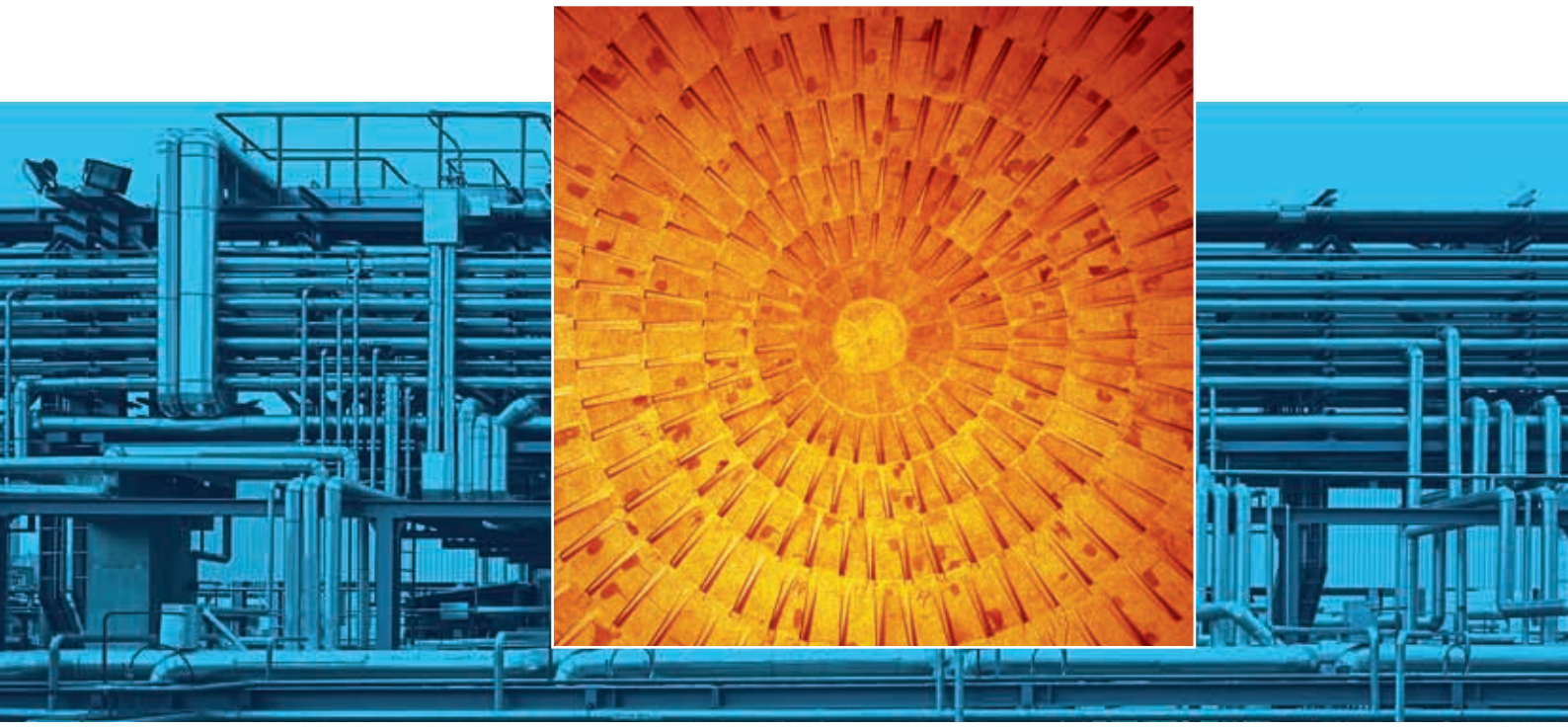
CHEMICAL AND HYDROCARBON PROCESSING



RHI REFRACTORIES

REFRACTORY SOLUTIONS DESIGNED BY RHI DINARIS

RHI Refractories is the world's technological leader in the field of high temperature processes. With our efficient system solutions and comprehensive range of services, we enable our clients to optimise their operational processes and in-crease rates of productivity. The RHI Refractories name includes a number of leading brands, all of which reflect the unrivalled product competence of the company.

As the specialist within the RHI Refractories community RHI DINARIS GmbH owes its high-impact potential to its combination of the advantages of a small, innovative enterprise (flexible organisation structures, streamlined work processes and a customer-oriented workforce) with the opportunities offered by a globally active industry group.

RHI Refractories Products

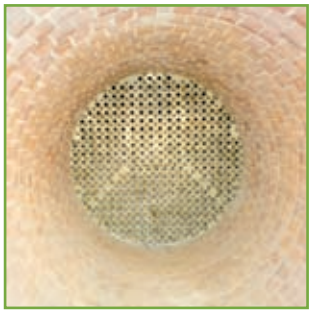
The multitude of processes and the severe operating conditions (extremely high temperatures, aggressive slags, etc.) are the particular challenges for refractory linings in the chemical and petrochemical industries. RHI DINARIS GmbH meets this challenge through high quality standards and an extensive product range.

- Shaped non-basic products based on raw materials ranging from fireclay to corundum, including special chrome-corundum and silicon-carbide grades;
- Shaped basic products ranging from pure magnesia-oxide to magnesia-spinel;
- Specially shaped bricks for specific applications and processes;
- High temperature insulation (HTI), i.e. insulating refractory bricks, insulating bricks, ceramic fibre products, calcium-silicate block insulation etc.;
- Fibre modules with new fixing design for cost-saving installation;
- Monolithics for innovative installations and techniques;
- Specially designed anchoring systems for the efficient installation of monolithics.

RHI Refractories Services

A high level of expertise is needed in order to select appropriate refractory solutions for chemical and petrochemical processes. RHI DINARIS GmbH engineers have cooperated for years with all the major engineering companies, licensers and plant / furnace operators and can therefore offer a unique range of services.

- Lining concepts and refractory engineering based on specific process environments and carried out by experienced designers on CAD systems;
- Detailed project documentation including installation instructions for faultless on-site installation;
- Multi-dimensional heat transfer calculations for stationary and non-stationary process conditions; thermal and energy calculations including general consulting with regard to all thermal factors;
- Calculation, evaluation and illustration of multidimensional stress conditions in refractory linings as a function of operating temperature;
- Development of custom-designed refractory solutions with the customer by focused projects/test programmes in cooperation with our renowned research centres;
- Complete installation and construction site supervision by experienced and highly trained site supervisors;
- Service teams and equipment to train site personnel for applying new lining techniques (self-levelling castables, Compac Shot applications);
- Extensive, world-wide sales network.


RHI REFRACTORIES

RADEX DIDIER VEITSCHER

SYNTHESIS GAS PROCESS

for Hydrogen, Carbon Monoxide, Methanol, Ammonia Production and Gas to Liquid (GTL) Processes

The steam reforming process from natural gas to synthesis gas is often used for the efficient production of hydrogen and carbon monoxide. The refractory materials in the steam reformer must have great stability, accomplish effective insulation and ensure high availability of the process through the indirect heating of the catalyser pipes. High temperatures and flue gas speeds require top quality pro-ducts and design.

In the cold collector zone and waste heat boiler there is direct contact between the refractory material and the strongly reducing synthesis gas. Consequently, only refractory products with a high level of purity can be installed. RHI Refrac-tories offers a specific method for lining pipe walls with self-flowing castables. This lining concept results in superb service lives, and therefore ensures a stable process and high dependability.

