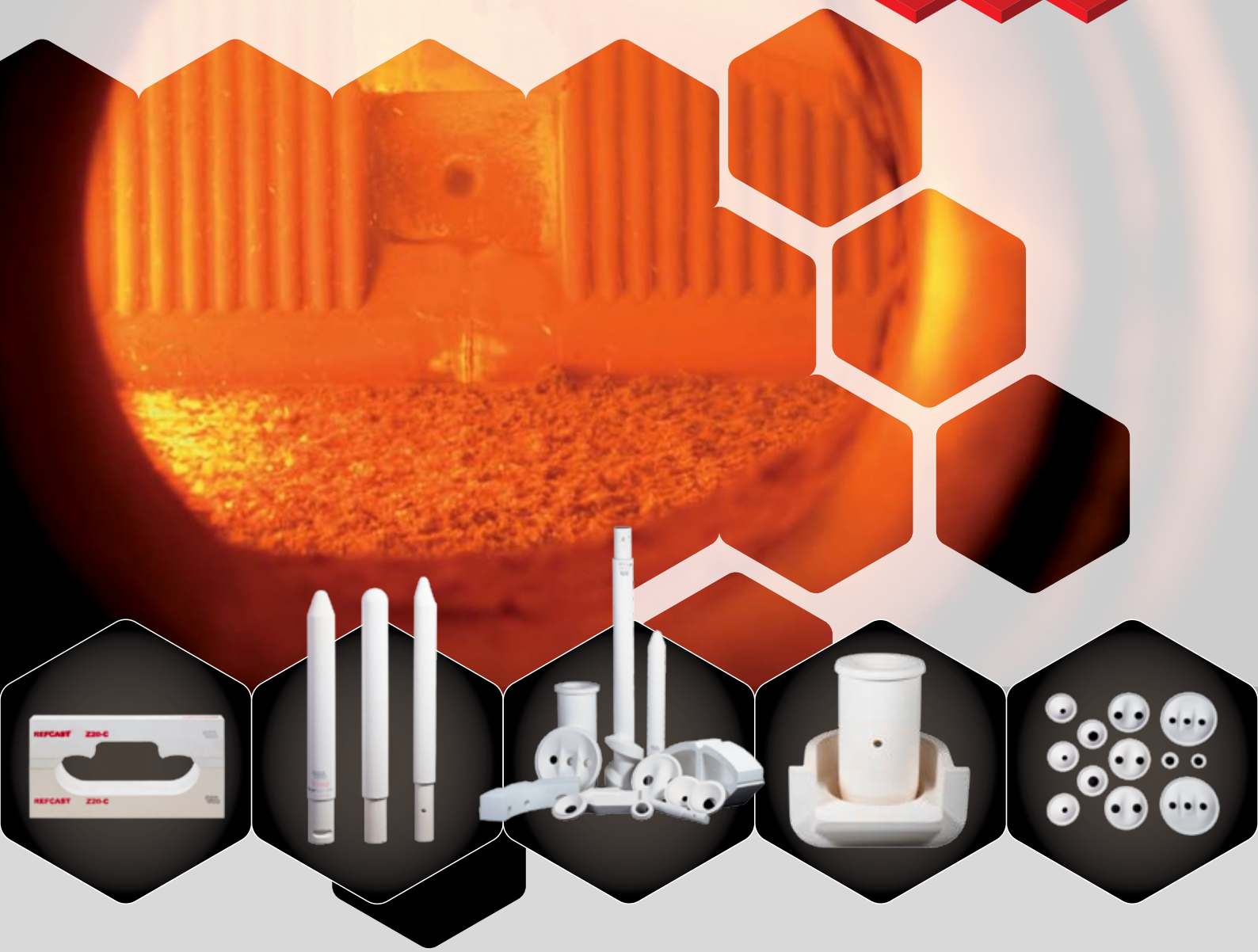


REFRACTORIES CATALOGUE 2018

Refractory parts for the Glassmaking industry

20 ANNIVERSARY YEARS

Edition III.

