

# High Performance Refractories for Glass Industry



Making  
A Material  
Difference

**Super Refractories**

**CARBORUNDUM UNIVERSAL LIMITED**





Ranipet Plant



Founded in 1900, Murugappa Group is one of India's leading business conglomerates. The Group has 29 businesses including ten listed Companies traded in NSE & BSE. Headquartered in Chennai, the major Companies of the Group include Carborundum Universal Ltd., CG Power and Industrial Solutions Ltd., Cholamandalam Financial Holdings Ltd., Cholamandalam Investment and Finance Company Ltd., Cholamandalam MS General Insurance Company Ltd., Coromandel International Ltd., Coromandel Engineering Company Ltd., E.I.D. Parry (India) Ltd., Parry Agro Industries Ltd., Shanthi Gears Ltd., Tube Investments of India Ltd. and Wendt (India) Ltd. The Group holds leadership position in several product lines including Abrasives, Technical Ceramics, Electro Minerals, Auto Components & Systems, Bicycles, Fertilisers, Sugar, Tea and Spirulina (Nutraceuticals). The Group has forged strong alliances with leading international companies such as Groupe Chimique Tunisien, Foskor, Mitsui Sumitomo, Morgan Advanced Materials, Yanmar & Co. and Compagnie Des Phosphat De Gafsa (CPG).

The Group has a wide geographical presence all over India and spanning 6 continents.

Renowned brands like BSA, Hercules, Montra, Mach City, Ballmaster, Ajax, Parry's, Chola, Gromor, Shanthi Gears and Paramfos are from the Murugappa stable.

The Group fosters an environment of professionalism and has a workforce of over 60,000 employees.





CUMI was founded in 1954 as a tripartite collaboration between the Murugappa Group, The Carborundum Co., USA and the Universal Grinding Wheel Co. Ltd., U.K.

The company pioneered the manufacture of Coated Abrasives and Bonded Abrasives in India in addition to the manufacture of Super Refractories, Electro Minerals, Industrial Ceramics and Ceramic Fibres. Today the company's range of over 20,000 different varieties of abrasives, refractory products and electro-minerals are manufactured in various locations across the globe.

With state-of-the art facilities and strategic alliances with global partners, CUMI has achieved a reputation for quality and innovation.

**Super Refractories division** was started in 1965, pioneering the manufacture of Silicon Carbide, Mullite, High Alumina, Insulation bricks and low cement castables in india. Today, the company's state-of-the-art plants in india and overseas manufacture a wide range of fired, monolithics and precast products for glass, ceramics, carbon black, cement, Petrochemicals, ferrous and non-ferrous industries., with exports to major countries across the globe. Product innovation and value engineering define the division's customer centric focus and total solutions work culture. Besides the capability to manufacture customised complex shapes for critical applications, CUMI's Super refractories division also offers technical expertise and application engineering support that is customised to suit the varied needs of different user industries. In addition to being a leading supplier of specialty refractory in the Indian market, we serve customers in the Middle East, Asia, Europe, North America, Australia, ASEAN and SAARC countries.



Serkadu Plant





Jabalpur Plant

**Bureau Veritas Certification**

**CARBORUNDUM UNIVERSAL LIMITED**

**PLANT OFFICE: PLOT NOS.: 102 & 103, SIPCOT INDUSTRIAL COMPLEX PHASE II, RANIPET – 632 403, TAMIL NADU, INDIA.**

This is a multi-site certificate, additional site(s) are listed on the next page(s)  
Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the Management System Standards detailed below.

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**Standards**

**ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018**

*Scope of certification*

**DEVELOPMENT AND MANUFACTURE OF VARIOUS TYPES OF REFRACTORIES, HIGH ALUMINA BINDER, ANTICORROSIVE MATERIALS & FRP / GRP COMPOSITES**

Original cycle start date for ISO 9001: **07 October 2012**  
 Original cycle start date for ISO 14001: **20 March 2013**  
 Original cycle start date for ISO 45001: **25 March 2021**  
 Recertification cycle start date: **19 January 2022**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **29 January 2025**

Certificate No. **IND.22.6623/IM/U**    Version: **1**    Revision date: **19 January 2022**

*Signed on behalf of BVCH SAS UK Branch*  
**Jagdeesh N. MANIAN**  
 Head – CERTIFICATION, South Asia  
 Commodities, Industry & Facilities Division

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.  
 Local office: Bureau Veritas (India) Private Limited (Certification Business) 72 Business Park, Marol Industrial Area, MIDC Cross Road 'C', Andheri (East), Mumbai – 400 093, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call + 91 22 6274 2000.

**Bureau Veritas Certification**

**CARBORUNDUM UNIVERSAL LIMITED**

**Standards**

**ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018**

*Scope of certification*

**DEVELOPMENT AND MANUFACTURE OF VARIOUS TYPES OF REFRACTORIES, HIGH ALUMINA BINDER, ANTICORROSIVE MATERIALS & FRP / GRP COMPOSITES**

SITE	ADDRESS	SCOPE
<b>PLANT - 1 (SUPER REFRACTORIES DIVISION)</b>	PLOT NOS. 102 & 103, SIPCOT INDUSTRIAL COMPLEX PHASE-II, RANIPET - 632403, TAMIL NADU, INDIA.	DEVELOPMENT AND MANUFACTURE OF VARIOUS TYPES OF REFRACTORIES
<b>PLANT - 2 (SUPER REFRACTORIES &amp; PRODORITE DIVISION)</b>	MUNGIERI VILLAGE, VINNAMPALLI POST - 632 516, KATPADI TALUK, VELLORE DISTRICT, TAMIL NADU, INDIA.	DEVELOPMENT AND MANUFACTURE OF VARIOUS TYPES OF REFRACTORIES, ANTICORROSIVE MATERIALS & FRP / GRP COMPOSITES
<b>PLANT - 3 (SUPER REFRACTORIES DIVISION)</b>	PLOT NOS. 35, 37, 48-51, ADHARTAL INDUSTRIAL ESTATE, JABALPUR – 482 004, MADHYA PRADESH, INDIA.	DEVELOPMENT AND MANUFACTURE OF HIGH ALUMINA BINDER, MONOLITHICS REFRACTORIES & SLIDE GATE REFRACTORIES

