUBE + CURVE	123	80	900	21.5	Al,Cu,Fe
N12/950	TUBE	100	12	950	44	Al,Cu,Fe
VG950	TUBE	51	13	950	19	Al,Cu,Fe
N12/67	TUBE	143	108	1000	17.5	Al,Cu,Fe
N12/69	TUBE	100	51	1020	24.5	Al,Cu,Fe

These products perform best at temperatures below 1600° C

TUBES

Morgan Advanced Materials

PATTERN	PART DESCRIPTION	OUTSIDE DIA (MM)	INSIDE DIA (MM)	LENGTH (MM)	WALL (MM)	APPLICATION METAL
N12/32E	TUBE	143	108	1070	17.5	Al,Cu,Fe
N12/32	TUBE	143	108	1219	17.5	Al,Cu,Fe
N12/65	TUBE	241	190	1219	25.5	Al,Cu,Fe
N12/72	TUBE + 45 ENDS	125	83	1397	21	Al,Cu,Fe
VG1830	TUBE	241	190	1830	25.5	Al,Cu,Fe
N12/33	TUBE	146	86	1930	30	Al,Cu,Fe
N12/501	ANGLE TUBE	200	150	349	25	Al,Cu,Fe
N12/58	ANGLE TUBE	200	150	267	18.5	Al,Cu,Fe
N12/160920B	TUBE	160	110	920	25	Al,Cu,Fe
N12/32/4	TUBE	143	108	230	17.5	Al,Cu,Fe
N12/34B	TUBE	200	150	398	25	Al,Cu,Fe
N12/34E	TUBE	200	150	600	25	Al,Cu,Fe
N12/61	TUBE	43	28	500	7.5	Al,Cu,Fe
N12/81	TUBE	114	89	762	12.5	Al,Cu,Fe
N12/83	TUBE	100	38	365	31	Al,Cu,Fe
VG1410	TUBE	55	19	1400	18	Al,Cu,Fe
VG391	TUBE	25	10	762	7.5	Al,Cu,Fe
VG392	TUBE	51	13	700	19	Al,Cu,Fe
VG427	TUBE	51	22	102	14.5	Al,Cu,Fe
VG448	TUBE	38	13	1000	12.5	Al,Cu,Fe
VG449	TUBE	38	13	610	12.5	Al,Cu,Fe
Vg461	TUBE	51	13	914	19	Al,Cu,Fe
VG462	TUBE	51	13	1220	19	Al,Cu,Fe
VG551000	TUBE	55	22	1000	16.5	Al,Cu,Fe
VG551000A	TUBE	55	22	1000	16.5	Al,Cu,Fe
Vg582	TUBE	100	70	762	15	Al,Cu,Fe
Vg583	TUBE	146	86	1000	30	Al,Cu,Fe
VG610	TUBE	57	25	610	16	Al,Cu,Fe
VG655	TUBE	68	45	655	11.5	Al,Cu,Fe
VG80380	TUBE	80	42	380	19	Al,Cu,Fe
VG2501900	TUBE	250	200	1900	25	Al,Cu,Fe
VG60850	TUBE	60	30	850	15	Al,Cu,Fe
VG1400	TUBE	51	13	1400	19	Al,Cu,Fe
VG1200A	TUBE	55	22	1200	16.5	Al,Cu,Fe
VG584	TUBE	146	86	480	30	Al,Cu,Fe
VG394	TUBE	38	13	457	12.5	Al,Cu,Fe
N241/100	TUBE	241	100	1000	70.5	Al,Cu,Fe
N241/150	TUBE	241	150	1000	45.5	Al,Cu,Fe
N241/200	TUBE	241	200	1000	20.5	Al,Cu,Fe
VG551220	TUBE	57	19	1200	19	Al,Cu,Fe
N241/150*740	TUBE	241	150	740	45.5	Al,Cu,Fe
N12/33A	TUBE	146	86	1500	30	Al,Cu,Fe
N12/33B	TUBE	146	86	1219	30	Al,Cu,Fe
N12/33C	TUBE	146	86	1000	30	Al,Cu,Fe
N12/33D	TUBE	146	86	1120	30	Al,Cu,Fe
N12/21580	TUBE	218	177	225	20.5	Al,Cu,Fe
N12/160200	TUBE	160	110	200	25	Al,Cu,Fe