Quality & flexibility

Quality and flexibility = REFMON

REFMON has already been worldwide known, but still considering as one of the most challenging companies, mainly producing refractory expendables and pre-cast shapes.

Thanks to its outstanding and proved quality, producing by vibrocast technology with chemical bonding agent **REFMON's** refractories can be found in five continents already.

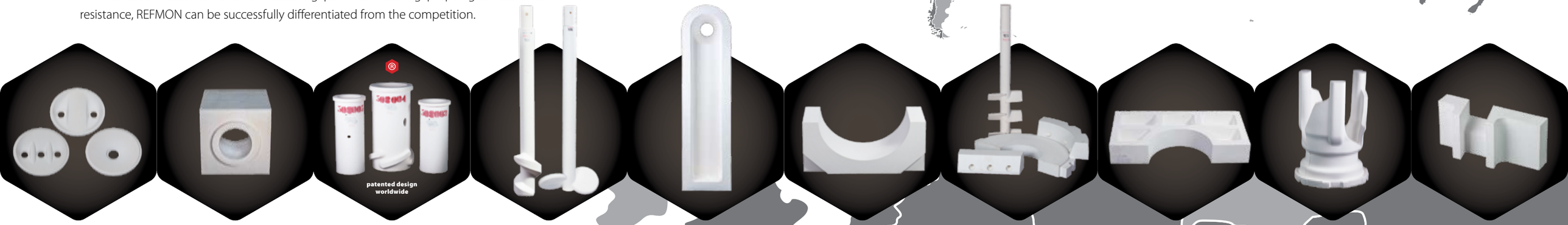
Thanks to our loyal customers as well as our business networks, **REFMON** is stably presented in more than thirty-nine countries and this number grows continuously.

REFMON always seeks to its further expansion and our goal is being a trustful and reliable partner of our customers mostly working with sodalime-glass, borosilicate-glass, different types of crystal glasses and special glasses.

Such market coverage and customer satisfaction would not been achieved without the enthusiastic, skilled members of **REFMON** and without applying our key values such as **QUALITY and FLEXIBILITY.**

REFMON marketing policy

We believe, serving our recent and potential customers by establishing **WIN-WIN** situation is what makes a fruitful long-term cooperation. By combining our open-minded business policy with **REFMON's** individual manufacturing process working with selected raw materials leads to the highest performance refractories, especially a **REAL** excellent thermal shock resistance and low bubbling potential resulting proper glass corrosion resistance, REFMON can be successfully differentiated from the competition.



History of REFMON

Company foundation has been begun by leading of a refractory specialist, a highly educated Hungarian refractory expert with association of an American refractory manufacturer company in 1997. The main focus was to fulfill special requirements of primarily glass melting and liquid steel industries and special applications.

Milestones:

1997 Foundation. **1997** Entering of EN ISO 9001 Quality Management System. **1999** Opening of a brand new manufacturing hall. **2000** Entering of EN ISO 14001 Environmental Management System. **2010** Acquisition by Germany-owned companies, KALENBORN and LIPHARD. Interest is growing in ceramic and biomass industry. **2014** Doubling sintering capacity, installation of a second furnace. **2017** Opening our new manufacturing hall, increased production capacity.