Steam Reformer

KONTIBLOCK 170/1430

DIDURITAL 140COR

MAXIAL 310
MAXIAL 37

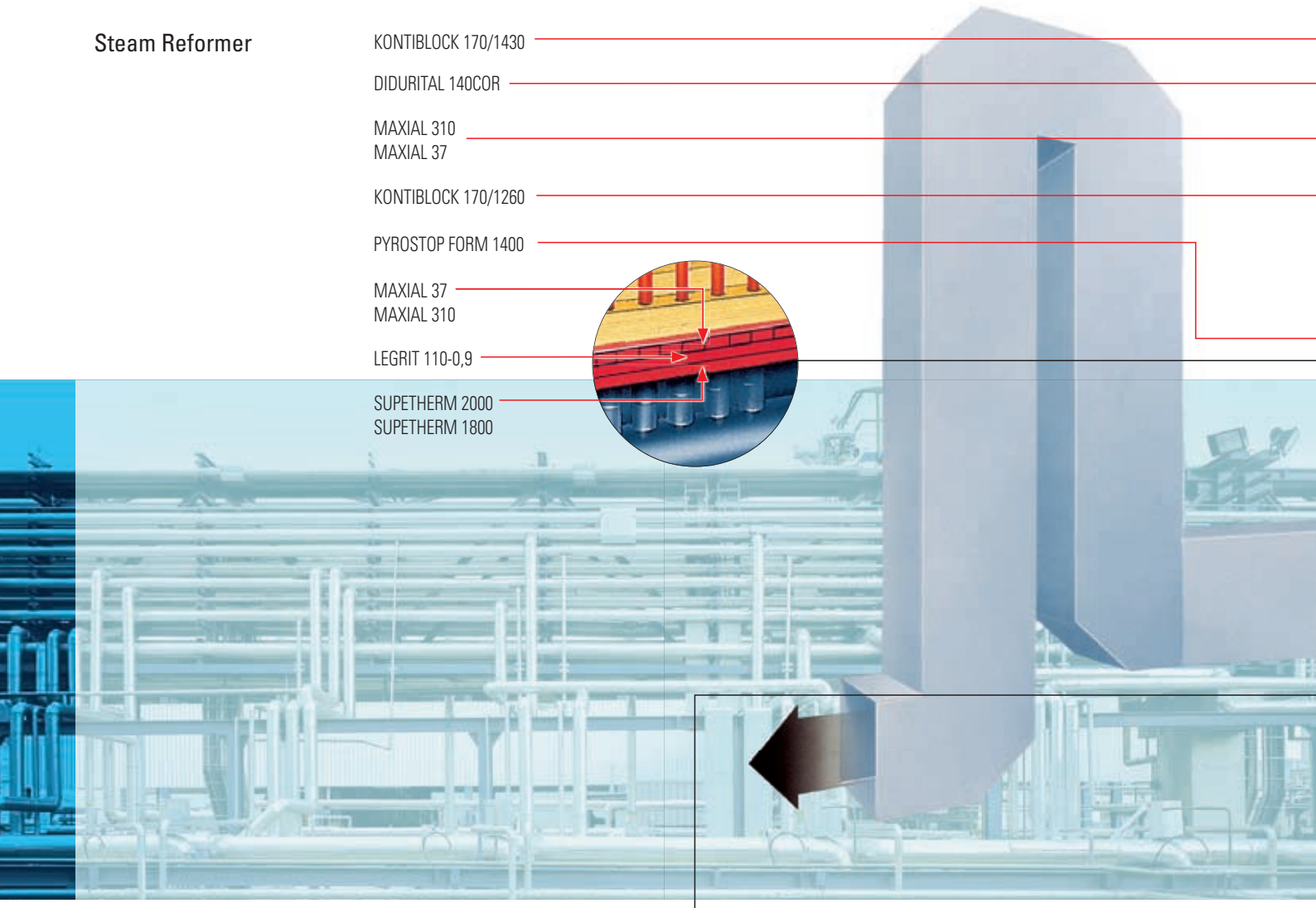
KONTIBLOCK 170/1260

PYROSTOP FORM 1400

MAXIAL 37
MAXIAL 310

LEGRIT 110-0,9

SUPETHERM 2000
SUPETHERM 1800

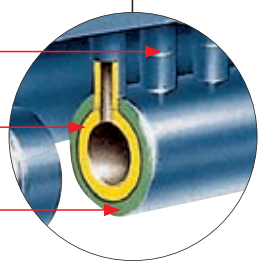


Manifold / Cold Collector

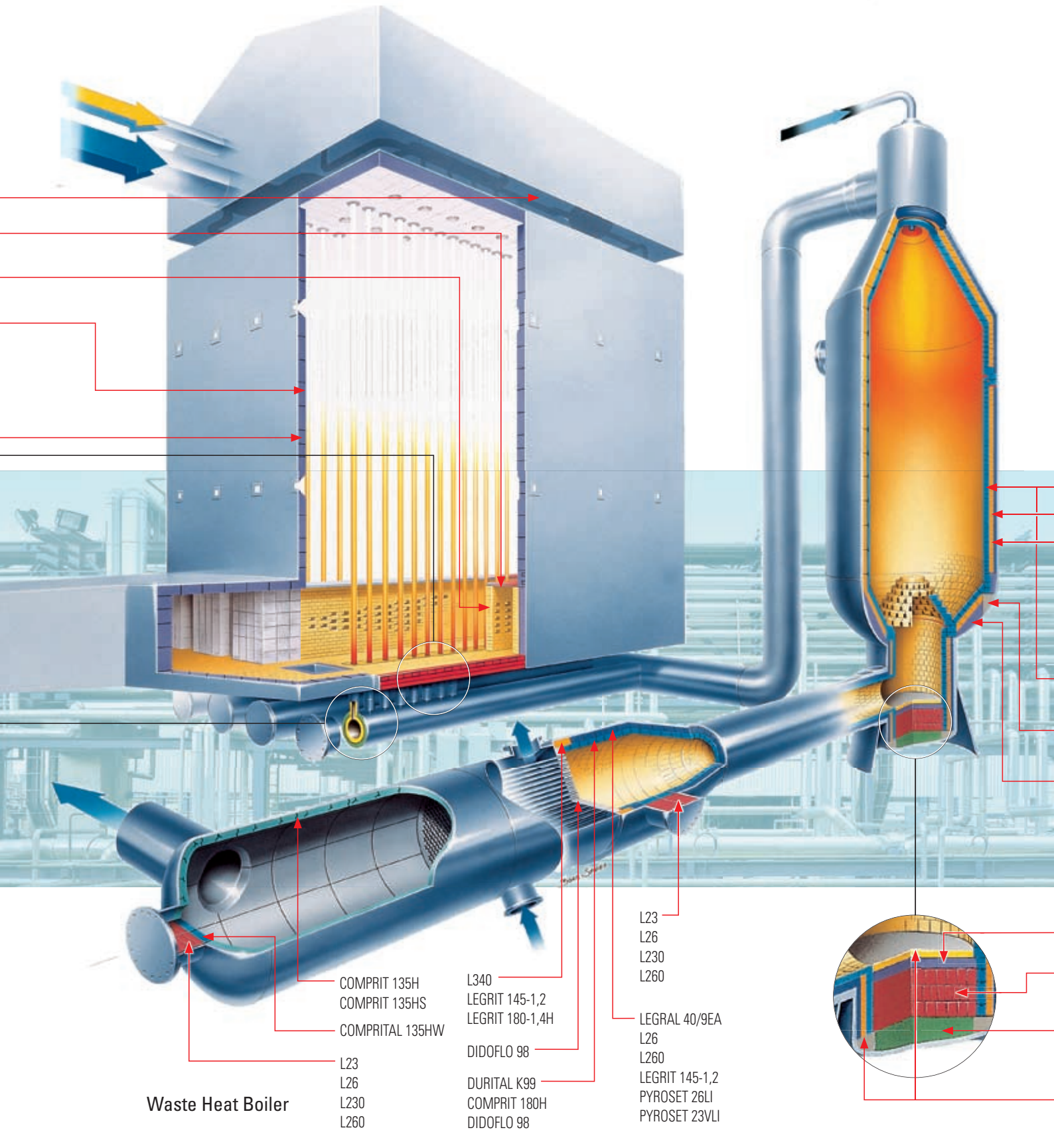
Pigtail Insulation
PYROSTOP FORM 1260

COMPRIT 180H
DIDOFLO 98

PYROSET 26LI
LEGRIT 180-1,4H
LEGRIT 145-1,2



RHI
REFRACTORIES

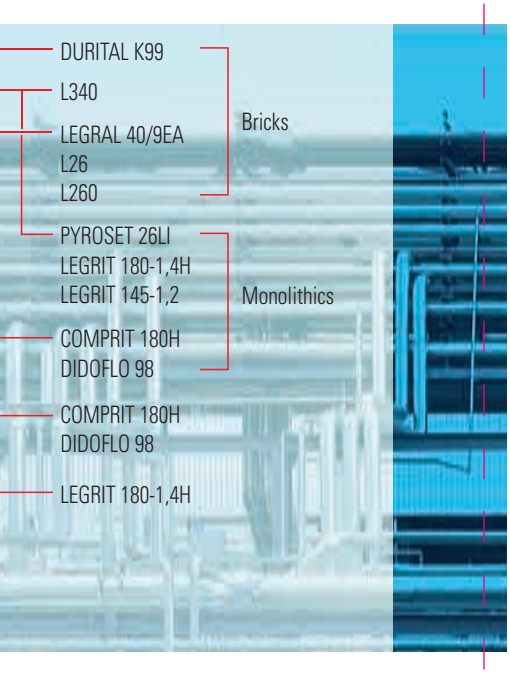


Waste Heat Boiler

Secondary Reformer

Depending on the educt or product of the primary process, a secondary reformer (autothermal reformer) may be needed for the production of synthesis gas for making ammonia and methanol. The experience and refractory preferences of the plant engineering are considered when selecting the appropriate refractories and design for this specific unit in the plant.

In the secondary reformer, refractories have direct contact with synthesis gas at extremely high temperatures (1,000 to 1,400 °C) under extreme hydrogen and carbon monoxide conditions, so that only high-purity materials will show good performance. The fused corundum grades DURITAL K99 (bricks) and DIDOFLO 98 (monolithics) have performed outstandingly in this area.



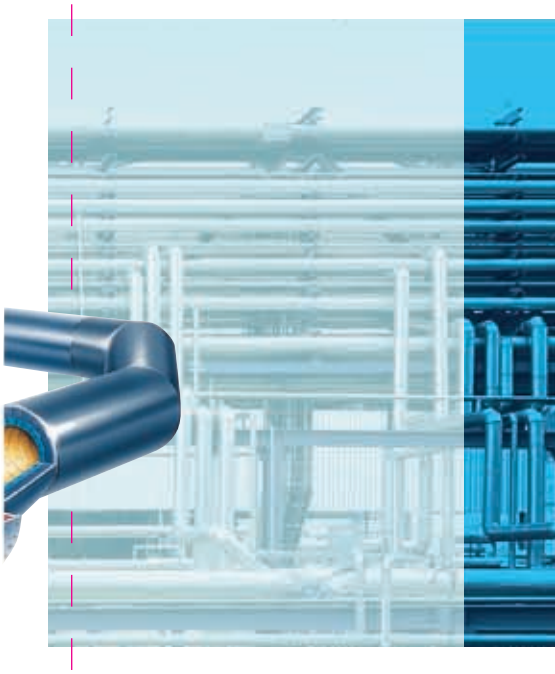
LEGRIT 180-1,4H

L23
L230

PYROSET 26LI

COMPRIT 180H
DIDOFLO 98


Reserve
Optimal



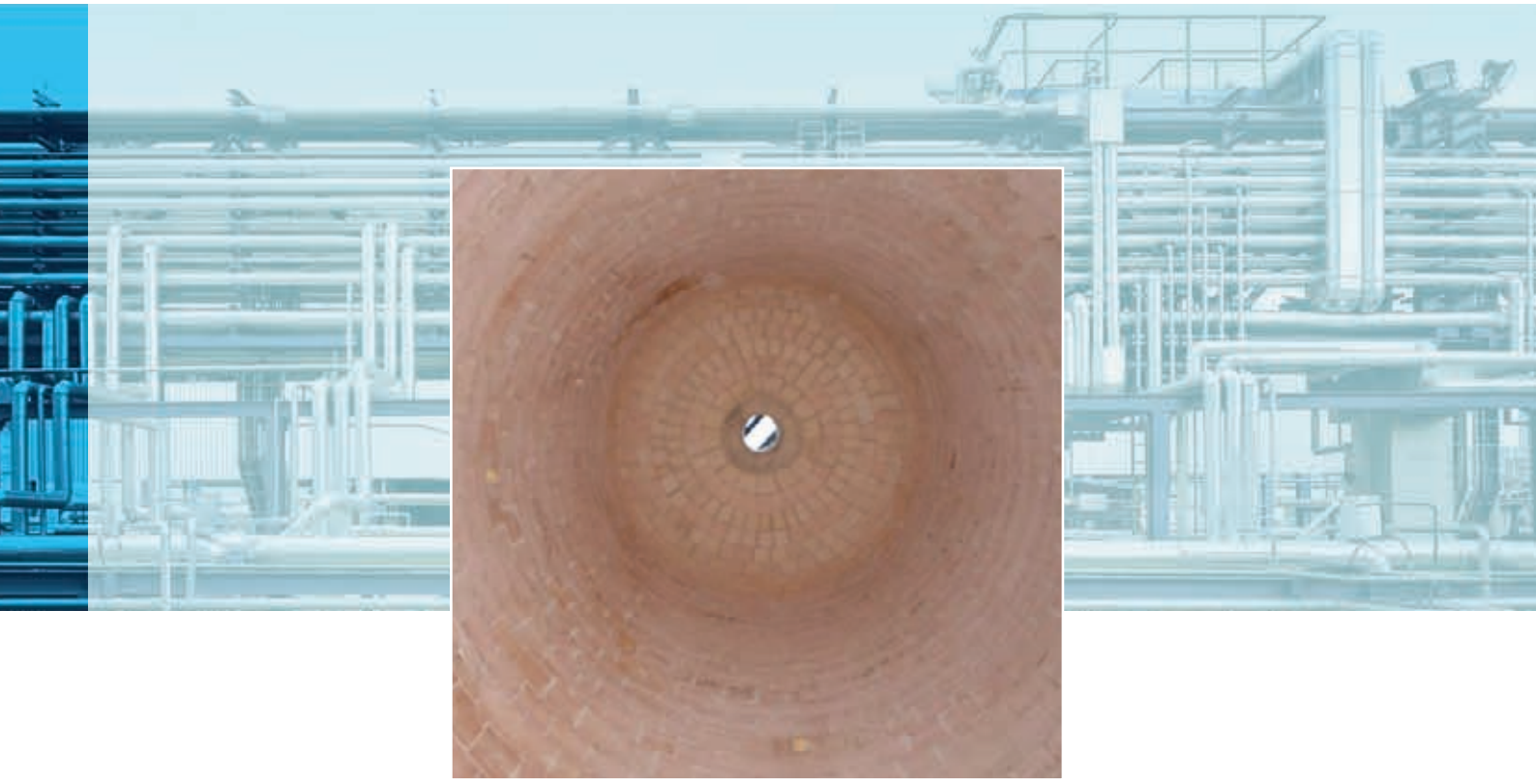
GASIFICATION REACTORS

for Natural Gas, Heavy Oil, Coal Waste

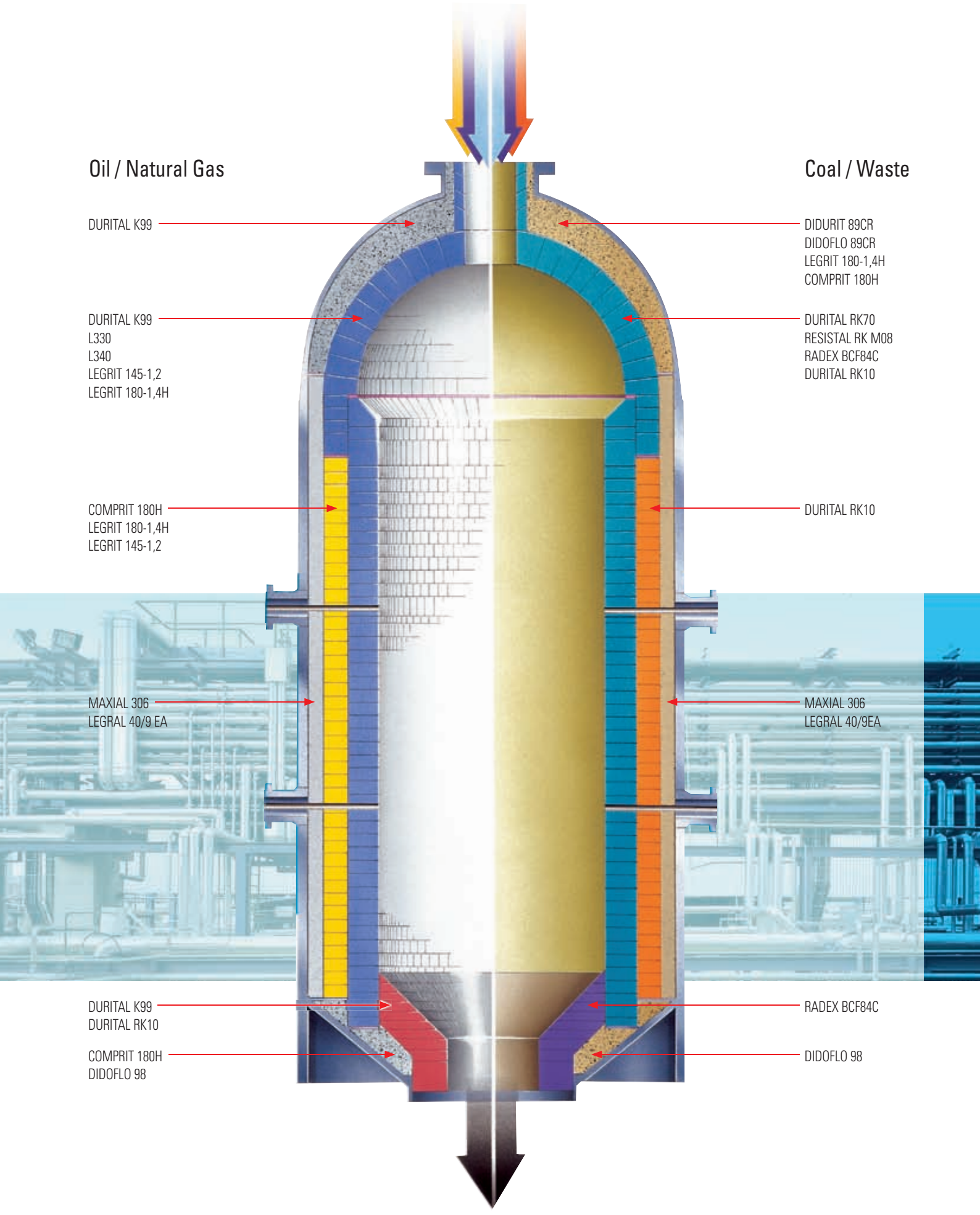
The gasification process is of growing importance for clean energy recovery and the production of synthetic fuels from oil, coal and waste products. Several different refractory lining concepts are utilised according to the gasification raw material. Depending on the hydrogen content, pure high-alumina and fused corundum refractory materials are generally used for the gasification of natural gas and oil.