These products perform best at temperatures below 1600° C

TUBES

Morgan Advanced Materials

PATTERN	PART DESCRIPTION	OUTSIDE DIA (MM)	INSIDE DIA (MM)	LENGTH (MM)	WALL (MM)	APPLICATION METAL
N12/860	TUBE	241	150	860	45.5	Al,Cu,Fe
N12/1100	TUBE	241	150	1100	45.5	Al,Cu,Fe
N12/1250	TUBE	241	150	1250	45.5	Al,Cu,Fe
N12/1350	TUBE	241	150	1350	45.5	Al,Cu,Fe
N12/502	TUBE	200	150	635	25	Al,Cu,Fe
N12/250	TUBE	120	80	250	20	Al,Cu,Fe
N12/130200	TUBE	130	100	200	15	Al,Cu,Fe
N12/160600	TUBE	160	86	600	37	Al,Cu,Fe
N12/35	TUBE	146	51	660	47.5	Al,Cu,Fe
N12/80	TUBE	50	25	360	12.5	Al,Cu,Fe
N12/73	TUBE	125	83	1220	21	Al,Cu,Fe
N12/60	TUBE	120	80	750	20	Al,Cu,Fe
N12/480	TUBE	120	80	750	20	Al,Cu,Fe
N12/448	TUBE	152	102	1219	25	Al,Cu,Fe
N12/34C	TUBE	200	150	1000	25	Al,Cu,Fe
N12/34D	TUBE	200	150	1070	25	Al,Cu,Fe
N12/76	TUBE	180	100	254	40	Al,Cu,Fe
N12/338	TUBE	144	89	965	27.5	Al,Cu,Fe
N12/32100	TUBE	143	108	100	17.5	Al,Cu,Fe
N12/37	TUBE	102	51	533	25.5	Al,Cu,Fe
N12/39	TUBE	51	30	908	10.5	Al,Cu,Fe
N12/44	TUBE	152	64	305	44	Al,Cu,Fe
N12/238	TUBE	127	70	965	28.5	Al,Cu,Fe

These products perform best at temperatures below 1600° C

PD COATING

PD Coating is a high purity, high alumina coating which is sintered onto the internal surface of the crucible during the manufacturing process. As a result of this process a dense physical barrier is formed which can enhance performance and extend crucible life when used in a range of applications.

Features

- Very low, almost negligible flux absorption
- Prevention of dross adhesion
- Prevention of contamination of the melt by crucible body material
- Wear resistance

Microstructure of PD coating

Typical Applications

- Aluminium alloys (particularly effective at preventing attack on crucible body by aggressive modifying agents such as sodium, sodium salts, strontium)
- Zinc distillation and zinc oxide production
- Precious metal melting

Note:

PD Coating can be supplied on any of the carbon bonded silicon carbide or clay graphite crucibles manufactured by Morgan Molten Metal Systems.

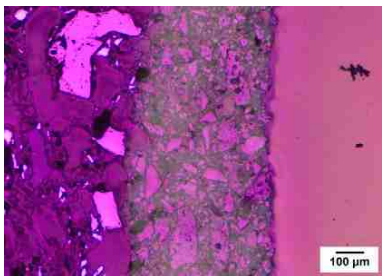
PRO COATING

Lower Dross Adhesion & Lower Impurities In Molten Metal

Prime Features

- High non-wettability leading to low dross adhesion
- Low impurity leak into molten metal
- Thin, low porosity, high density coat due to mirco-scaled ingredients

PRO coated crucible



PRO Coating under the microscope

Applications

- High purity aluminium metal (99.999%)
- Aluminium alloys
- Zinc distillation
- Precious metal melting

Usage Instructions

- All types of crucibles
- All types of furnaces
- Installation and pre-heating procedures of coated crucibles remain unchanged

Physical & Technical Properties

- Colour: White
- Max. application temperature: 1600°C

PURECOAT COATING

Lower dross adhesion & improved crucible performance

Prime Features

- Excellent non-wettability leading to low dross adhesion
- Low coating thickness (Fig.2)
- Low porosity, high density coat due to nano-scaled ingredients

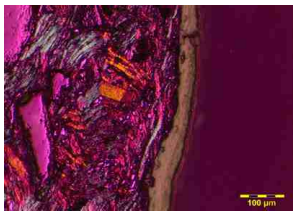
Applications

- Zinc distillation
- Aluminium alloys
- Copper melting

Usage Instruction

- All types of crucibles
- All types of furnaces
- Installation and pre-heating procedures of coated crucibles remain unchanged