References in the whole World

Group	Brand	Type of manufacturing	Al_2O_3 [%]	ZrO_2 [%]	SiO_2 [%]	Fe_2O_3 [%]	Na_2O [%]	TiO_2 [%]	CaO [%]	CaO+MgO [%]	Na_2O+K_2O [%]	Cold crushing strength [MPa]	Bulk density [g/cm^3]	Open porosity [%]	Thermal expansion at 1000 °C [%]	Refractoriness under Load (RUL) Ta [°C]	Thermal shock resistance Temperature: 1200 °C Quenching in water [Cycles]	Application
AZS MATERIALS																		
REFCAST	Z10-CS	cast	78	12	9	0,05	0,2	0,05					2,8	19	0,7			plunger, tube, forehearth cover block
	Z10-CFS	cast	78	12	9	0,05	0,2	0,05					2,8	19	0,7			orifice ring
	Z20-CP	cast	66	21	12	0,1	0,2	0,1				85	2,9	18	0,7	1650	>50	tube, plunger, forehearth cover, channel shape, burner, camera, doghouse protection arch, rotor segment, stirrer, special shape
	Z20-CFP	cast	67	20	12	0,1	0,2	0,1				50	2,8	19	0,7	1650	>50	orifice ring
	ZPAVE-C	cast	54	29	16	0,1	0,3	0,1				120	2,95	19	0,7	1650	>50	spout, tube, stirrer, plunger, melting tank burner, camera, DH protection arch, rotor segment
	Z35-C	cast	45	35	18	0,1	0,1	0,1					3,17	20	0,7		>50	spout, tube, stirrer, plunger, melting tank burner, camera, DH protection arch, rotor segment
REFCOMP	ZM10	pressed	54	10	33	max. 1,00						50	2,75	15		1550		furnace construction
	ZM20	pressed	65	22	12							120	3,05	20				furnace construction
	ZM30	pressed	50	30	16							80	3,00	18				furnace construction
	ZS65	pressed	1,2	65	33							110	3,62	18				furnace construction
CORUNDUM																		
REFCAST	K98-C	cast	97,7		1,9	0,1	0,1		0,2			100	2,95	19	0,85	1650	>30	orifice ring, forehearth channel block
MULLITE																		
REFCAST	M70-C	cast	69		28	1	0,1			0,2		80	2,5	17	0,7	1600	>30	spout cover, special shape
	M75-C	cast	75		21	1	0,1			0,2								special shape
REFCOMP	M70	pressed	70		30	1						75	2,6	17		1700		furnace construction
	M75	pressed	75		25	0,5						50	2,75	15		1700		furnace construction
ANDALUSITE																		
REFCAST	S60-C	cast	61		37	0,8							2,6			1600		forehearth cover, burner, special shape
	S65-C	cast	65		33	0,7			0,1		0,5		2,7			1600		forehearth cover, burner, special shape
REFCOMP	S55	pressed	57		38	1,20						75	2,5	17		1620		furnace construction
	S60	pressed	60		35	1,00						65	2,52	18		1620		furnace construction
	S63	pressed	60		38	1,00						90	2,60	14				furnace construction
	S65	pressed	63		35	1,00						90	2,65	15		1700		furnace construction
	S68	pressed	68		28	max. 1,00						110	2,78	12		1700		furnace construction
FIRECLAY																		
REFCOMP	A40	pressed	40		50	2,00						50	2,2	16		1450		furnace construction
	A45	pressed	45		48	1,80						50	2,3	16		1480		furnace construction
FUSED-SILICA																		
REFCAST	FS99	cast	0,2		99,5	0,04						40		18		1500		orifice ring, plunger, tube