Certificate No. **IND.22.6623/IM/U**    Version: **1**    Revision date: **19 January 2022**

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Batch Kilns with operating Temp. upto 1750°C



Six Face Surface Grinding Machine



Refractoriness under Load & Creep resistance under Compression test



Reversible Thermal Expansion Test



X-ray fluorescence spectroscopy

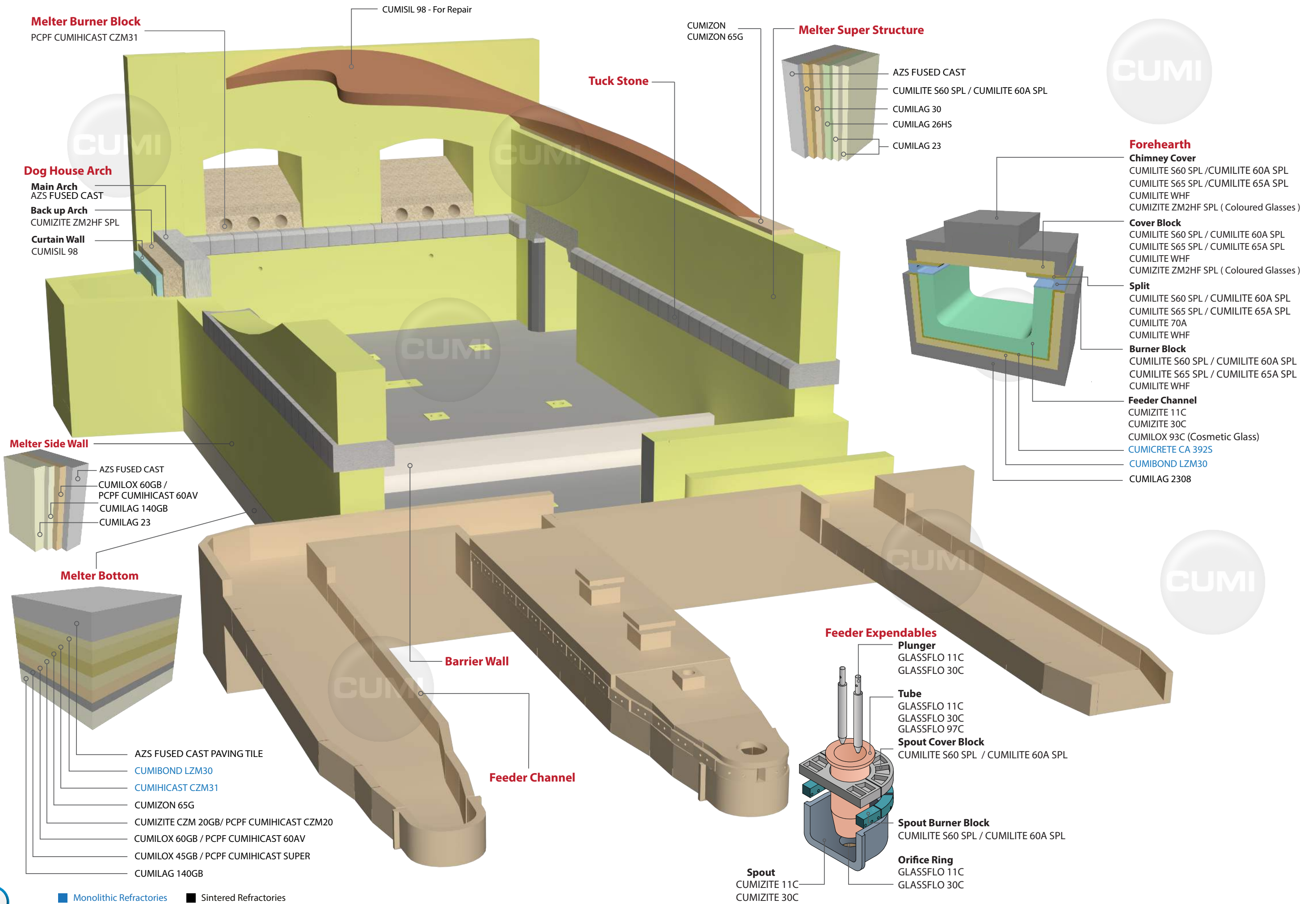


NDT – Ultrasonic Pulse Velocity Test



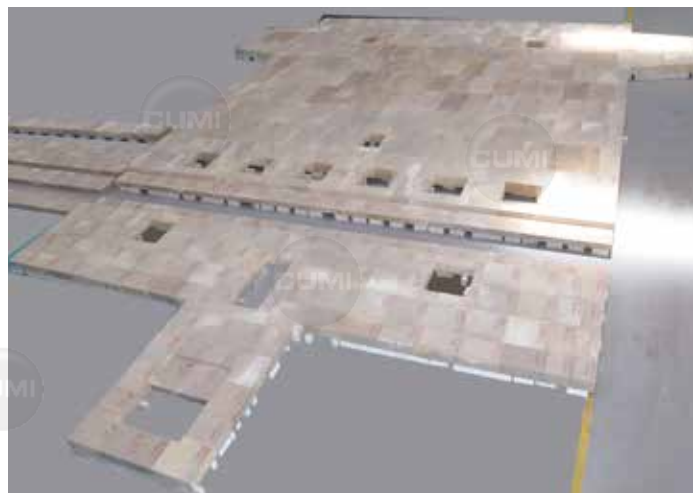
Glass Corrosion Resistance Test







Melter Bottom Blocks in Fireclay -  
CUMILOX 45GB / PCPF CUMIHICAST SUPER



Melter Bottom Blocks in High Alumina -  
CUMILOX 60GB / PCPF CUMIHICAST 60AV



Melter Bottom Blocks in Zirconia - Mullite -  
CUMIZITE CZM 20GB / PCPF CUMIHICAST CZM 20