PureCoat coated crucible



PureCoat Coating under the microscope

Physical & Technical Properties

- Colour: White
- Max. application temperature: 1500°C

RESCOAT COATING

Better erosion resistance & improved crucible performance

Prime Features

- Exceptional erosion resistance
- High non-wettability leading to low dross adhesion
- Low coating thickness (Fig 2)
- Low porosity, high density coat due to Nanoscaled ingredients

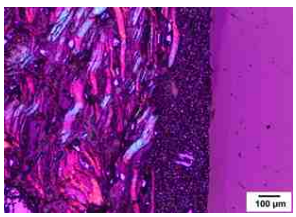
Applications

- Copper and copper alloys melting using fluxes
- Precious metal refining
- Zinc distillation

Usage Instruction

- All types of crucibles
- All types of furnaces
- Installation and pre-heating procedures of coated crucibles remain unchanged

ResCoat coated crucible



ResCoat Coating under the microscope

Physical & Technical Properties

- Colour: Grey
- Max. application temperature: 1600°C

INTERNAL CRUCIBLE LIFTER

Internal crucible lifter allows quick and easy movement of crucibles without removing the furnace top cover.

Advantages

- Easy handling
- Crucible can be lifted through top opening without removing the furnace top cover, reducing down-time and saving valuable man hours
- Prevents damage to heater panels and eliminates costly repairs, as furnace top can be left in place

SIZES	MINIMUM INSIDE DIAMETER (MM)	MAXIMUM INSIDE DIAMETER (MM)	MAXIMUM LIFTING CAPACITY (KG)
Size 1	350	600	175
Size 2	580	740	300
Size 3	720	840	500
Size 4	820	1000	700
Size 5	940	1070	1000

Handling instructions for internal crucible lifter

1 Assemble the lifter to the crucible in such a way that all 3 clamps are at the same distance from the crucible top.

2 Move the sliding sleeve pos. 4 to the next free hole and secure it there with the locking screw pos. 2.

3 Turn the sliding sleeve pos. 4 manually until all 3 clamps are touching the crucible.

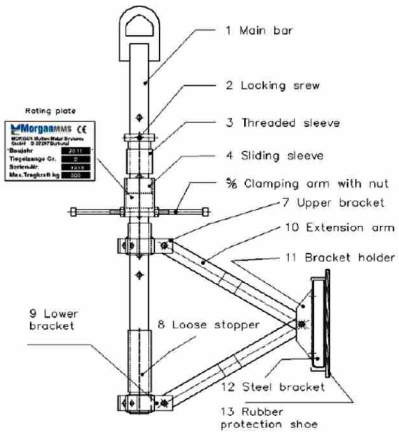
4 Tighten the sliding sleeve manually over the clamping arm until the clamps are secure.

5 Lift the crucible slowly avoiding any jerky movements.

6 After lifting slightly, lower off and then retighten the clamps before lifting the crucible into the furnace.

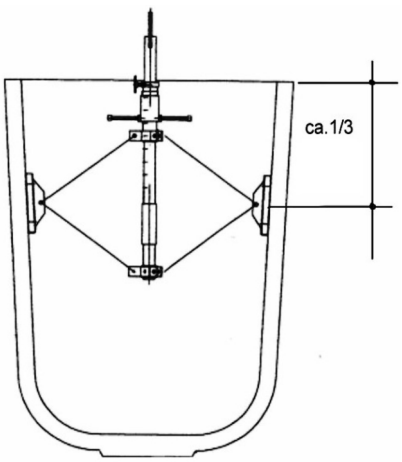
7 After use turn the sliding sleeve pos. 4 to the top of the shaft in order to protect the thread from getting dirty.

8 The thread should be cleaned regularly to ensure free movement and should the situation arise graphite powder can be used as a lubricant.



Attention

- Strictly forbidden: Do not stand under or near a suspended load!
- When lifting used crucibles out of the furnace, great care must be taken to avoid any burst out of the crucible.
- Use the crucible lifter for transporting the crucible only in the immediate front area of the furnace to eliminate any safety hazards (installation and demounting).
- When installing new crucibles, rubber protection shoes should be placed over the brackets.



MORGAN MMS
GLOBAL PRESENCE

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