														Thermal conductivity [W/mK]			
INSULATION																		
REFMON	ISOL 23		37		45	0,7			15		1,1	1,2	0,5		0,19 W/mK (at 1000 °C)			furnace construction
	ISOL 24		37		56	1,9						1,2	0,64		0,38 W/mK (at 1000 °C)			furnace construction
	ISOL 25		38		55	2,2				0,3		3,0	0,8		0,28 W/mK (at 1000 °C)			furnace construction
	ISOL 26		58		38	0,7						1,6	0,8		0,33 W/mK (at 1000 °C)			furnace construction
	ISOL 28		67		31	0,6						2,1	0,9		0,38 W/mK (at 1000 °C)			furnace construction
	ISOL 30		74		25	0,3						4,5	1,1		0,43 W/mK (at 1000 °C)			furnace construction
	ISOL 33		98		1,5	0,1						20	1,5		1,17 W/mK (at 1000 °C)			furnace construction
REFMON	Cerfibre 1260		48		52								0,128		0,29 W/mK (at 1000 °C)			furnace construction
	Cerfibre 1400		54		45								0,128		0,28 W/mK (at 1000 °C)			furnace construction
	Biocerfibre				75					25			0,128		0,33 W/mK (at 1000 °C)			furnace construction
REFMON	Panel 1000												0,3		0,035 W/mK (at 800 °C)			furnace construction
	Slatted 1000												0,3		0,035 W/mK (at 800 °C)			spout insulation
AUXILIARIES																		
REFMORT	Luting cement (fine)		61		36	0,6									0,01 mm grain size			Clay-bonded luting cement for orifice ring (packed in 5 kg or 10 kg)
	Luting cement		65		33	0,5									0-0,5 mm grain size			Clay-bonded luting cement for orifice ring (packed in 5 kg or 10 kg)
	LC-SP (MULDUR)		61		38	1												Dry mix under spout

Tipical values are given!

Inserted parts

Spouts with insert

● **REFMON** developed and produce special spouts with inserts for the packaging glass producers. Due to these inserts the lifetime of the spout could be significantly longer, depending on pulling rate and gop temperature and glass quality. This property assures less spout change hereby more safety, more profit and less faulty product in the continuous production.

● The materials of the insert rings can be either: fused-cast refractory (AZS) or isostatic pressed chrome-inserts (94% chrome).

● The products are manufactured in wide variety of shapes and sizes and special requirements can be accomodated too This insert is grinded and assembled by **REFMON**.

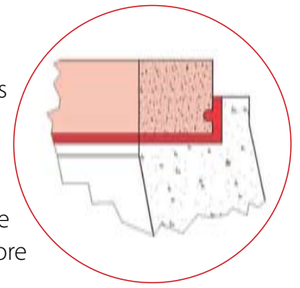
● **REFRACTORY PARTS OF THE SPOUT ITSELF (Z20-CP, ZPAVE-C or Z35-C)**

A bonded alumina, zirconium and silica (AZS) cast composition with a good corrosion and erosion resistance and excellent thermal shock resistance.

	Spout Refcast Z20-CP	Spout Refcast ZPAVE-C	Spout Refcast Z35-C	Insert AZS33
CHEMICAL COMPOSITION %				
Al_2O_3	66	54	45	51,5
ZrO_2	21	29	35	33,8
SiO_2	12	16	18	13,3
Fe_2O_3	0,1	0,1	0,1	0,06
Na_2O	0,2	0,3	0,1	1
TiO_2	0,1	0,1	0,1	0,07
PHYSICAL PARAMETERS				
Cold crushing strength [N/mm²]	85	120	-	200
Apparent density [g/cm³]	2,90	2,95	3,17	3,70
Open porosity [%]	18	19	20	3
Thermal expansion at 1000 °C	0,7	0,7	0,7	0,7
Application temperature limit [°C]	1650	1650	1950	1650

Inserted parts

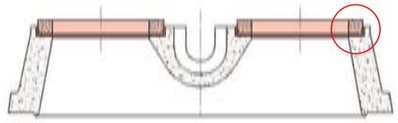
Orifice ring with high-alumina ceramic insert



● The orifice ring with oxide ceramic insert for the packaging glass producers has been developed by **REFMON.**

REFMON produces this type especially for the glass makers, who are producing long series. Due to this insert the lifetime of the orifice rings could be 10–12 weeks instead the earlier average 2-4 weeks, depending on gob temperature and pulling rate. This property assures less gob changes hereby more safety, more profit and less faulty product in the continuous production.

● The products are manufactured in wide range of shapes and sizes and special requirements can be accommodated too.