The selection of the appropriate refractories for the gasification of heavy oil, petrol coke, coal and waste materials is complicated and requires intensive analysis of the gasification raw material and the type of slag that forms.

Based on the chemical and physical characteristics of the slags, our specialists can prepare precise product specifications which will ensure long service lives and process stability. The extensive product range of our chrome-corundum refractories enables us to offer individual lining concepts for gasification processes which take the specific wear of the lining concept into consideration.



RHI
REFRACTORIES


Oil / Natural Gas
Coal / Waste
DURITAL K99
DIDURIT 89CR
DIDOFLO 89CR
LEGRIT 180-1,4H
COMPRIT 180H
DURITAL K99
L330
L340
LEGRIT 145-1,2
LEGRIT 180-1,4H
DURITAL RK70
RESISTAL RK M08
RADEX BCF84C
DURITAL RK10
COMPRIT 180H
LEGRIT 180-1,4H
LEGRIT 145-1,2
DURITAL RK10
MAXIAL 306
LEGRAL 40/9 EA
MAXIAL 306
LEGRAL 40/9EA
DURITAL K99
DURITAL RK10
RADEX BCF84C
COMPRIT 180H
DIDOFLO 98
DIDOFLO 98

INCINERATORS FOR GASEOUS AND LIQUID WASTE

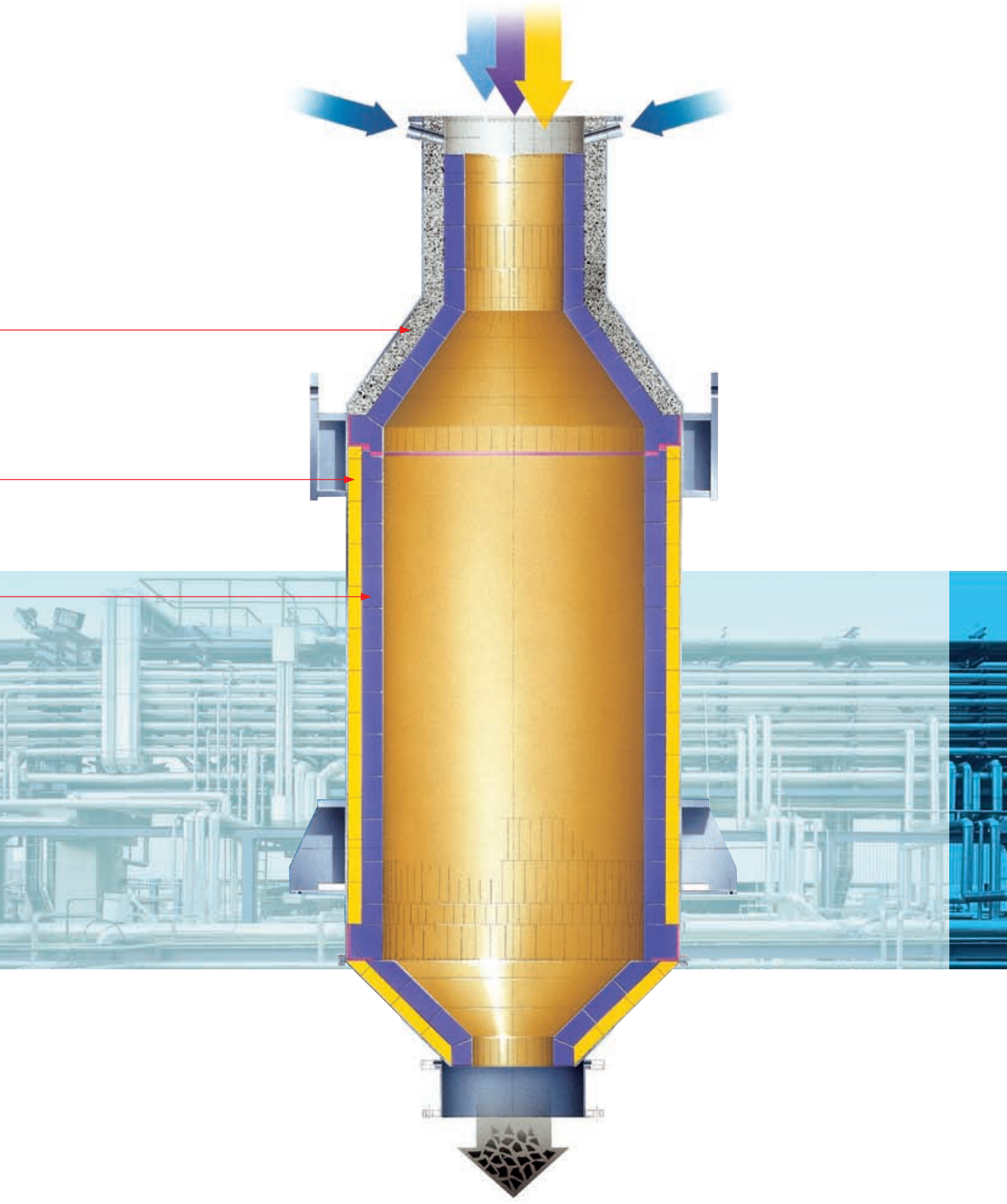
The combustion of liquid and gaseous waste – usually with varying chemical composition – is carried out in incinerators, which are of growing importance these days. RHI Refractories has a high level of expertise which is indispensable for selecting appropriate refractories for these units, thereby ensuring long service life and optimum economic performance.

LEGRIT 180-1,4H
L330
L260
L280
L300

L280
L260
LEGRAL 26/7

DIDURIT 89CR
DURITAL E90
DURITAL K99
DURITAL RK10
RESISTAL B85AC
RESISTAL KR85C
RESISTAL KR70C
RESISTAL S65
RESISTAL SK60C
RESISTAL M45 SICIS
RESISTAL S55 SICIS
DIPLAST 165
DIPLAST 175
DIPLAST 185K M
MAXIAL 300C
MAXIAL 382Z
RUBINAL VS

RHI
REFRACTORIES



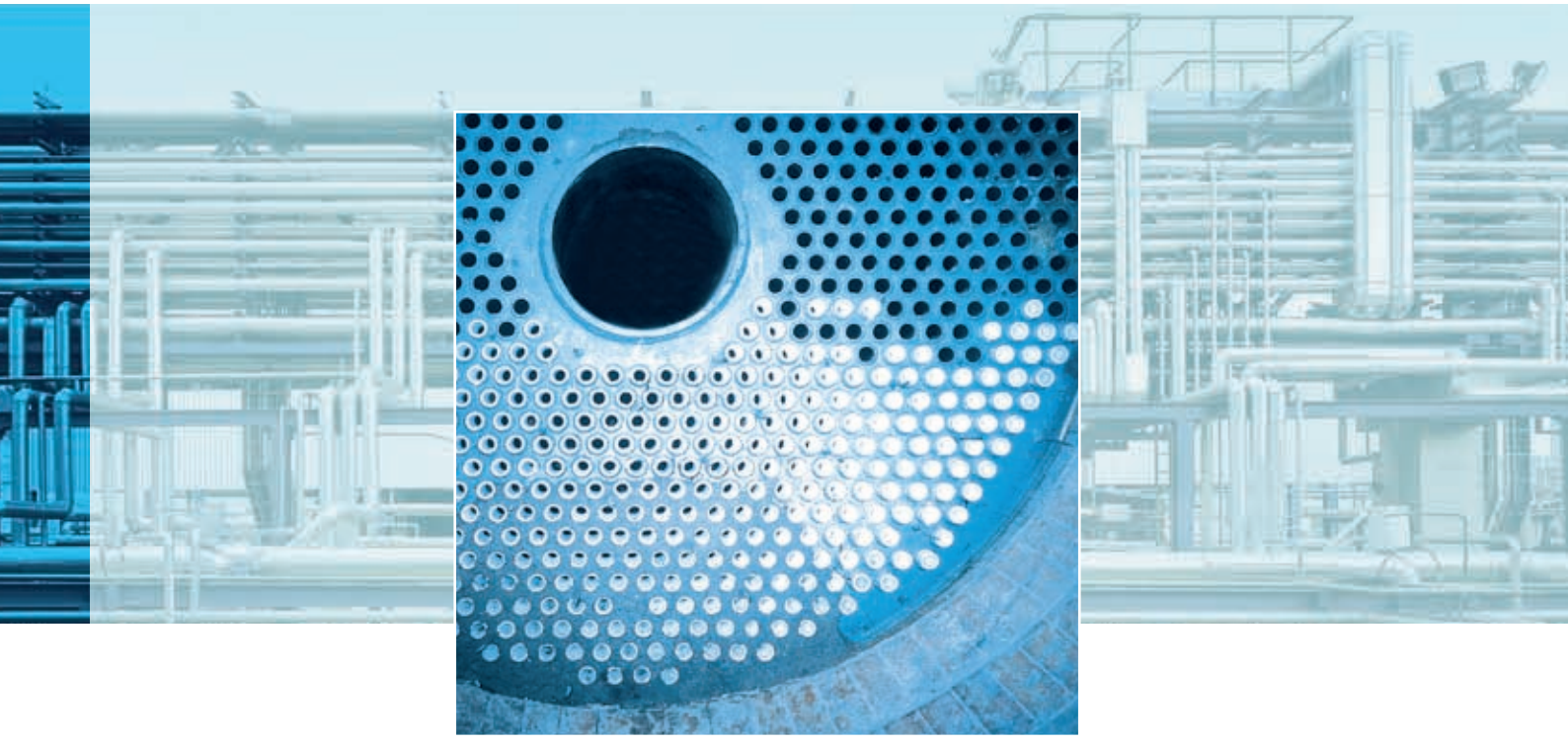
SULPHUR RECOVERY UNIT
CLAUS COMBUSTION CHAMBER

RHI Refractories provides all the refractories required for sulphur recovery units – for every area ranging from the Claus combustion chamber to the reactor.

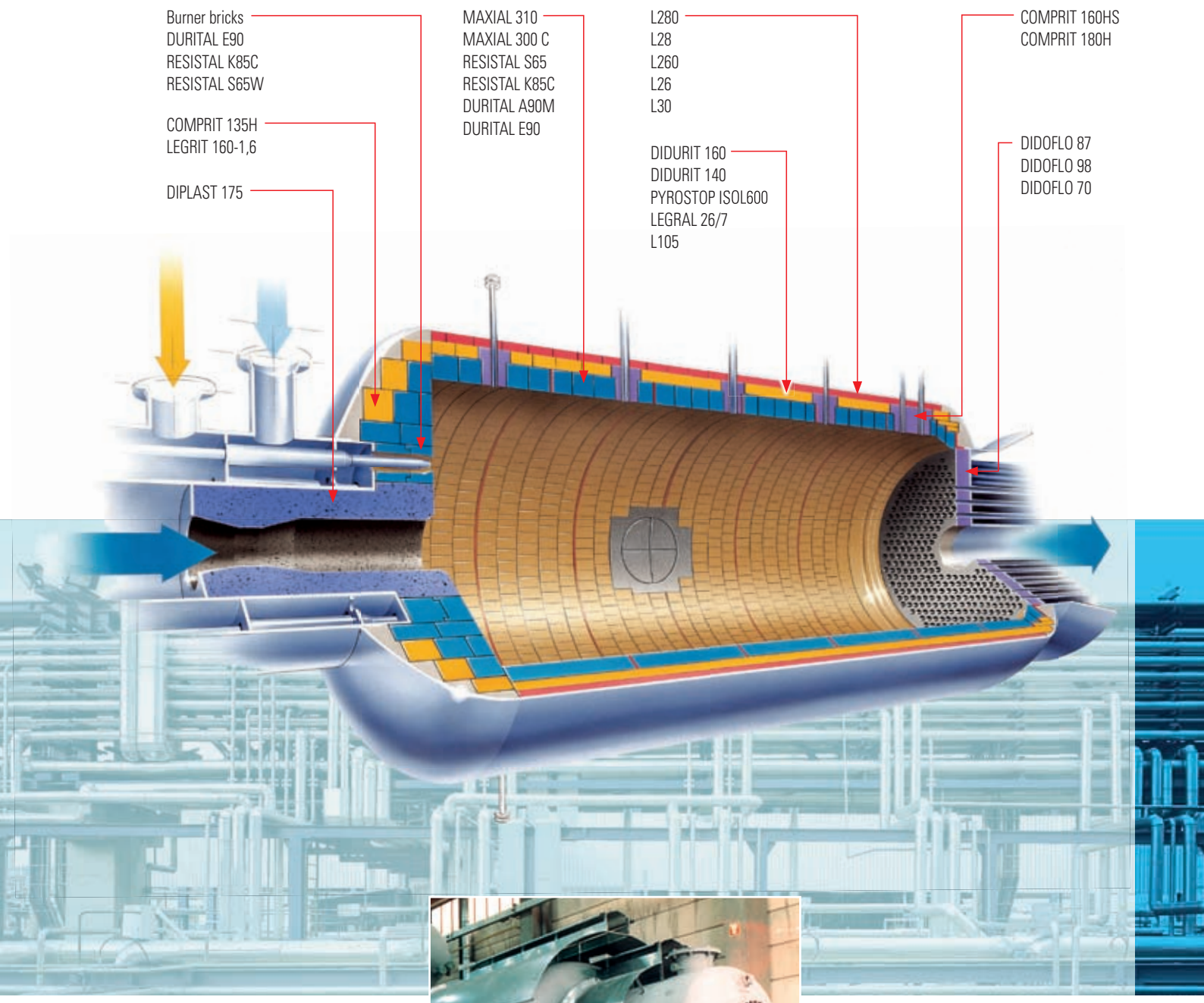
In combustion chambers with oxygen feed burners the refractory grades DURITAL E90 and RESISTAL K85C have provided outstanding service results. In units with airfed burners the refractory grade RESISTAL S65 has performed well in the front layer. Dense refractory castable is installed to protect the tube sheet from overheating.