Distributor Bottom Blocks in Fireclay -  
CUMILOX 45GB / PCPF CUMIHICAST SUPER



Port Neck Arch in Mullite - CUMILITE WHF



Port Neck Arches in Mullite - CUMILITE WHF



Dog House Backup Arch in Mullite - CUMILITE WHF





Forehearth Superstructure in Sillimanite - CUMILITE 60A SPL



Colouring forehearth Superstructure in Mullite & Zirconia Mullite - CUMILITE WHF & CUMIZITE ZM2 HF SPL



Forehearth Superstructure in Mullite - CUMILITE 65A SPL



Forehearth Cover Block in Mullite & Zirconia Mullite - CUMILITE WHF & CUMIZITE ZM2 HF SPL



Distributor Cover Block in Mullite - CUMILITE 77A



Feeder Channels in Zirconia Mullite - CUMIZITE 11C



Feeder Channels in Zirconia Mullite - CUMIZITE 11C



Tubes, Plungers & Orifice Rings in Zirconia Mullite - GLASSFLO 11C

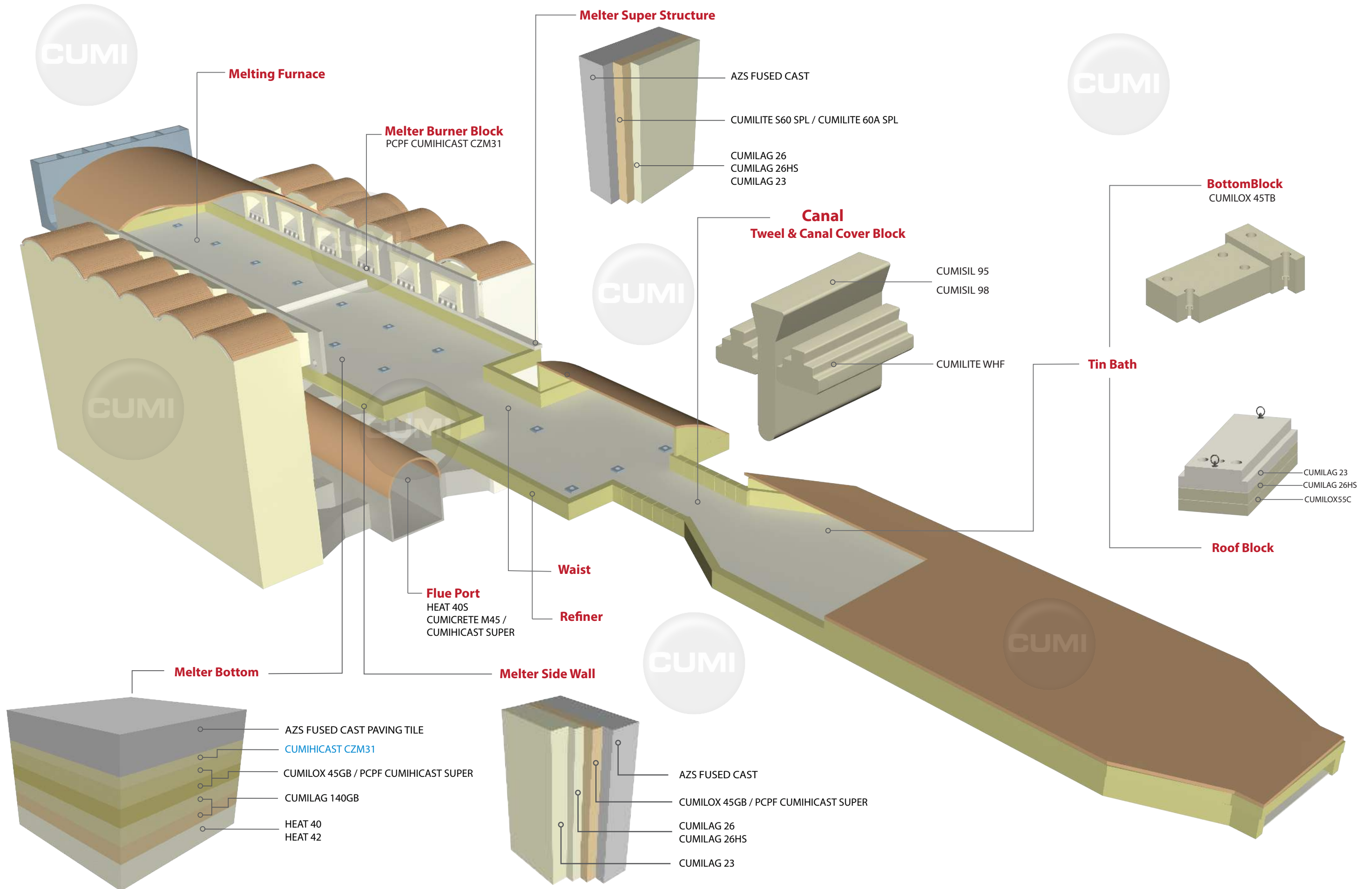


Stirrers in Zirconia Mullite - GLASSFLO 11C



Spouts in Zirconia Mullite - GLASSFLO 30C

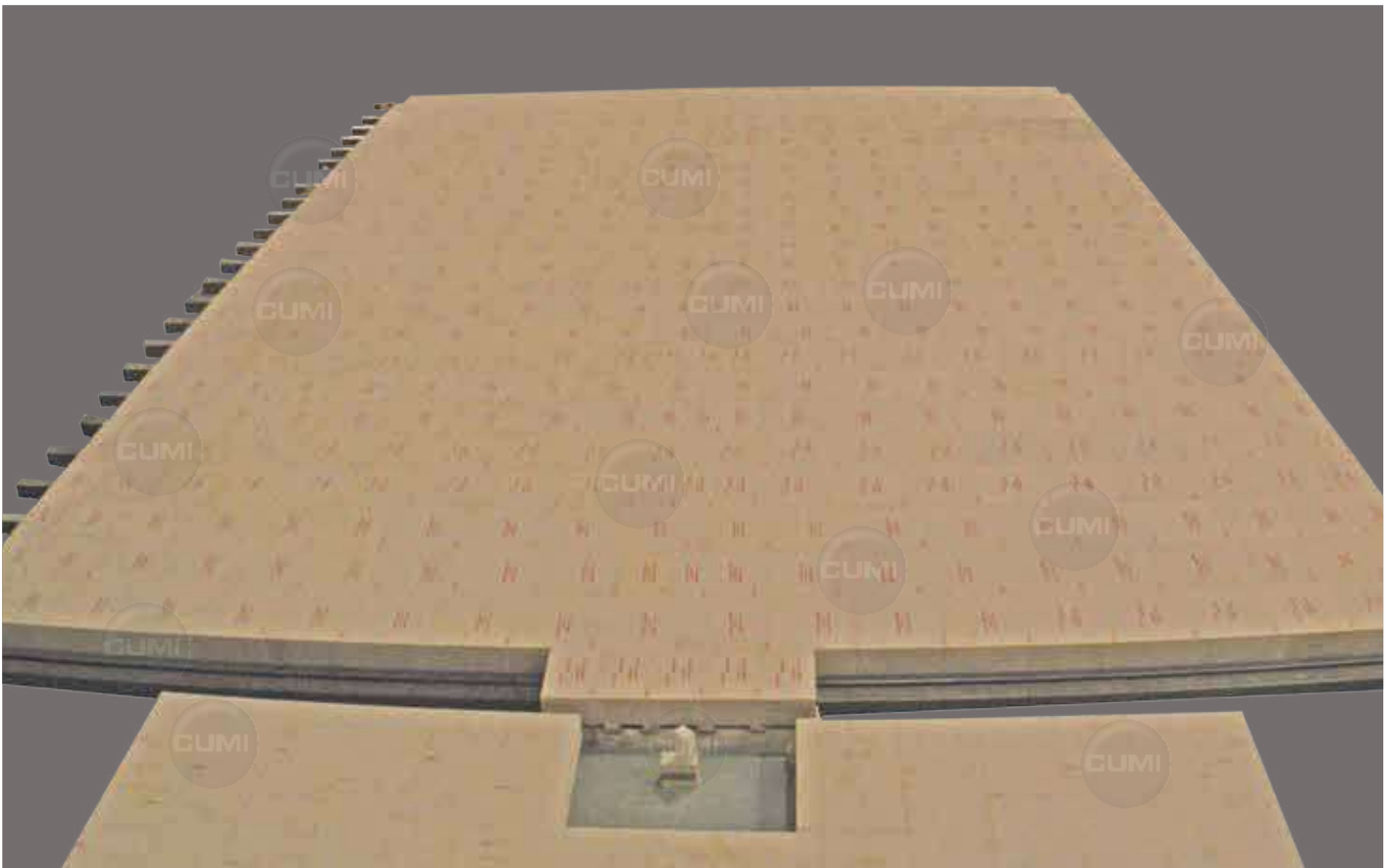




■ Monolithic Refractories ■ Sintered Refractories



Bottom Blocks for float Glass Melter in Fireclay - CUMILOX 45GB / PCPF CUMIHICAST SUPER