● **REFCAST Z20-CFP**

A bonded alumina, zirconium and silica (AZS) **premium** cast composition with good corrosion and erosion resistance.

● **REFMON pressed ceramic Insert:**

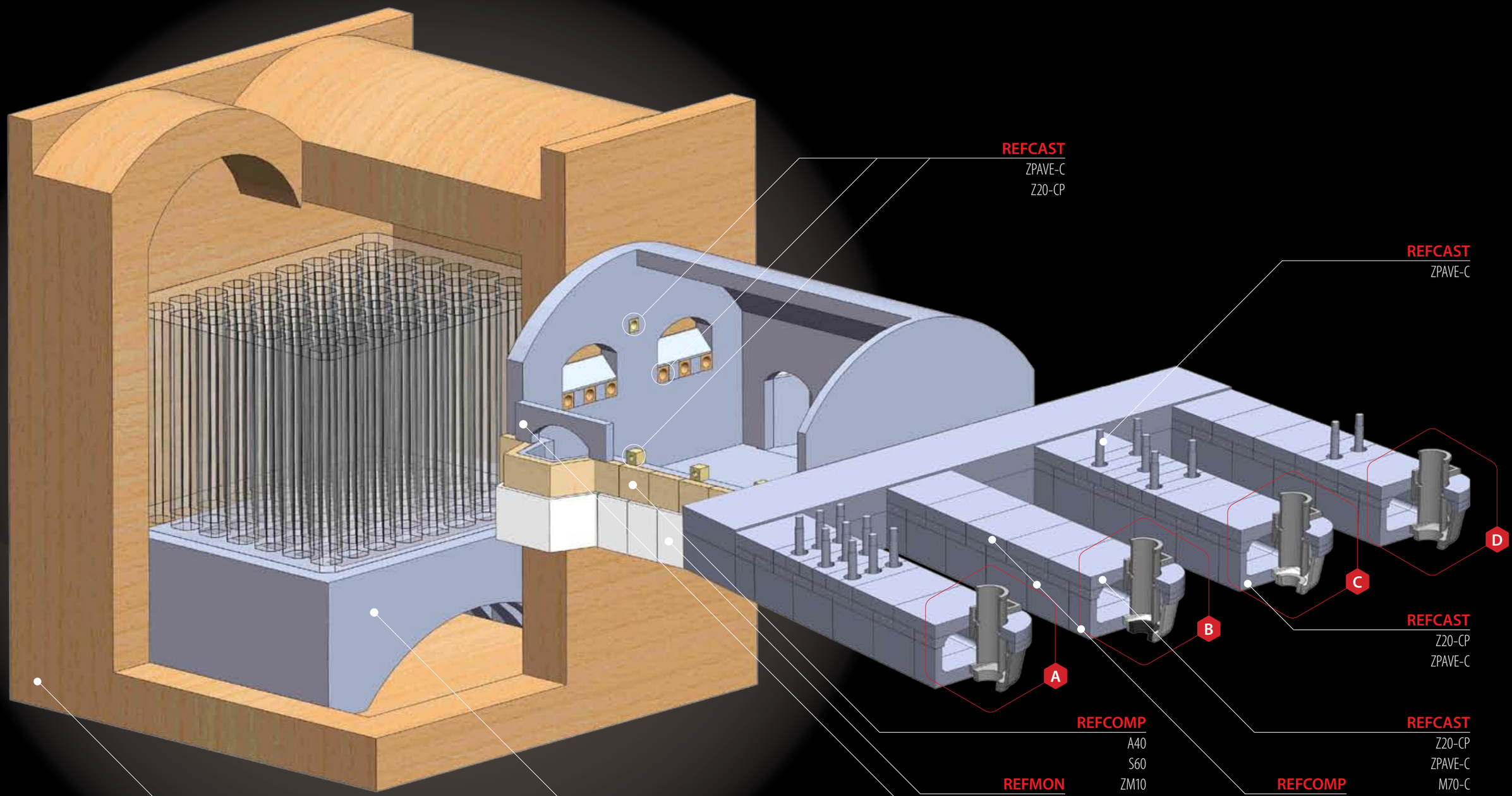
A high alumina based, pressed and precious grinded material, with excellent corrosion and erosion resistance in glass processing applications.