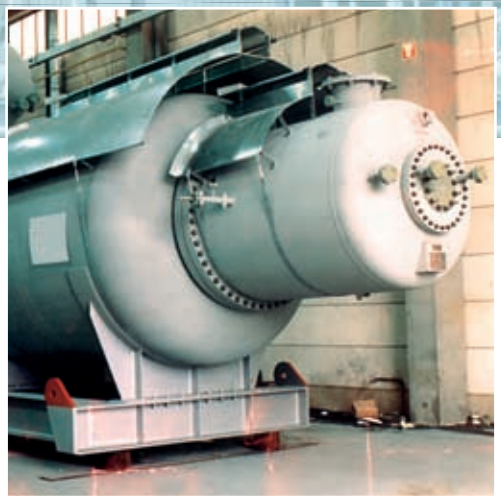
Here it is possible to use self-levelling DIDOFLO mixes, which are available in a number of different material compositions and simplify installation. Given the wide range of available insulating refractories, our engineers can achieve a specific steel shell temperature according to customer requirements.

High-grade fireclay refractories MAXIAL 310 and MAXIAL 382Z are installed in the acid-exposed plant sections following the tail gas incinerator and the Claus reactor.



RHI
REFRACTORIES


Burner bricks
DURITAL E90
RESISTAL K85C
RESISTAL S65W
COMPRIT 135H
LEGRIT 160-1,6
DIPLAST 175
MAXIAL 310
MAXIAL 300 C
RESISTAL S65
RESISTAL K85C
DURITAL A90M
DURITAL E90
L280
L28
L260
L26
L30
DIDURIT 160
DIDURIT 140
PYROSTOP ISOL600
LEGRAL 26/7
L105
COMPRIT 160HS
COMPRIT 180H
DIDOFLO 87
DIDOFLO 98
DIDOFLO 70

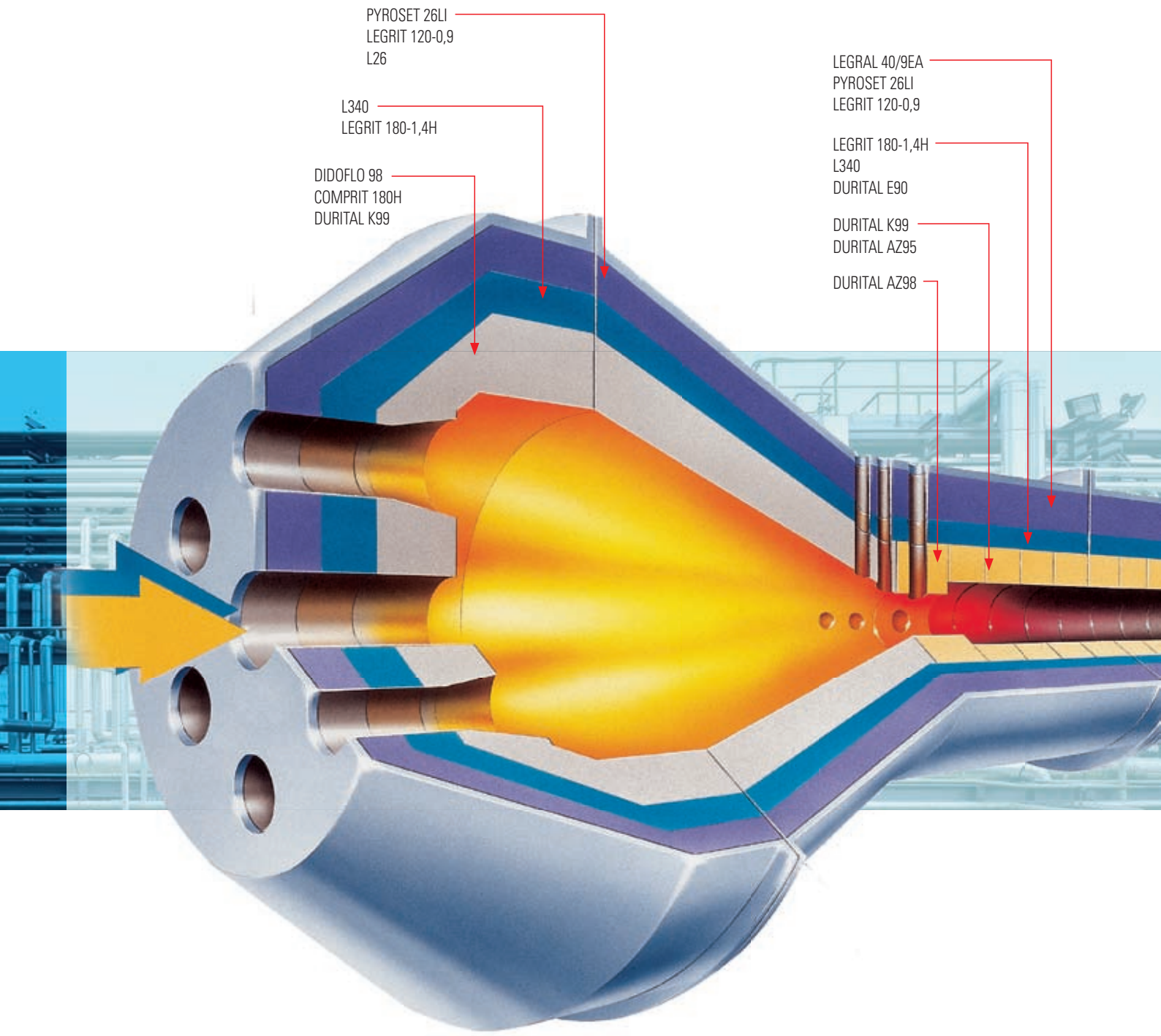


CARBON BLACK REACTORS

for Soft and Hard Carbon

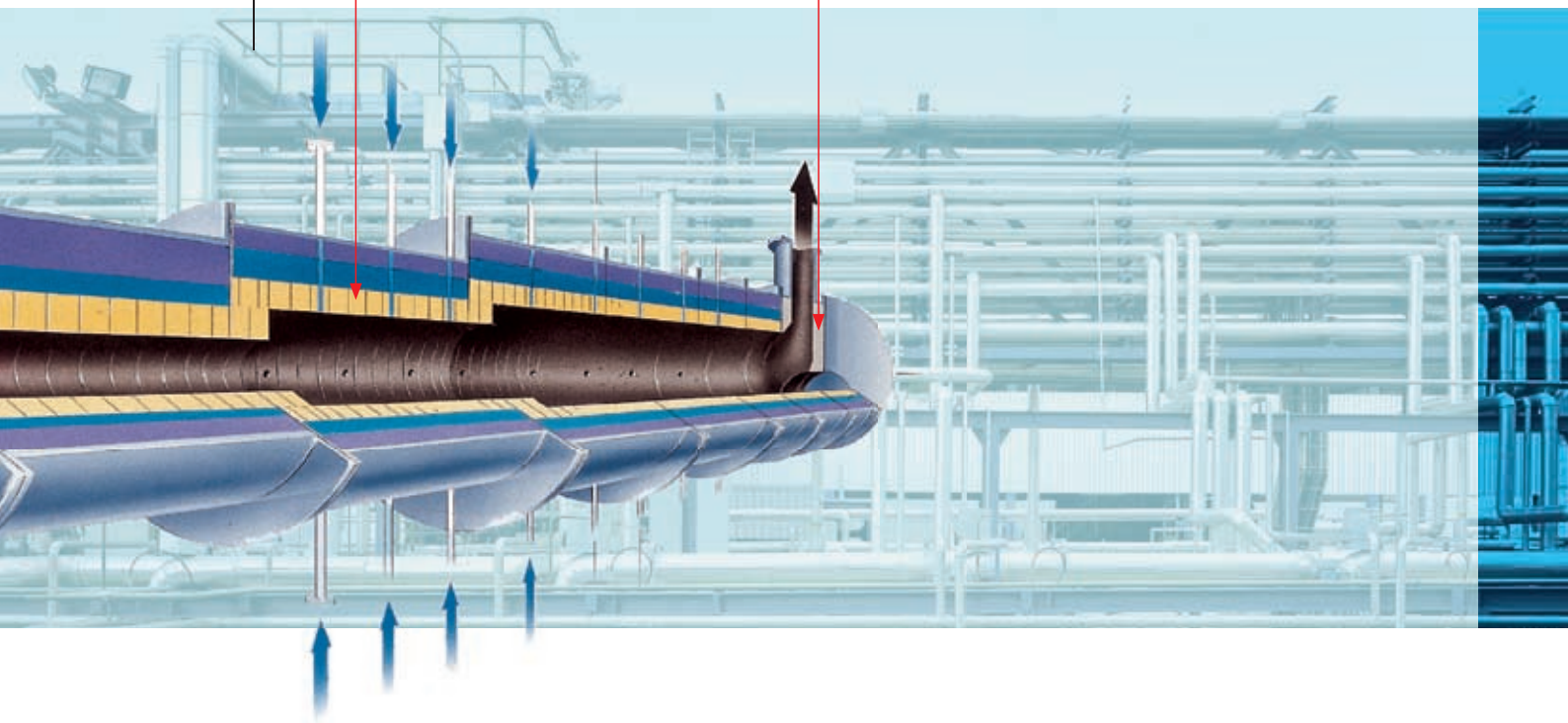
Carbon black is produced from natural gas and air at extremly high temperatures. Water injection is used to quench the process gas and obtain carbon black powder. Highest refractoriness and thermal shock resistance are required from the refractories here. RHI Refractories recommends a three-layer lining concept.