Bottom Blocks for Solar Glass in Fireclay - CUMILOX 45GB / PCPF CUMIHICAST SUPER





Curtain Wall in Fused Silica - CUMISIL 98



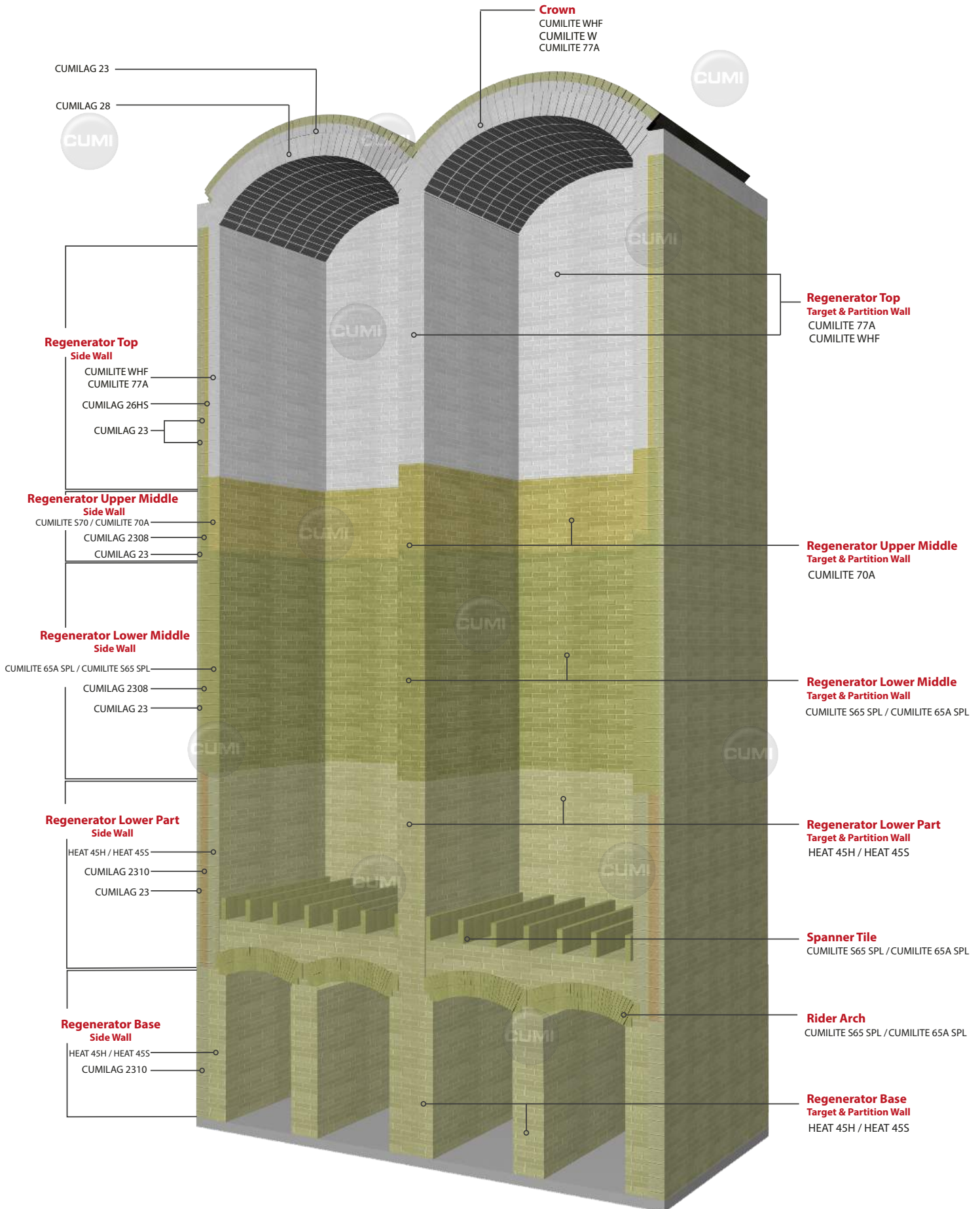
Canal Cover Blocks in Mullite - CUMILITE WHF



Tweel Block in Fused Silica - PCPF CUMISIL 95



Tin Bath Roof Blocks Assembly







Rider Arch Construction at site



Fused Mullite Bricks for side wall, Target wall & Crown - CUMILITE WHF



Rider Arches in Sillimanite - CUMILITE 65A SPL



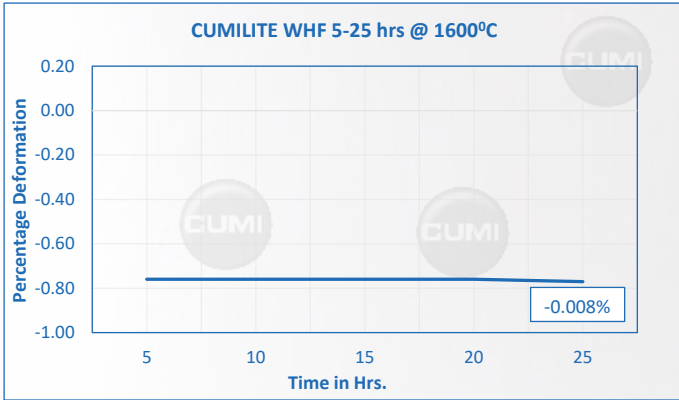
Rider Arch in Sillimanite - CUMILITE 60A SPL



Spanner Tile in sillimanite - CUMILITE 65A SPL

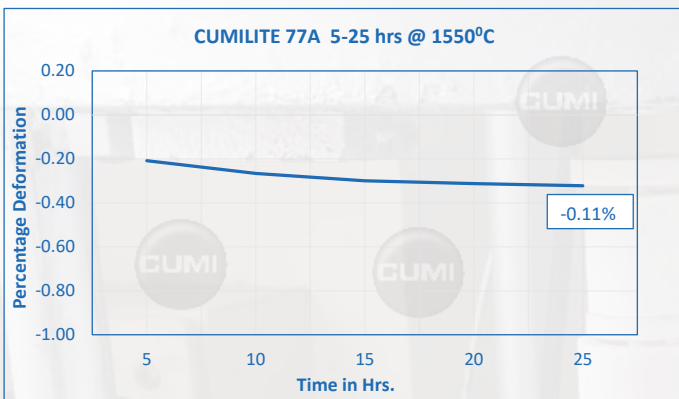


Chimney Block in 99.5% Alumina - CUMILOX 101HB



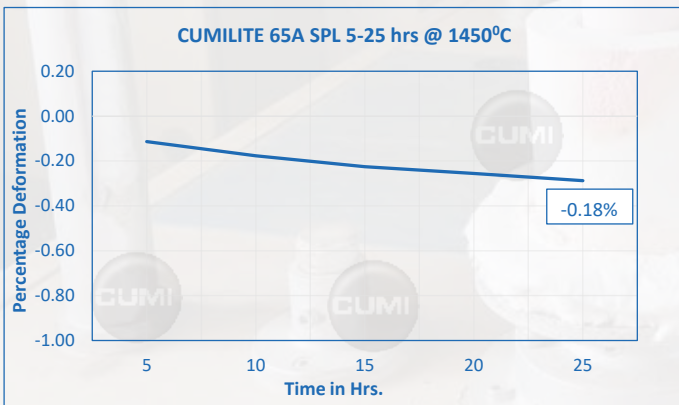
CUMILITE WHF

CUMILITE WHF 5-25 hrs @ 1600°C	
Time in Hrs.	Percentage Deformation
5	-0.76
10	-0.76
15	-0.76
20	-0.76
25	-0.77