● **Application reference:**

The rings work in heavy-duty white, green and brown soda lime glass packaging glass production lines. Hot end working machine: GPS produced IS machines. Weight of the double gobs: 75–600 gr. ⬢ Gob cuts: 40–180 / min. Average lifetime: 8–9 weeks ⬢ Max. lifetime: 12 weeks

	Orifice ring Refmon Z20-CFP	Insert Refmon pressed ceramic
CHEMICAL COMPOSITION %		
Al_2O_3	67	96
ZrO_2	20	-
SiO_2	12	1,8
Fe_2O_3	0,1	-
Na_2O	0,2	0,1
TiO_2	0,1	-
PHYSICAL PARAMETERS		
Cold crushing strength [N/mm²]	50	300
Apparent density [g/cm³]	2,65	3,7
Open porosity [%]	29	5,1
Thermal expansion at 1000 °C:	0,7	-
Application temperature limit °C:	1650	1650

REFMON refractories application



REFCAST
ZPAVE-C
Z20-CP

REFCAST
ZPAVE-C

REFCAST
Z20-CP
ZPAVE-C

REFCOMP
A40
S60
REFMON
ISOL 23
ISOL 25
ZM10
ZM20

REFCOMP
dense refractory
insulation
castables

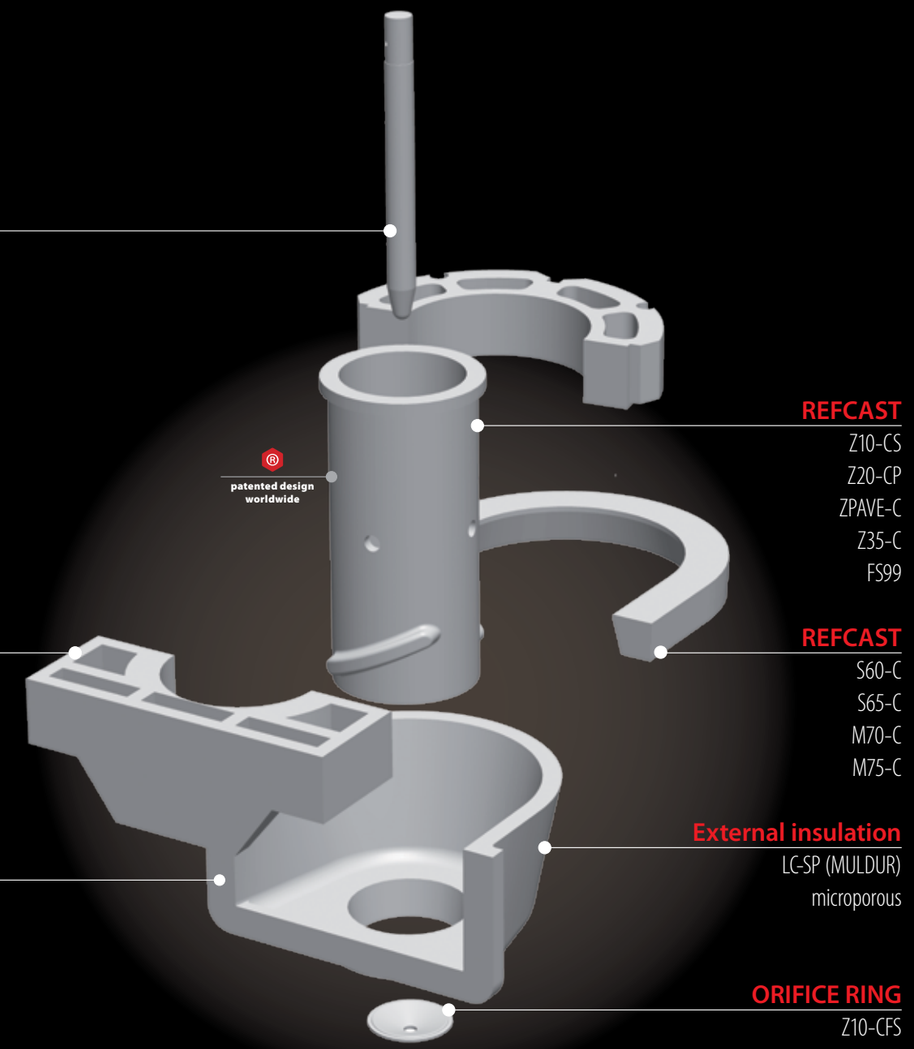
REFCAST
Z20-CP
ZPAVE-C
M70-C
S60-C

REFMON
ISOL 23
ISOL 25
ISOL 28
ISOL 30

REFCOMP
S60
S63

REFCAST
Z20-CP
ZPAVE-C

REFMON Refractories for gob forming



REFCAST
Z10-CS
Z20-CP
ZPAVE-C
Z35-C
FS99

REFCAST
Z10-CS
Z20-CP
ZPAVE-C
Z35-C
FS99

REFCAST
S60-C
S65-C
M70-C
M75-C

REFCAST
S60-C
S65-C
M70-C
M75-C

External insulation
LC-SP (MULDUR)
microporous

REFCAST
Z20-CP
ZPAVE-C
Z35-C

ORIFICE RING
Z10-CFS
Z20-CFP
K98-C
FS 99

A without insert

B chrome (94%) inserted spout

C AZS inserted spout

D without insert

MATERIAL GUIDE	Orifice ring	Plunger	Tube	Rotor segment	Stirrers	Spout	Spout burner	Spout cover	Forehearth Channel block	Forehearth cover block	Forehearth burner	Melting tank burner block	Melting tank peep hole block	Doghouse protection arch	Special shape
ZIRCON-MULLITE PRODUCTS															
Z10-CS		●	●							●					
Z10-CFS	●														