High Temperature Section



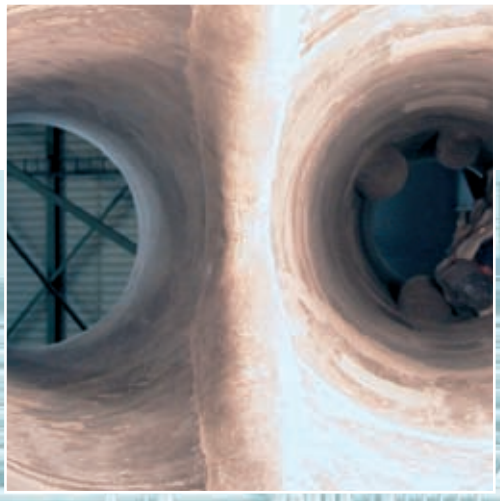
RHI REFRACTORIES

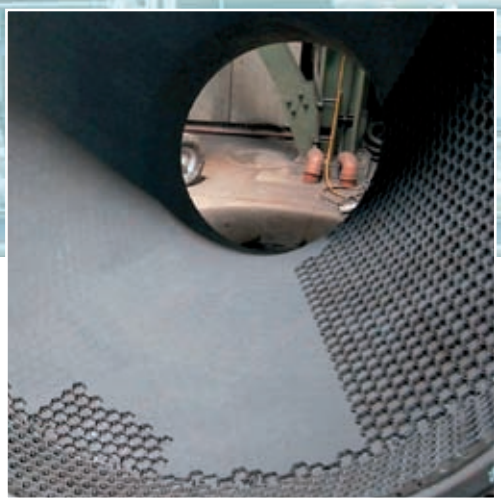
Quench Section



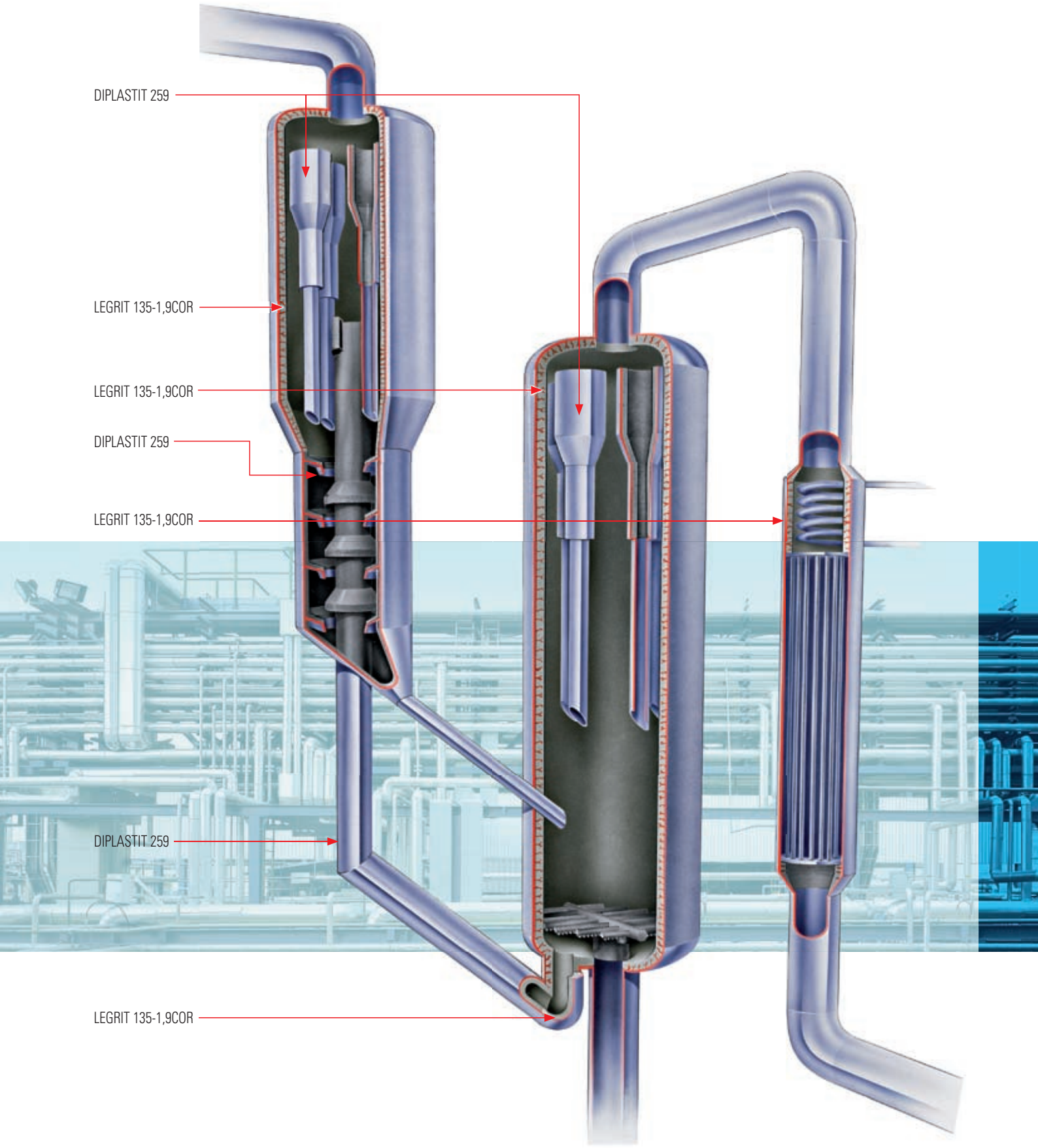
FLUID CATALYTIC CRACKING UNITS

FCCUs are crucial in oil refinery plants and the demands on the lifetime and reliability of refractory products to line these units are extremely high. With LEGRIT 135-1,9COR, RHI Refractories can offer a novel refractory grade that combines good abrasion resistance, high strength, and thermal insulation properties. Furthermore, this product offers the possibility for both vibrocasting and gunning applications, thereby ensuring maximum installation flexibility. In combination LEGRIT 135-1,9COR and DIPLASTIT 259, a grade developed for the thin layer hexmesh lining that has a good workability and an extremely low abrasion loss, provide an RHI Refractories' lining concept for FCCUs that significantly reduces the number of material grades required.





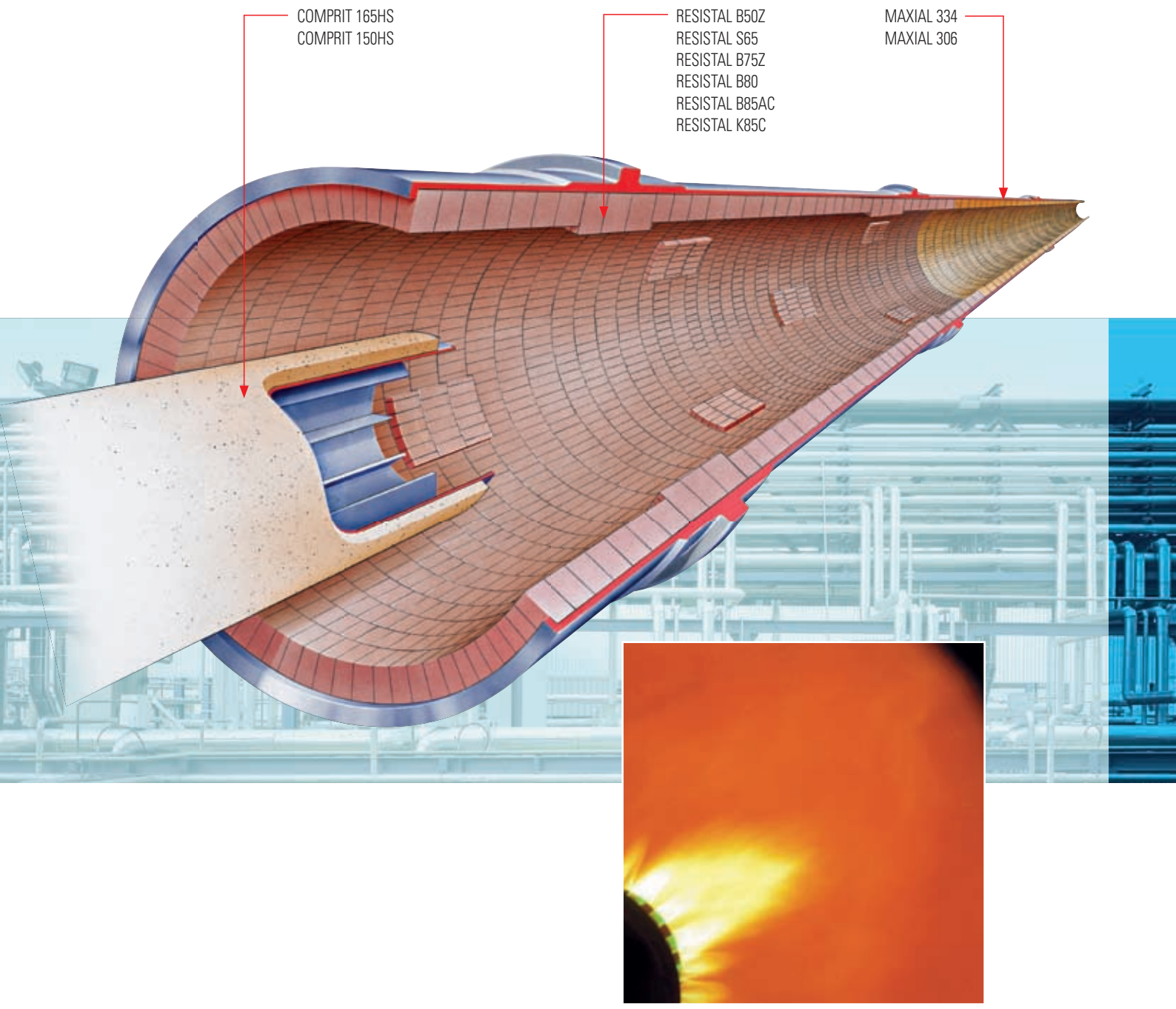
RHI
REFRACTORIES


DIPLASTIT 259
LEGRIT 135-1,9COR
LEGRIT 135-1,9COR
DIPLASTIT 259
LEGRIT 135-1,9COR
DIPLASTIT 259
LEGRIT 135-1,9COR

COKE CALCINERS

RHI Refractories can provide a wide range of refractory bricks for the lining of Pet-Coke Calciners.

Material selection is done based on operating conditions and specific coke composition.



CHEMICAL & PHYSICAL PROPERTIES

BRICKS

GRADE	Al_2O_3	SiO_2	Fe_2O_3	MgO	TiO_2	ZrO_2	Cr_2O_3	Na_2O	BD	
	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	kg/dm³	
Fireclay										
MAXIAL 382Z	30.0	62.0	1.4	0.4	1.3			0.8	2.12	
MAXIAL 334	36.0	59.5	1.2	0.5	1.0			0.5	2.18	
MAXIAL 37	38.0	56.0	1.9						2.17	
MAXIAL 310	41.0	54.0	1.5	0.4	1.7			0.1	2.23	
MAXIAL 306	48.0	48.0	1.2	0.3	1.4			0.1	2.35	
MAXIAL 300C	47.0	48.0	1.3		1.8				2.31	
High-Aluminia										
RESISTAL M45SICIS	44.0	34.0	0.8		1.2			SiC/20.0	2.56	
RESISTAL S55SICIS	53.0	38.0	0.5		0.2			SiC/8.0	2.66	
RESISTAL B50Z	54.0	41.0	1.6		2.1			0.1	2.36	
RESISTAL SK60C	59.0	36.0	0.9						2.53	
RESISTAL S65	64.5	33.5	0.8	0.4					2.55	
RESISTAL S65W	63.5	34.5	0.8	0.4	0.7			0.3	2.54	
RESISTAL S70	70.0	28.0	0.5		0.3				2.58	
RESISTAL B75Z	77.0	16.0	1.6		2.6			0.1	2.74	
RESISTAL B80	80.5	13.0	1.7	0.3	3.1		0.2	0.1	2.75	
RESISTAL B85AC	81.5	10.5	1.6	0.1	1.9				2.93	
RESISTAL K85C	87.5	8.0	0.4	0.3	0.4			0.4	3.11	
RESISTAL A90M	90.0	8.0	0.4	0.4	0.3			0.5	3.02	
RESISTAL KR85C	84.0	4.0					6.0		3.25	
RESISTAL RK10	84.0	1.9				3.0	9.0		3.33	
RESISTAL RK30	60.0	2.5				3.5	29.0		3.48	
High-Aluminia High Fired										
DURITAL S75	75.0	24.0	0.6		0.1				2.66	
DURITAL E75	76.0	23.0	0.1					0.1	2.66	
DURITAL E90	89.0	10.0	0.1					0.3	2.95	
DURITAL K99	99.3	0.2	0.1					0.3	3.23	
DURITAL AZ95	95.0	1.4	0.2			3.0		0.4	3.15	
DURITAL AZ98	97.2	0.2		0.2		2.0		0.3	3.20	
DURITAL RK10	86.0	1.0					10.5		3.40	
DURITAL RK70	12.5	3.5			1.0	6.5	73.5		3.95	
RADEX BCF84C	0.4	0.1	0.5	17.0			81.0		3.95	
RADEX BCF86C	0.2	0.1	0.5	18.5			80.0		3.90	
Several Grades										
CARSIAL 90	1.1	9.0	1.0					SiC/88.0	2.72	
RUIBINAL VS		0.6	0.5	97.0					2.96	

RHI
REFRACTORIES

	Po	CCS	CMR	RUL T_{05}	CR	TSR	Thermal Expansion	TC 400 °C	TC 700 °C	TC 1000 °C
	%	N/mm²	N/mm²	°C	0,2 N/mm²; (z 5-25h)%	[H_2O]	[%]	W/m·K	W/m·K	W/m·K
	12.0	80.0	11.0	1250		10	0.5 (1000 °C)	1.20	1.30	1.40
	13.5	70.0		1350		20		1.20	1.30	1.40
	18.0	45.0		1300			0.6 (1400 °C)			
	16.5	60.0		1350	-0.25 (1200 °C)	15		1.2 (500 °C)	1.30 (750 °C)	1.40
	15.0	65.0	12.0	1470	-0.15 (1280 °C)	>30	0.7 (1400 °C)	1.2 (500 °C)	1.30 (750 °C)	1.40
	16.0	70.0	10.0	1350		15	0.6 (1000 °C)	1.6 (500 °C)	1.60 (750 °C)	1.70
	11.0	140.0		1500		>60		1.85	1.95	2.05 (1100 °C)
	10.0	150.0	21.0	1620	-0.147 (1425 °C)	>50	0.7 (1500 °C)	1.45 (500 °C)	1.50 (750 °C)	1.60
	17.5	60.0		1400		20		1.40	1.50	1.60
	15.0	80.0	7.0	1500		>30	0.8 (1400 °C)	1.5 (500 °C)	1.60 (750 °C)	1.70
	15.5	75.0		1650	-0.2 (1500 °C)	>30	0.8 (1400 °C)	1.2 (500 °C)	1.30 (750 °C)	1.40
	15.5	75.0	8.0	1650	-0.15 (1425 °C)	>30	0.8 (1400 °C)	1.4 (500 °C)	1.40 (750 °C)	1.50
	18.0	70.0		1680			0.75 (1500 °C)	1.70	1.65 (750 °C)	1.75
	17.5	100.0		1500		>30	0.7 (1100 °C)			
	20.5	80.0	10.0	1500		>30	1.1 (1400 °C)	1.85		
	14.5	160.0	10.0	1500		20	1.1 (1400 °C)	2.7 (500 °C)	2.50 (750 °C)	2.50
	14.5	150.0	11.0	1650		30	1.0 (1400 °C)	2.7 (500 °C)	2.60 (750 °C)	2.90
	14.5	126.0	19.0							
	13.5	160.0	20.0	1700		>30	1.1 (1400 °C)	3.15	3.00	3.05
	14.5	140.0	15.0	>1700		>50	1.1 (1400 °C)	3.50	3.00	2.80
	14.5	140.0	10.0	>1700		>30	1.2 (1500 °C)	2.70	2.40	2.30
	18.0	85.0		1700	-0.23 (1550 °C)	>30	0.83 (1400 °C)	1.70	1.65	1.75 (1100 °C)
	15.5	110.0	17.0	1700	-0.25 (1600 °C)	30	0.8 (1500 °C)	1.50	1.50 (750 °C)	1.50
	15.5	120.0		>1700		>60	1.07 (1400 °C)	2.00	2.00	2.3 (1100 °C)
	18.0	80.0		>1700		10	1.2 (1400 °C)	3.80	3.20	2.95
	16.0	120.0		1700		>50		2.90	2.50	2.3 (1100 °C)
	17.0	100.0		>1700	-0.69 (1600 °C)	30	1.17 (1500 °C)	3.6 (500 °C)	2.80 (750 °C)	2.30
	14.5	240.0		>1700			1.2 (1500 °C)	3.50	3.00	2.80
	13.0	160.0		1650		5	1.1 (1500 °C)	2.40	2.20	2.20
	12.0	40.0		>1700			1.31 (1400 °C)	2.2 (500 °C)	2.00 (750 °C)	2.00
	15.0	25.0		>1700			1.31 (1400 °C)	2.2 (500 °C)	2.00 (750 °C)	2.00
	12.0	150.0				>60	0.7 (1400 °C)		15.00	12.5 (1100 °C)
	15.9	80.0		>1700			1.95 (1400 °C)	7.7 (500 °C)	5.90 (750 °C)	4.60