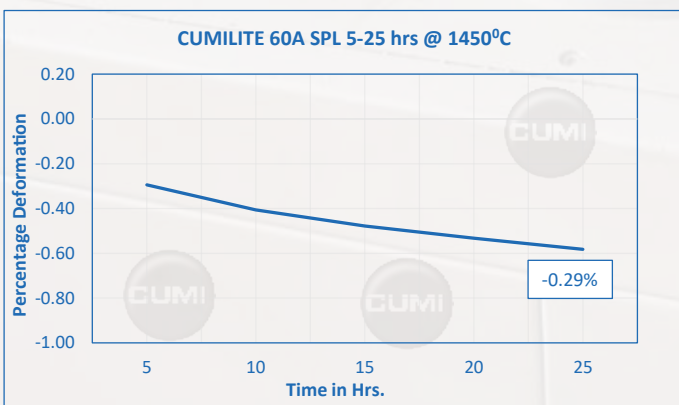
CUMILITE 77A

CUMILITE 77A 5-25 hrs @ 1550°C	
Time in Hrs.	Percentage Deformation
5	-0.21
10	-0.27
15	-0.30
20	-0.31
25	-0.32



CUMILITE 65A SPL

CUMILITE 65A SPL 5-25 hrs @ 1450°C	
Time in Hrs.	Percentage Deformation
5	-0.11
10	-0.18
15	-0.23
20	-0.26
25	-0.29



CUMILITE 60A SPL

CUMILITE 60A SPL 5-25 hrs @ 1450°C	
Time in Hrs.	Percentage Deformation
5	-0.29
10	-0.41
15	-0.48
20	-0.53
25	-0.58