Z20-CP		●●	●●	●●	●●	●●			●●	●●	●●			●●	●●
Z20-CFP	●●														
ZPAVE-C			♣	♣	♣	♣			♣	♣		♣	♣	♣	♣
Z35-C			♣	♣	♣	♣			♣	♣		♣	♣	♣	♣
CORUNDUM PRODUCT															
K98-C	♣								♣						♣
Standard alumina products															
S60-C							●	●		●	●				
S65-C							●	●		●	●				
M70-C			●				●	●		●	●				
M75-C			●				●	●		●					
STANDARD ALUMINA PRODUCTS															
FS99	●	●	●												●
QUALITY GRADES	● standard			●● premium					♣ extra premium			♣ special			

MANUFACTURING TYPE				
	C = Casted	**CS** = Casted Standard	**CP** = Casted Premium	**CFP** = Casted Fine Premium

New service, new materials for cold-end

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for batch-houses, cullets transport and rejected glass products recycling

The use of quartz sand as a raw material in glass production necessitates good industrial wear protection for the pipelines used to fill the silos and feed the tanks. The processing and conveying equipment used in recycling old glass also has to be protected. We also offer economical solutions to protect the production and optimize recycling wear protection processes in the manufacture of glass wool and insulation materials.

Kalenborn
Wear Protection Solutions

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REFMON
refractories to the Glass Industry!

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- **the shortest possible lead time working with premium grade raw materials**
- **flexibility**
- **long service-file according to Customers' demands**
- **standard spare parts stock availability**
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- **the very best value for money on the market**

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REFMON

Refmon has been producing refractories since 1997.