MR	Material Requirement
CCS	Cold Crushing Strength
CMR	Cold Modulus of Rupture
PLC	Permanent Linear Change
TC	Thermal Conductivity
AR	Abrasion Resistance
Temp.Lim.	Temperature Limit of Application
BD	Bulk Density

CHEMICAL & PHYSICAL PROPERTIES

CASTABLES

GRADE	Al_2O_3	SiO_2	MgO	Fe_2O_3	CaO	TiO_2	MR	CCS (110 °C)	CCS (1000 °C)	CMR (110 °C)	
	[%]	[%]	[%]	[%]	[%]	[%]	kg/dm³	N/mm²	N/mm²	N/mm²	
Insulating Castables											
LEGRIT 100-0,5	28.0	18.0	8.5	14.0	26.0	1.5	0.5(C)/0.7(G)	1.5	1.0		
LEGRIT 105-0,5	14.5	43.0	8.7	6.3	19.0		0.5(R)/0.7(G)	1.4	0.7		
LEGRIT 110-0,7	15.5	48.0	7.1	6.0	17.5	0.8	0.70	3.5	4.5		
LEGRIT 110-0,8	26.0	36.0	5.0	11.5	17.5	1.3	0.85	6.0	3.0		
LEGRIT 120-0,9	35.0	37.0	0.5	2.9	20.0	1.4	1.00	7.0	4.0	2.4	
LEGRIT 135-1,3S	43.0	41.0	0.8	3.8	9.5	0.9	1.35	14.0	8.0	3.0	
LEGRIT 135-1,3	38.5	45.0	0.4	3.3	11.0	1.4	1.37	12.0	10.0	3.0	
LEGRIT 144-0,9LI	45.0	32.0		0.5	20.0		0.95	6.0	3.0 (1300 °C)		
LEGRIT 145-1,2	85.0	0.2	1.0	0.1	13.0		1.25	6.0	10.0 (1300 °C)		
LEGRIT 160-1,6	52.0	38.5		1.7	5.0	1.4	1.60	13.0	11.0		
LEGRIT 180-1,4H	91.5	0.5		0.1	7.5		1.37	10.0	10.0	4.0	
LEGRIT 135-1,9COR	44.0	42.0		0.5	10.0		1.87	65.0	50.0 (1300 °C)		
LEGRIT 135-1,9SF	43.5	47.0		0.4	6.5		1.88	65.0	70.0 (1300 °C)		
PYROSET 23VLI	47.4	31.7		0.5	17.6	0.7	0.86	3.7	1.9		
PYROSET 26LI	58.0	31.4		0.7	6.8	0.5	1.14	6.3	4.3		
Refractory Castables											
COMPRIT 115	33.0	47.0	0.7	1.1	14.0	0.4	2.00	65.0	20.0	10.0	
COMPRIT 130HSR	46.5	42.5	0.4	0.8	7.4		2.10	75.0	50.0		
COMPRIT 135	47.0	41.0		1.2	7.8	2.0	2.00	60.0	35.0		
COMPRIT 135H	44.0	47.5	0.4	0.6	3.5	0.3	2.15	60.0	45.0	6.5	
COMPRIT 135S	43.0	46.0	0.7	1.4	6.6	1.9	2.00	17.0	24.0		
COMPRIT 135HS	43.0	46.0	0.6	0.6	5.0	0.4	1.95	65.0	40.0		
COMPRIT 145	72.0	15.0		1.5	7.5		2.54	75.0	45.0		
COMPRIT 145S	72.0	15.0		1.9	8.0	2.8	2.30	55.0	40.0		
COMPRIT 145HSR	53.0	36.0	0.2	0.9	7.9		2.20	110.0	70.0	13.0	
COMPRIT 150HS	55.0	37.0	0.1	1.0	5.0	1.8	2.10	60.0	40.0		
COMPRIT 150Z	56.0	16.5		0.3		ZrO_2/22.5	2.90	110.0	90.0		
COMPRIT 160H	75.0	18.0	0.2	1.0	3.5	2.0	2.45	80.0	65.0	9.5	
COMPRIT 165HS	94.0	1.2		0.1			2.74	50.0	80.0		
COMPRIT 170H	92.0	2.5	0.3	0.1	3.3	1.0	2.95	100.0	80.0	15.0	
COMPRIT 180H	95.0	0.1		0.1			2.74	60.0	80 (1100 °C)		
COMPRIT 185H	97.0	0.1		0.1			2.90	80.0	75.0		
LC-Refractory Castables											
DIDURIT 140	41.0	51.0		0.7	3.4		2.20	85.0	80.0	9.0	
DIDURIT 140COR	45.0	47.0		0.6	4.0		2.28	115.0	100.0		
DIDURIT 160	51.0	44.0		1.0	1.6	1.5	2.35	55.0	110.0		
DIDURIT 170	85.0	10.5		1.2		2.6	2.80	50.0	130.0		
DIDURIT 175	88.5	7.0		0.6	1.5	1.9	3.05	80.0	135.0	10.0	
DIDURIT 89CR	88.5	1.0		0.1		Cr_2O_3/10.1	3.15	25.0	50.0		

RHI REFRACTORIES

	PLC (110 °C)	PLC (1000 °C)	Thermal Expansion	TC 400 °C	TC 800 °C	TC 1000 °C	TC 1200 °C	Temp. Lim.	AR ASTM C704	APPLICATION
	[%]	[%]	[%]	W/m·K	W/m·K	W/m·K	W/m·K	°C	cm^3	
		-2.6	0.25 (1000 °C)	0.17	0.21	0.24		1000		casting, gunning, rodding
		-1.5	0.22 (1000 °C)	0.16	0.18	0.21		1050		rodding, gunning
		-0.5	0.5 (1000 °C)	0.25	0.30	0.33		1100		rodding, gunning, casting
		-1.7	0.5 (1000 °C)	0.20	0.23	0.25		1100		rodding, gunning,c asting
		-1.0	0.6 (1200 °C)	0.24	0.29	0.30		1200		rodding, gunning, casting
		-0.4	0.6 (1200 °C)	0.43	0.46	0.49	0.53	1350		casting, gunning
		-0.2	0.6 (1200 °C)	0.47	0.51	0.54		1350		rodding, casting, vibrating
		-0.4		0.33	0.36	0.38		1440		casting, rodding
		-0.1 (1400 °C)	0.5 (1000 °C)	0.50	0.45	0.48	0.50	1450		casting
		-2.5 (1500 °C)		0.49	0.56	0.59		1580		casting, gunning
		1.2 (1500 °C)	1.4 (1400 °C)	0.89	0.78		0.73	1800		rodding, casting
	-0.20 (815 °C)	-0.6 (1300 °C)	0.25 (1000 °C)	0.90	0.93	0.98		1375	12.00	casting, gunning
	-0.20 (815 °C)	-0.4 (1300 °C)	0.25 (1000 °C)	0.97	1.02	1.05		1375	12.50	casting without vibrating
		-0.3 (1200 °C)		0.19	0.21	0.23		1260		casting, gunning
		-0.8 (1200 °C)		0.31	0.36	0.40		1430		casting, gunning
		-0.2	0.35 (1000 °C)	0.70	0.70	0.70		1150		casting, vibrating
		-0.3	0.5 (1200 °C)	0.90	1.00	1.10	1.10	1300		gunning
		-0.17 (1200 °C)	0.35 (1000 °C)	0.67	0.67		0.81	1400		casting, vibrating
		-0.1		0.90	0.90	1.00	1.10	1350		casting, vibrating
		-0.3	0.5 (1000 °C)	0.85	0.83	0.88	0.80	1380		gunning, trowelling, ramming
		-0.2	0.5 (1200 °C)	0.80		0.90	1.00	1350		gunning, trowelling, ramming
		-0.1	0.7 (1400 °C)	0.90		1.00	1.00	1450		casting, vibrating
		-0.1	0.7 (1400 °C)	0.90		0.90	1.00	1450		gunning, trowelling, ramming
			0.53 (1000 °C)	0.87	0.85		0.93	1500	14.00	gunning
		-0.2	0.7 (1400 °C)	0.90	0.95	1.00	1.00	1500		gunning, trowelling, ramming
			0.7 (1000 °C)	1.62	1.73		1.87	1550	8.00	vibrating, casting
		-1.5 (1500 °C)	0.6 (1000 °C)	1.30		1.30	1.40	1600		vibrating, casting
			0.75 (1000 °C)	2.72	2.27		2.35	1780		gunning, trowelling, ramming
		-0.2	0.75 (1000 °C)	3.10		2.20	2.50	1700		vibrating, casting
		0.1	0.75 (1000 °C)	2.60	2.08	2.13		1780		vibrating, casting
			0.75 (1000 °C)	3.20	2.49		2.44	1850		vibrating, casting
		-0.25	0.6 (1400 °C)	0.90	1.00	1.10	1.30	1400	8.50	vibrating
		-0.2	0.6 (1400 °C)	1.30	1.30	1.40	1.50	1400	8.00	vibrating
			0.55 (1000 °C)	1.50	1.60		1.90	1500	14.00	vibrating
			0.6 (1000 °C)	4.02	3.33		2.27	1700		vibrating
		-0.2	0.7 (1000 °C)	1.90	1.80	2.00	2.10	1750		vibrating
		-0.10 (1200 °C)	1.2 (1400 °C)	3.50	2.90		2.50	1750		vibrating

CHEMICAL & PHYSICAL PROPERTIES

CASTABLES

GRADE	Al_2O_3	SiO_2	MgO	Fe_2O_3	CaO	TiO_2	MR	CCS (110 °C)	CCS (1000 °C)	CMR (110 °C)	
	[%]	[%]	[%]	[%]	[%]	[%]	kg/dm³	N/mm²	N/mm²	N/mm²	
Self-Levelling Castables											
DIDOFLO 70COR	70.0	17.0		0.6		9.5	2.72	100.0	80 (1200 °C)		
DIDOFLO 87	87.0	9.0		0.9		1.8	2.90	50.0	70 (1100 °C)		
DIDOFLO 98	97.5	0.1		0.1			3.10	70.0	90 (1100 °C)		
Others (acid resistant)											
STELLIT FS	1.6	98.0		0.2		0.1	1.80	20.0	30.0		
Plastics											
DIPLASTIT 165	63.0	28.5	0.1	1.3	4.0	2.6	2.10	10.0	50 (1500 °C)	3.0	
DIPLASTIT 170	68.0	25.0	0.1	1.6	3.0	2.1	2.10	10.0	40 (1500 °C)	3.0	
DIPLASTIT 259	86.0	8.0		0.8		1.5	2.95	60.0	210 (1200 °C)		
DIPLAST 150	49.0	46.0	0.3	1.1	0.1	2.0	2.40	4.0	30.0		
DIPLAST 165	60.0	35.0	0.3	1.2	0.1	2.0	2.50	3.0	35.0		
DIPLAST 170	77.0	18.0	0.3	0.8	0.1	2.2	2.80	4.0	36.0		
DIPLAST 175	90.0	7.0	0.3	0.3	0.1	2.0	3.10	3.0	50.0		
DIPLAST 185K 0-5 M	86.5	7.3	0.3	0.6	0.3	0.4	3.00	70.0	165 (815 °C)		