Melter Bottom Blocks in 94% Alumina for Fiber Glass - PCPF CUMICRETE CA66



Bottom Blocks in Mullite for Opal Glass Day tank- CUMILITE W



Side wall Blocks in Mullite for Opal Glass Day tank - CUMILITE W

# Product Data



	Grade	Maximum Hot Face Temperature	Bulk Density	Apparent Porosity	Cold Crushing Strength	Refractoriness Under Load Ta	Creep in Compression 5-25 hrs @1450°C at 0.2 Mpa	Thermal Expansion at 1000°C	Reheat Change after heating at 1450°C/6 hr.	Thermal Conductivity					Chemical Analysis					Mortar		
										400°C	600°C	800°C	1000°C	1200°C	Al <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO		Na <sub>2</sub> O + K <sub>2</sub> O	
										IS 9490 / ASTM C202					IS 12107 / ISO 21587 (Part 2) / ISO 12677:2011							
	°C	g/cc	%	Mpa	°C	%	%	%	W/m <sup>2</sup> K					%								
Mullite Refractories	CUMILITE W	1760	2.55	18.5	90	1762	0.10 at 1550°C	-	-	-	1.68	1.61	1.74	77.5	-	20.6	0.21	-	-	CUMIBOND LM 36		
	CUMILITE WHF	1760	2.60	17.5	95	1767	0.05 at 1550°C	-	-	-	1.68	1.61	1.74	77.4	-	21.0	0.19	-	-	CUMIBOND LM 36		
	CUMILITE 60A SPL	1550	2.55	16.0	65	1662	0.25	-	+0.17	-	1.60	1.49	1.65	60.5	-	35.0	0.75	-	-	CUMIBOND LK 65		
	CUMILITE 65A SPL	1550	2.60	17.5	75	1662	0.20	-	+0.01	-	1.64	1.53	1.72	66.5	-	32.5	0.85	-	-	CUMIBOND LK 65		
	CUMILITE 70A	1600	2.60	15.0	75	1662	0.20 at 1550°C	-	+0.01	-	1.64	1.53	1.72	70.0	-	28.7	1.00	-	-	CUMIBOND LM 36		
	CUMILITE 77A	1550	2.60	17.5	75	1766	0.12	-	+0.01	-	1.64	1.53	1.72	76.5	-	22.7	0.62	-	-	CUMIBOND LM 36		
	CUMILITE S70	1600	2.56	17.0	90	1660	-	0.55	+0.05	-	-	-	-	70.0	-	-	0.84	-	-	CUMIBOND LM 36		
	CUMILITE S60 SPL	1550	2.51	18.8	82	1656	0.25	0.58	+0.04	-	-	-	-	65.2	-	-	0.94	-	-	CUMIBOND LK 65		
	CUMILITE S65 SPL	1550	2.52	19.1	90	1660	0.20	0.60	+0.06	-	-	-	-	66.2	-	-	0.91	-	-	CUMIBOND LK 65		
High Alumina Refractories	CUMILOX 101HB	1870	3.30	16.0	90	-	-	-	-0.05	-	2.54	2.65	2.45	2.60	99.5	-	0.17	0.06	-	-	CUMIBOND LA 102	
	CUMILOX 101HF	1870	3.20	19.0	70	-	-	-	-	-	2.54	2.63	2.43	2.56	99.5	-	0.18	0.06	-	-	CUMIBOND LA 102	
	CUMILOX 45TB	1500	2.32	19.0	38	-	-	-	-	-	-	-	-	41.2	-	55.0	1.50	1.60	1.20	-		
	CUMILOX 55C	1500	2.14	25.0	4	-	-	-	+0.20 at 1500°C/3 hrs.	-	-	-	-	-	55.0	-	41.0	0.40	-	-	-	
	CUMILOX 93C	1700	3.23	12.0	19	-	-	0.80	-	-	3.80	3.30	3.30	3.10	93.0	-	6.0	0.10	-	-	-	
Fireclay Refractories	HEAT 35H	1350	2.15	21.0	25	1400	-	-	-	1.20	-	1.28	-	1.35	38.4	-	2.50	-	-	-	CUMIBOND LK35	
	HEAT 35S	1350	2.22	16.0	45	1380	-	-	-	-	-	-	-	37.0	-	57.0	1.50	-	-	-	CUMIBOND LK35T	
	HEAT 40H	1400	2.25	20.0	25	1420	-	-	-	-	1.21	-	1.28	-	44.2	-	2.50	-	-	-	CUMIBOND LK45	
	HEAT 40S	1400	2.20	17.0	41	1380	-	-	-	-	-	-	-	42.0	-	52.0	1.80	-	-	-	CUMIBOND LK45	
	HEAT 42S	1450	2.28	17.0	60	1400	-	-	-	-	-	-	-	46.0	-	50.0	1.20	-	-	-	CUMIBOND LK45	
	HEAT 45H	1450	2.20	17.0	40	1400	-	-	-	-	-	-	-	42.0	-	56.0	1.80	-	-	-	CUMIBOND LK50	
	HEAT 45S	1450	2.32	16.0	50	1470	-	-	-	-	-	-	-	48.0	-	48.0	1.10	-	-	-	CUMIBOND LK50	
Zircon & Zirconia Mullite Refractories	CUMIZON	1600	3.55	20.5	60	1661	-	0.60	+0.10	-	-	-	-	-	63.6	32.6	0.40	-	-	-	CUMIBOND LZ 85	
	CUMIZON 65G	1600	3.62	18.2	77	1661	-	0.60	+0.10	-	-	-	-	-	63.8	32.1	0.40	-	-	-	CUMIBOND LZ 85	
	CUMIZITE 30C	1750	2.81	24.5	46	1670	-	0.65	-0.30 at 1500°C/4 hrs	-	-	-	-	-	51.2	28.7	-	0.10	-	-	CUMIBOND LZM 30	
	CUMIZITE 11C	1650	2.92	20.5	61	1660	-	0.65	-0.40 at 1500°C/4 hrs	-	-	-	-	-	76.5	11.7	-	0.10	-	-	CUMIBOND LZM 11	
	CUMIZITE ZM2 HF SPL	1750	3.00	17.0	95	1670	-	0.65	+0.05	-	-	-	1.90	-	65.5	19.8	12.9	0.13	-	-	CUMIBOND LZM 30	
Insulation Refractories			ASTM C134 / ISO 5016		ASTM C133 / ISO 8895				ASTM C210 / ISO 2477		IS 9490/ASTM C182					IS 12107 / ISO 21587 (Part 2) / ISO 12677: 2011						
	CUMILAG 23	1260	0.55	-	1.2	-	-	-	-0.70 at 1250°C / 24 Hrs.	0.14	0.17	0.24	0.26	0.30	37.2	-	45.1	0.80	-	-	-	CUMIBOND LK FX
	CUMILAG 2612	1300	1.12	-	10	-	-	-	-0.20 at 1300°C / 24 Hrs.	0.50	0.60	0.65	0.72	-	41.5	-	-	1.60	-	-	-	CUMIBOND LK FX
	CUMILAG 26HS	1400	0.81	-	1.9	-	-	-	-0.40 at 1350°C / 24 Hrs.	0.16	0.22	0.30	0.34	0.40	56.5	-	39.2	0.81	-	-	-	CUMIBOND LK FX
	CUMILAG 30	1650	1.12	-	5	-	-	-	-0.30 at 1620°C / 24 Hrs.	0.60	0.60	0.55	0.60	0.60	73.6	-	25.5	0.54	-	-	-	CUMIBOND LM 36
	CUMILAG 2310	1260	0.95	-	3	-	-	-	-0.70 at 1250°C / 24 Hrs.	0.30	0.36	0.41	0.44	-	40.5	-	-	0.96	-	-	-	CUMIBOND LK FX
	CUMILAG 140GB	1300	1.21	-	14.5	-	-	-	-0.20 at 1350°C / 5Hrs.	0.43	0.48	0.52	0.59	-	41.5	-	-	1.60	-	-	-	CUMIBOND LK FX
	CUMILAG 2308	1300	0.75	-	2.7	-	-	-	-0.50 at 1300°C / 5Hrs.	0.19	0.22	0.22	0.35	-	40.6	-	-	1.20	-	-	-	CUMIBOND LK FX
	CUMILAG 28	1550	0.93	-	2.5	-	-	-	-0.20 at 1510°C / 24 Hrs.	0.28	0.30	0.35	0.42	0.43	67.2	-	31.4	0.62	-	-	-	CUMIBOND LK 65