MORTARS / MASTICS

GRADE	BONDING	Al_2O_3	SiO_2	TiO_2	Fe_2O_3	K_2O	P_2O_5	Other	MR
		[%]	[%]	[%]	[%]	[%]	[%]	[%]	kg/dm³
DIDOMUR 1	ceramic	40.0	53.0	1.9	1.2	-	-	-	1.4
RESIMUR 50/70	ceramic	64.0	30.5	2.3	1.9	0.5	-	-	1.65
RESIMUR 70/90	ceramic	83.0	10.5	2.8	1.5	0.4	-	-	1.85
DURAMUR 95T	ceramic	97.5	1.5	-	0.1	-	-	-	2.15
COMPRIMUR 125	hydraulic	44.0	42.5	2.0	3.7	-	-	-	1.55
DURAMUR 95H	hydraulic	93.0	0.5	-	0.2	-	-	-	2.1
DIDOTECT 135T	chemical	23.5	72.0	1.2	1.0	0.4	-	-	1.4
DIDOTECT 135V	chemical	20.0	73.5	0.7	0.7	1.3	-	-	1.85
DIDOTECT 150T	chemical	53.5	41.0	2.2	1.6	0.5	-	-	1.40
DIDOTECT 150V	chemical	49.5	42.5	1.8	1.3	1.5	-	-	1.95
RESITECT 165V	chemical	61.5	31.0	2.2	1.6	1.4	-	-	2.10
RESITECT 180 KT	chemical	90.5	9.0	-	0.1	-	-	-	1.90
RESITECT 180 KV	chemical	85.5	7.0	1.4	0.9	-	4.5	-	2.60
RESITECT 190KU	chemical	92.5	2.0	-	0.2	-	5.0	-	2.65
RESITECT 190K	chemical	88.0	1.6	0.1	0.3	-	5.0	Cr_2O_3/4.5	2.65
CARSITECT 150V	chemical	3.0	15.0	-	0.3	-		SiC/78.0	2.10
CARSITECT 170V	chemical	2.5	3.5	0.2	0.3	-	5.2	SIC/86.0	2.30

RHI REFRACTORIES

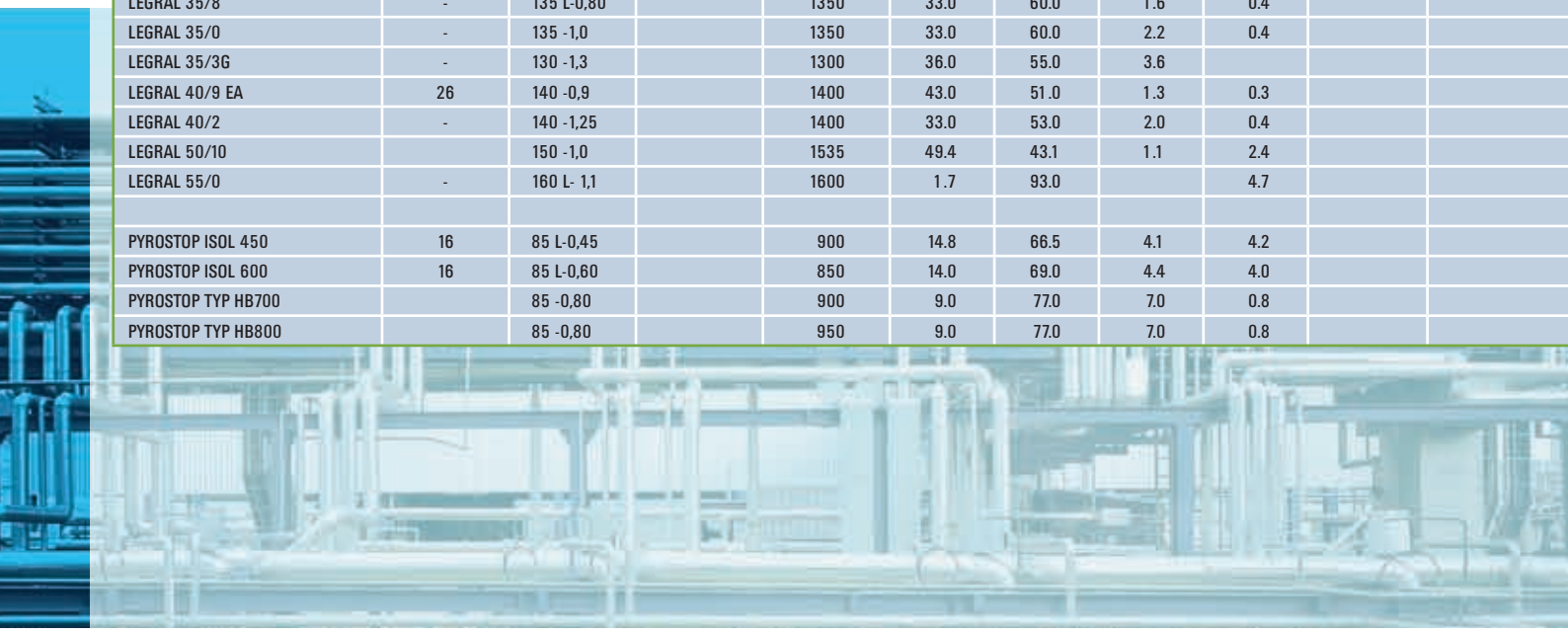
	PLC (110 °C)	PLC (1000 °C)	Thermal Expansion	TC 400 °C	TC 800 °C	TC 1000 °C	TC 1200 °C	Temp. Limit	AR ASTM C704	APPLICATION
	[%]	[%]	[%]	W/m·K	W/m·K	W/m·K	W/m·K	°C	cm^3	
		-0.10 (1200 °C)	0.6 (1000 °C)	2.35	2.15		2.05	1650	9.00	casting, pumping
		-0.50 (1500 °C)	0.6 (1000 °C)	2.60	2.25		2.30	1700		casting, pumping
		0.30 (1500 °C)	0.75 (1000 °C)	2.70	2.20		2.30	1800		casting, pumping
		0.5 (1300 °C)	0.4 (1200 °C)	0.56	0.59	0.61		1600		smearing, vibrating, gunning
		-0.2	0.8 (1400 °C)	0.65		0.73	0.78	1650		trowelling, ramming, gunning
		-0.2	0.9 (1400 °C)	0.71		0.79		1700		trowelling, ramming, casting, gunning
		0.10 (800 °C)		2.30	2.40	2.40		1350	2.20	ramming, vibrating
		-0.3	0.65 (1400 °C)	1.10		1.20	1.50	1500		ramming
		-1.25	0.7 (1600 °C)	1.20		1.40	1.90	1650		ramming
			0.9 (1600 °C)	1.40		1.40	1.90	1700		ramming
		-0.8 (1500 °C)	1.2 (1600 °C)	1.70		1.90	2.30	1750		ramming
		-0.6 (1000 °C)	0.8 (1000 °C)					1850	4.10	ramming

	Mixing Liquid	Temp. Lim.	Storage Limit
		°C	
	water	1250	12 Months
	water	1550	unlimited
	water	1700	unlimited
	water	1800	unlimited
	water	1250	12 Months
	water	1800	12 Months
	DIKASIL 3:1	1350	unlimited
	-	1350	12 Months
	DIKASIL 3:1	1500	12 Months
	-	1500	12 Months
	-	1650	12 Months
	DIFOSIL 32+H_2O (2:1)	1800	12 Months
	-	1800	6 Months
	-	1800	6 Months
	-	1800	6 Months
	-	1500	12 Months
	-	1700	6 Months

CHEMICAL & PHYSICAL PROPERTIES

INSULATING PRODUCTS

GRADE	CLASSIFICATION		CLASSIFICATION TEMPERATURE		Al_2O_3	SiO_2	Fe_2O_3	CaO	Other	
	ASTM	EN / ISO	ASTM	EN / ISO	[%]	[%]	[%]	[%]	[%]	
Insulating Bricks										
L105	-	105 L-0,60		1050	10.0	79.0	3.2	2.1		
L23	23	125 L-0,50		1250	37.0	44.0	0.7	15.0		
L230	23	125 L-0,50		1300	44.5	41.0	0.7	12.0		
L26	26	140 L-0,80		1400	58.0	39.0	0.7	0.1		
L260	26	140 L-0,79		1400	49.5	44.5	1.1	0.7		
L28	28	150 L-0,90		1500	68.0	31.0	0.6	0.1		
L280	28	150 L-1,0		1500	66.0	31.0	0.8	0.4		
L30	30	160 L-1,0		1600	73.0	25.0	0.5			
L300	30	160 L-1,15		1600	74.0	23.0	0.6	0.4		
L32	32	170 L-1,2		1700	77.0	21.0	0.3			
L330	33	180 -1,40		1800	91.0	8.3	0.2	0.1		
L340	-	180 L-1,55		1800	99.0	0.6	0.1	0.1		
LEGRAL 26/7	23	125 L-0,60		1250	32.0	62.0	1.8	0.6		
LEGRAL 25/09	-	125 -0,75		1260	39.6	41.4	1.2	12.3		
LEGRAL 35/8	-	135 L-0,80		1350	33.0	60.0	1.6	0.4		
LEGRAL 35/0	-	135 -1,0		1350	33.0	60.0	2.2	0.4		
LEGRAL 35/3G	-	130 -1,3		1300	36.0	55.0	3.6			
LEGRAL 40/9 EA	26	140 -0,9		1400	43.0	51.0	1.3	0.3		
LEGRAL 40/2	-	140 -1,25		1400	33.0	53.0	2.0	0.4		
LEGRAL 50/10		150 -1,0		1535	49.4	43.1	1.1	2.4		
LEGRAL 55/0	-	160 L- 1,1		1600	1.7	93.0		4.7		
PYROSTOP ISOL 450	16	85 L-0,45		900	14.8	66.5	4.1	4.2		
PYROSTOP ISOL 600	16	85 L-0,60		850	14.0	69.0	4.4	4.0		
PYROSTOP TYP HB700		85 -0,80		900	9.0	77.0	7.0	0.8		
PYROSTOP TYP HB800		85 -0,80		950	9.0	77.0	7.0	0.8		