# Product Data

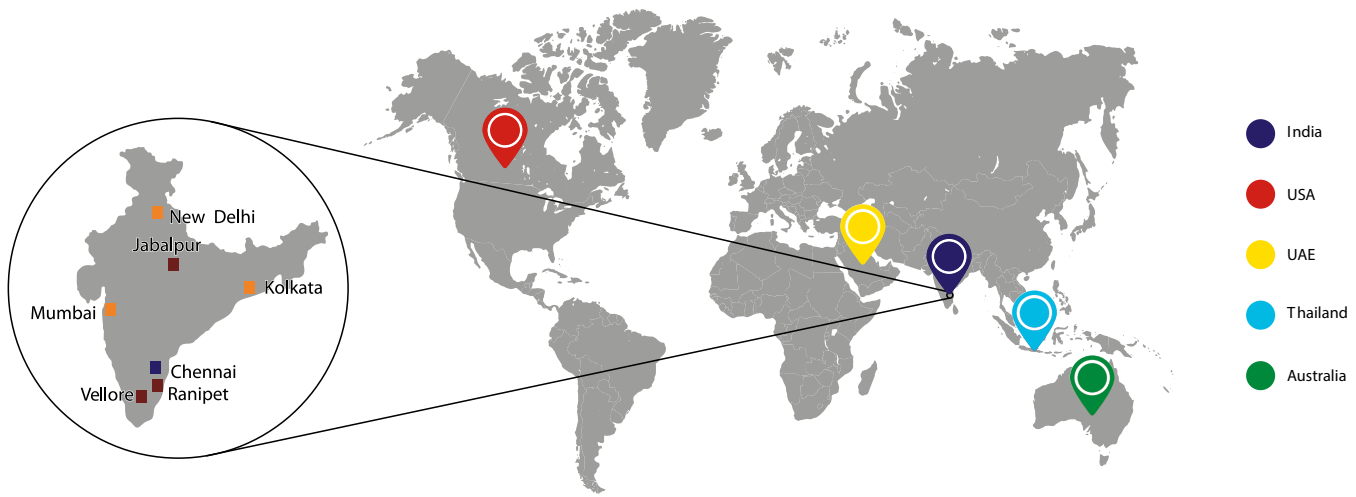


Grade		Maximum Hot Face Temperature	Bulk Density	Apparent Porosity	Cold Crushing Strength	Reheat Change	Chemical Analysis				
							Al <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO
			ASTM C20 / ISO 5017	ASTM C20 / ISO 5017	ASTM C133 / ISO 10059-1	ASTM C113 / ISO 2478	IS 12107 / ISO 21587 (Part 2) / ISO 12677:2011				
		°C	g/cc	%	Mpa	%	%				
Feeder Expandables	GLASSFLO 11C	1650	2.90	21.0	55	-	75.0	11.0	-	0.15	-
	GLASSFLO 30C	1743	2.78	23.5	43	-0.30 at 1500°C / 4 Hrs	51.2	28.5	-	0.12	-
	GLASSFLO 97C	1600	2.90	20.5	80	-	97.0	2.40	-	0.08	-
Precast Shapes	PCPF CUMIHICAST SUPER/ CUMILOX 45GB	1550	2.28	18.0	80	-	45.8	-	-	1.10	2.00
	PCPF CUMIHICAST CZM 20/ CUMIZITE CZM 20GB	1750	3.00	22.0	80	-	52.0	21.0	-	0.30	-
	PCPF CUMIHICAST 60AV/ CUMILOX 60GB	1600	2.55	20.0	90	-	60.0	-	38.0	1.00	-
	PCPF CUMIHICAST CZM 31/ CUMIZITE CZM 31GB	1600	2.90	20.0	100	-	42.6	30.5	24.0	0.14	-
	PCPF CUMICRETE CA66	1800	2.80	-	70	-	94.0	-	0.20	0.10	-
Fused Silica Based	PCPF CUMISIL 95	1450	1.80	21.5	25	-	-	-	95.5	-	2.80
	CUMISIL 98	1650	1.75	20.0	25	-	-	-	98.5	-	-
Laying Mortars	Grade	Max. Service Temperature	Maximum Grain Size	Type of Setting	Recommended Binder Addition (By wt.)	Recommended Water Addition (By wt.)	Chemical Analysis				
							Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	IS 12107 / ISO 21079 (Part 2) / ISO 21587 (Part 2) / ISO 12677:2011	
		°C	mm		%	%	%				
	CUMIBOND LKFX	1600	0.5	Air	18	27	36.0	1.20	-		
	CUMIBOND LM 36	1700	0.5	Heat	-	20	67.0	0.75	-		
	CUMIBOND LA 102	1850	0.5	Heat	-	20	96.2	0.20	-		
	CUMIBOND LK 65	1600	0.5	Heat	-	28	64.0	1.20	-		
	CUMIBOND LZ 85	1650	0.5	Heat	8	8	-	-	60.0		
	CUMIBOND LZM 11	1600	0.5	Heat	-	-	-	-	11.0		
	CUMIBOND LZM 30	1600	0.5	Heat	-	25	42.0	-	29.0		
	CUMIBOND LK 45	1600	0.5	Ceramic	-	30	45.2	2.20	-		
CUMIBOND LK 50	1600	0.5	Ceramic	-	28	46.1	1.80	-			

Castables & Ramming Masses	Grade	Maximum Service Temperature	Maximum Grain Size	Bulk Density	Cold Crushing Strength			Permanent Linear Change		Chemical Analysis					Recommended Water Addition	Recommended Binder Addition
					Dried at 110°C / 24 Hrs	at 110°C / 24 Hrs	at 1000°C / 3 Hrs	at 1550°C / 3 Hrs	at 1000°C / 3 Hrs	at 1550°C / 3 Hrs	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	ZrO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>		
				IS 10570/ASTM C134	IS 10570/ASTM C133			IS 10570/ASTM C113		IS 12107/IS 10085/ISO 12677:2011						
		°C	mm	g/cc	Mpa			%		%					%	%
CUMICRETE CA 392S	1650	6	2.72	61	32.5	60	-0.20	± 0.95	85.2	-	-	1.70	-	9.3	-	
CUMIHICAST CZM 31	1600	5	2.85	90	100	130	-0.1	-0.5	42.6	24.0	30.5	0.14	-	4.75	-	
CUMIRAM RM ZM 25	1600	3	2.97	80	-	-	-	-	58.0	12.5	24.0	-	5.2	3.5	7	
CUMIRAM RZ 60	1600	0.5	3.45	-	-	53	-	-	-	34.0	59.5	-	3.5	-	7	

Note: The above values shown are based on average test result on standard samples. Properties are subjected to reasonable variation based on product shape etc. and hence should be considered for general guidance only.



## CUMI's Worldwide Network at Your Service

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