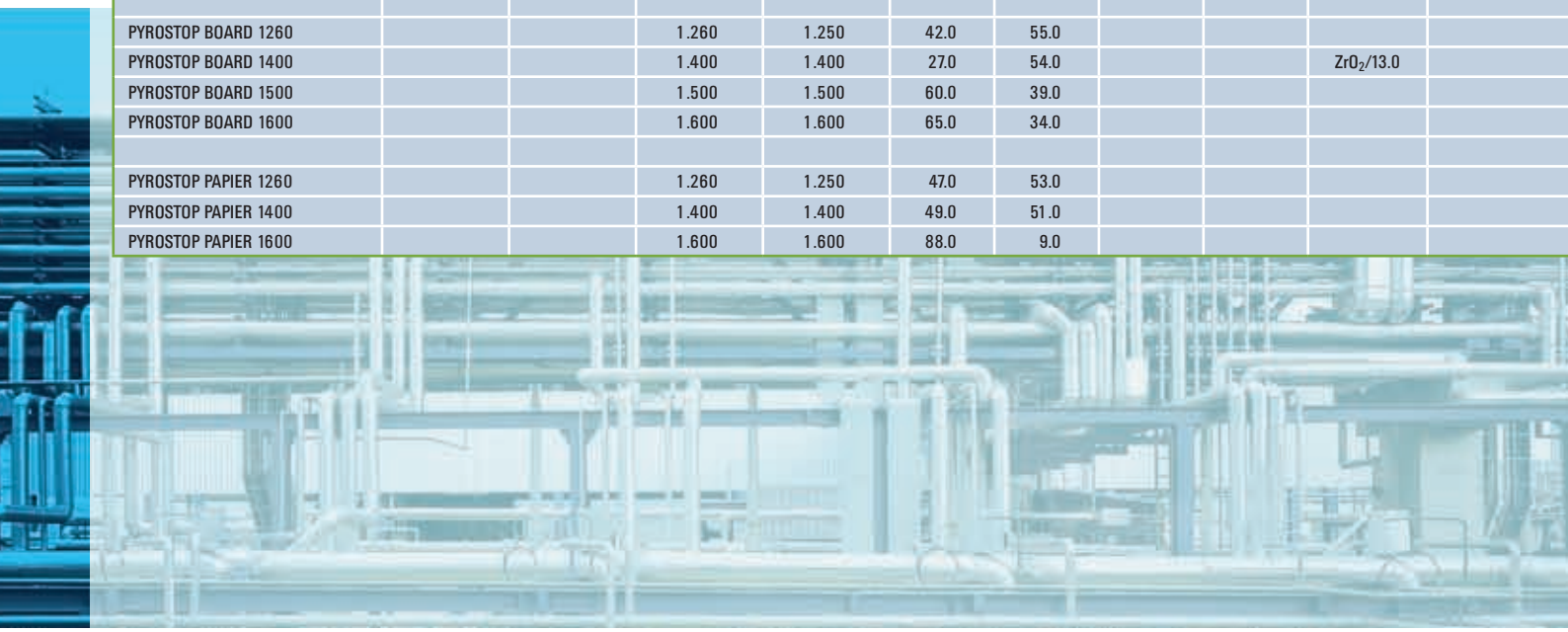
RHI REFRACTORIES

	BD	CCS	PLC	THERMAL EXPANSION	TC 400 °C	TC 600 °C	TC 800 °C	TC 1000 °C	TC 1200 °C
	g/cm³	N/mm²	[%]	[%]	W/m·K	W/m·K	W/m·K	W/m·K	W/m·K
	0.59	1.0	-0.5 (1000 °C)		0.17	0.20	0.22	0.24	-
	0.48	1.1	-0.2 (1250 °C)	0.7 (1000 °C)	0.14	0.16	0.18	0.20	
	0.51	1.0	-0.3 (1300 °C)	0.6 (1100 °C)	0.14	0.16	0.18	0.20	
	0.79	1.6	-0.2 (1400 °C)	0.6 (1100 °C)	0.27	0.29	0.31	0.33	0.36
	0.81	3.5	-0.6 (1400 °C)	0.6 (1100 °C)		0.33	0.34	0.41	
	0.88	2.1	-0.2 (1500 °C)	0.6 (1100 °C)	0.32	0.34	0.36	0.38	0.41
	1.00	5.0	-0.7 (1500 °C)	0.6 (1100 °C)		0.38	0.40	0.41	
	1.02	2.5	-0.6 (1600 °C)	0.6 (1100 °C)	0.41	0.43	0.44	0.45	0.47
	1.15	5.5	-0.9 (1600 °C)	0.7 (1100 °C)		0.45	0.47	0.49	
	1.25	3.5	-0.6 (1650 °C)	0.7 (1100 °C)	0.49	0.50	0.51	0.53	0.56
	1.40	13.5		0.9 (1100 °C)	0.90	0.90	0.90	0.90	
	1.55	13.0		1.0 (1100 °C)	0.94	0.96	0.99	0.99	
	0.60	1.5		0.5 (1000 °C)	0.19	0.22	0.25	0.29	
	0.75	1.5	1.6 (1250 °C)		0.23	0.26			
	0.80	3.0	-1.6 (1350 °C)	0.6 (1000 °C)	0.25	0.27	0.31	0.33	
	1.00	6.0	-1.0 (1350 °C)	0.5 (1000 °C)	0.42	0.46		0.53	
	1.35	20.0	-1.0 (1100 °C)	0.5 (1000 °C)	0.52 (500 °C)		0.57 (750 °C)	0.62	
	0.90	5.0	-1.5 (1350 °C)	0.5 (1000 °C)	0.29	0.32	0.35	0.37	
	1.25	8.0	-2.0 (1400 °C)	0.5 (1000 °C)		0.46		0.55	
	1.00	4.4	-0.03 (1500 °C)		0.35	0.39			
	1.10	5.0	-0.4 (1600 °C)	1.2 (1000 °C)	0.42	0.57	0.67	0.77	
	0.43	1.0		0.4 (800 °C)	0.12	0.14			
	0.60	2.5	-1.2 (850 °C)	0.4 (800 °C)	0.16	0.19	0.21		
	0.75	7.0	-1.0 (900 °C)	0.4 (800 °C)	0.14	0.15			
	0.80	10.0	-1.0 (950 °C)	0.4 (800 °C)	0.19	0.20			

CHEMICAL & PHYSICAL PROPERTIES

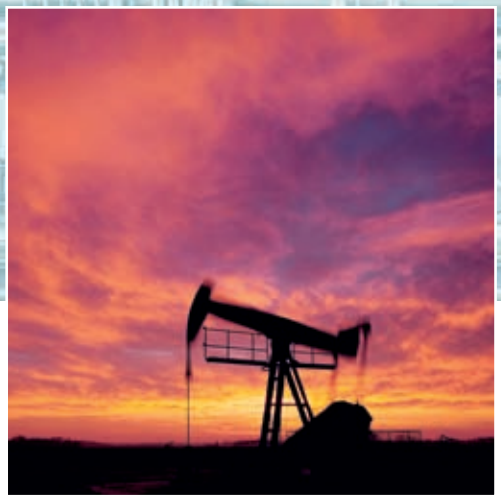
INSULATING PRODUCTS

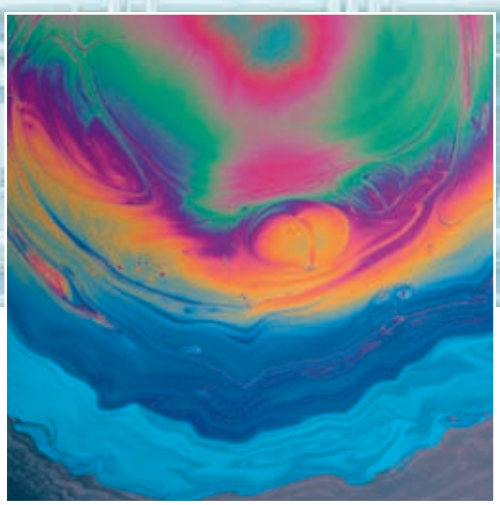
GRADE	CLASSIFICATION		CLASSIFICATION TEMPERATURE		Al_2O_3	SiO_2	Fe_2O_3	CaO	Other	
	ASTM	EN / ISO	ASTM	EN / ISO	[%]	[%]	[%]	[%]	[%]	
Ceramic Fiber Products										
PYROSTOP BLANKET 64/1260			1.260	1.250	44.0	56.0				
PYROSTOP BLANKET 96/1260			1.260	1.250	44.0	56.0				
PYROSTOP BLANKET 128/1260			1.260	1.250	44.0	56.0				
PYROSTOP BLANKET 160/1260			1.260	1.250	44.0	56.0				
PYROSTOP BLANKET 64/1430			1.430	1.400	35.0	50.0			ZrO_2/15.5	
PYROSTOP BLANKET 96/1430			1.430	1.400	35.0	50.0			ZrO_2/15.5	
PYROSTOP BLANKET 128/1430			1.430	1.400	35.0	50.0			ZrO_2/15.5	
PYROSTOP BLANKET 160/1430			1.430	1.400	35.0	50.0			ZrO_2/15.5	
PYROSTOP LD MATTE 35/1600			1.600	1.600	96.0	3.5				
PYROSTOP BLANKET 80/1600			1.600	1.600	80.0	20.0				
PYROSTOP BLANKET 100/1600			1.600	1.600	80.0	20.0				
PYROSTOP BOARD SPEZIAL			800	800	14.2	61.0	0.8			
PYROSTOP BOARD EXTRA			1.100	1.100	13.5	58.4	0.7			
PYROSTOP BOARD 1260			1.260	1.250	42.0	55.0				
PYROSTOP BOARD 1400			1.400	1.400	27.0	54.0			ZrO_2/13.0	
PYROSTOP BOARD 1500			1.500	1.500	60.0	39.0				
PYROSTOP BOARD 1600			1.600	1.600	65.0	34.0				
PYROSTOP PAPIER 1260			1.260	1.250	47.0	53.0				
PYROSTOP PAPIER 1400			1.400	1.400	49.0	51.0				
PYROSTOP PAPIER 1600			1.600	1.600	88.0	9.0				



RHI REFRACTORIES

	BD	CCS	PLC	THERMAL EXPANSION	TC 400 °C	TC 600 °C	TC 800 °C	TC 1000 °C	TC 1200 °C
	g/cm³	N/mm²	[%]	[%]	W/m·K	W/m·K	W/m·K	W/m·K	W/m·K
	0.064		-3.0 (1200 °C)		0.12	0.20	0.30	0.43	
	0.096		-3.0 (1200 °C)		0.11	0.16	0.23	0.32	
	0.128		-3.0 (1200 °C)		0.10	0.15	0.20	0.27	
	0.160		-3.0 (1200 °C)		0.09	0.13	0.18	0.25	
	0.064		-3.0 (1300 °C)		0.12	0.20	0.30	0.43	
	0.060		-3.0 (1300 °C)		0.11	0.16	0.23	0.32	
	0.128		-2.9 (1300 °C)		0.10	0.15	0.20	0.27	
	0.160		-3.0 (1300 °C)		0.09	0.13	0.18	0.25	
	0.350				0.12	0.16	0.21	0.27	
	0.080		-2.0 (1500 °C)		0.09	0.15	0.23	0.37	0.59
	0.100		-3.0 (1600 °C)		0.09	0.13	0.19	0.28	0.41
	0.340		-1.7 (800 °C)		0.10	0.13	0.16		
	0.320		-1.0 (1100 °C)		0.08	0.10	0.16		
	0.390		-3.1 (1200 °C)		0.09	0.12		0.19	
	0.350		-3.2 (1400 °C)		0.08	0.11		0.20	
	0.300		-2.0 (1500 °C)			0.14	0.18	0.23	0.30
	0.300		-2.0 (1500 °C)					0.26	0.34
	0.210				0.09	0.13	0.20		
	0.210				0.08	0.11			
	0.120				0.07	0.11	0.13	0.15	





CHEMICAL & PHYSICAL PROPERTIES

INSULATING PRODUCTS

GRADE	CLASSIFICATION		CLASSIFICATION TEMPERATURE		Al_2O_3	SiO_2	Fe_2O_3	CaO	Other	
	ASTM	EN / ISO	ASTM	EN / ISO	[%]	[%]	[%]	[%]	[%]	
Ceramic Fiber Modules										
KONTIBLOCK 170/1260			1.260	1.250	47.0	52.0				
KONTIBLOCK 190/1260			1.260	1.250	47.0	52.0				
KONTIBLOCK 170/1430			1.430	1.400	35.0	50.0			ZrO_2/15.0	
KONTIBLOCK 120/1600			1.600	1.600	80.0	20.0				
KONTIBLOCK 190/1430			1.430	1.400	35.0	50.0			ZrO_2/15.0	
KONTIBLOCK 150/1600			1.600	1.600	80.0	20.0				
PYROSTOP FALTBLOCK 160/1260			1.260	1.250	47.0	52.0				
PYROSTOP FALTBLOCK 160/1430			1.430	1.400	35.0	50.0				
Microporus Insulation										
PYROSTOP LTC			1.050	1.000	5.0	50.0			$ZrSiO_4$/45.0	
SUPETHERM MIPO ALU			1.000	1.000		78.0		2.5	ZrO_2/19.5	
Block Insulation and Mineral Wool Products										
SUPETHERM 1800			1.000	950	0.2	45.0	0.2	45.0		
SUPETHERM 2000			1.100	1.050	0.3	47.0		45.0		
PYROSTOP BOARD PV 900				900	11.0	48.0	8.0	16.0	MgO/11.0	
MINWOL 100				680	18.4	37.3	5.6	20.9	MgO/9.9	
MINWOL 140				740	18.4	37.3	5.6	20.9	MgO/9.9	
High Dense Insulation Board										
PYROSTOP CARTO 75			750	750	27.0	61.0	1.9			
PYROSTOP CARTO 110			1.100	1.100	38.0	49.0	1.0	0.7		
SUPETHERM D1650			900	900	1.3	49.0	1.1	35.0		

RHI REFRACTORIES

	BD	CCS	PLC	THERMAL EXPANSION	TC 400 °C	TC 600 °C	TC 800 °C	TC 1000 °C	TC 1200 °C
	g/cm³	N/mm²	[%]	[%]	W/m·K	W/m·K	W/m·K	W/m·K	W/m·K
	0.170				0.12	0.15	0.21	0.30	
	0.190				0.10	0.13	0.17	0.22	0.29
	0.170				0.12	0.17	0.24	0.31	0.40
	0.120				0.11	0.13	0.17	0.23	0.31
	0.190				0.11	0.15	0.19	0.25	0.32
	0.150				0.09	0.11	0.15	0.20	0.26
	0.160				0.11	0.15	0.21	0.30	
	0.160				0.12	0.16	0.23	0.32	
	0.315	2.0	-0.8 (800 °C)		0.03		0.04		
	0.320	2.0	-2.0 (1000 °C)		0.03	0.04	0.05		
	0.230	2.6	-1.0 (950 °C)		0.08	0.10	0.12		
	0.250	2.7	-1.5 (1050 °C)		0.09	0.10	0.12		
	0.230		-2.5 (900 °C)		0.09	0.17	0.30		
	0.090				0.11	0.18			
	0.150				0.10	0.16			
	1.000				0.10	0.11	0.13		
	0.900				0.10	0.11	0.13		
	0.770	13.0	-0.64 (900 °C)		0.20	0.22			

Our KONTIBLOCK ceramic fiber modules with our patented „speed fix“ module fixing system is the latest innovation for a safe, dust minimised and very rapid installation method of fiber modules. Please contact us for more information.

DIDOFLO CASTABLES

DIDOFLO are self-levelling low cement castables noted for their easy application and their superior product characteristics. Several grades have been specially developed to meet the particular requirements in various processes in the Hydrocarbon and Chemical Industries.

Easier, faster application:

- no vibration needed
- lining of complex geometries
- ideal for high anchor density
- no heavy, hard-to-handle moulds

Excellent product properties:

- low porosity, high density, high thermal shock resistance
- good structural flexibility combined with high cold crushing strength
- fused corundum as main component gives good alkali resistance in synthesis gas processes (DIDOFLO 98)

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RHI DINARIS GmbH, 65189 Wiesbaden, Abraham-Lincoln-Straße 1, Germany, Phone: +49 (0) 611 / 23 66-11, Fax: +49 (0) 611 / 23 66-411
E-mail: eec@rhi-ag.com

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www.rhi-ag.com