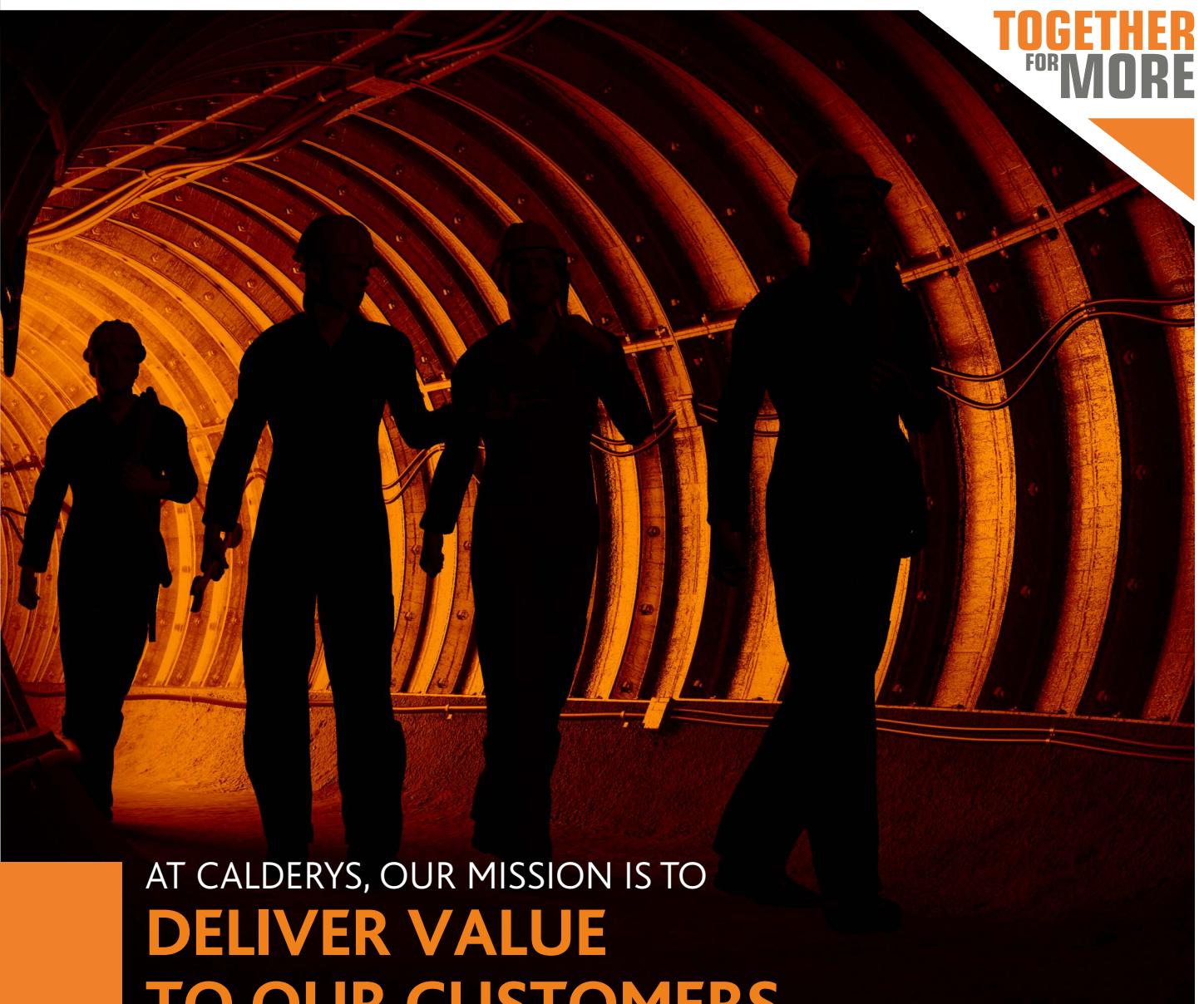


STEEL INDUSTRY

LANCES &
PURGING PLUGS

REFRACTORY
CONCEPT
SOLUTIONS



**TOGETHER
FOR
MORE**

AT CALDERYS, OUR MISSION IS TO
**DELIVER VALUE
TO OUR CUSTOMERS.**

We are a world leader in providing refractory solutions and services. Our value proposition to you is built on combining our world-class refractory product portfolio with our ability to deliver high-quality project management services - from planning and installation, to turnkey delivery and commissioning.

Across all the industries we serve – Iron, Steel, Foundry, Aluminium, Cement, Power, and Petrochem - we deliver to you our promise of superior product performance and value-adding service, thanks to our global network of specialised industry experts and project management professionals.

Our journey of 100 years is a testimony of our commitment to our customers. We listen to you and understand your requirements. We believe in working as one team with you and aiming for continuous improvement.

Together, we always reach an extra mile for our customers in our mission of delivering MORE.

Over 2,500 employees across

31 COUNTRIES

3 R&D CENTERS

and 11 Design & Engineering Centers

18 PLANTS

in 16 Countries

Annual Revenue of over

500 MILLION EUROS

Wholly-owned Subsidiary of

IMERYS GROUP

PARTNERING YOU IN THE STEEL INDUSTRY FOR MORE

As a leading provider of refractory solutions and services to the global steel industry, Calderys is considered a reference supplier by steel makers across the globe. Our team of steel industry experts ensure that we propose products most suitable for your process requirements and deliver you superior refractory performance and reliable services. We are able to do so by combining our innovative product range and modern installation techniques with end-to-end project management services.



WE BRING TO STEEL MAKERS:

VALUE OPTIMISATION

Offering tailor-made solutions that meet the commercial and technical requirements for optimal performance

COMPLETE REFRACTORY SOLUTIONS

We offer a full range of refractory products to meet the process needs of modern steelmaking

TECHNOLOGY EXPERTISE

By contributing to ensure the best possible steel quality and cleanliness results, whilst adhering to strict environmental regulations in operations

OUR END-TO-END PRODUCTS AND SERVICES DEDICATED TO STEEL INDUSTRY ENCOMPASS:

PRODUCT PORTFOLIO

Our comprehensive product portfolio for steel industry includes both alumina and basic products and covers complete application requirements - Converters, AOD Furnaces, Electric Arc Furnaces, Steel Ladles, RH Degasser Units, Purging plugs, Lances and Tundish Technologies. We also provide installation services for cast-in-situ applications, dry mixes, standard gunning, low-porosity dense gunning, shotcreting and spray solutions.

DESIGN

In addition to product selection considerations, there are considerable benefits to be gained by optimizing the design aspects of the steel vessel. Overall, the selection of products and vessel designs should:

- Meet the metallurgical targets set by the end user, in order to prevent the chosen lining being a potential contaminant in the steelmaking process, and
- Provide the best value in use with regards to cost considerations

Thanks to close working relationship between the steelmakers and Calderys refractory engineers, we are able to meet the design and product selection targets.

INSTALLATION

We carry out high-quality installation services by using in-house equipments and through use of optimal installation techniques. This ensures best installation and dry-out of the refractory so that the customer gets maximum performance.

MAINTENANCE

We offer permanent on-site refractory services including regular and predictive maintenance and repairs. Our comprehensive range of repair products, in co-operation with state-of-the-art measurement techniques, allow for systematic repairs to extend vessel lifetime with minimum vessel downtime.

PROJECT MANAGEMENT

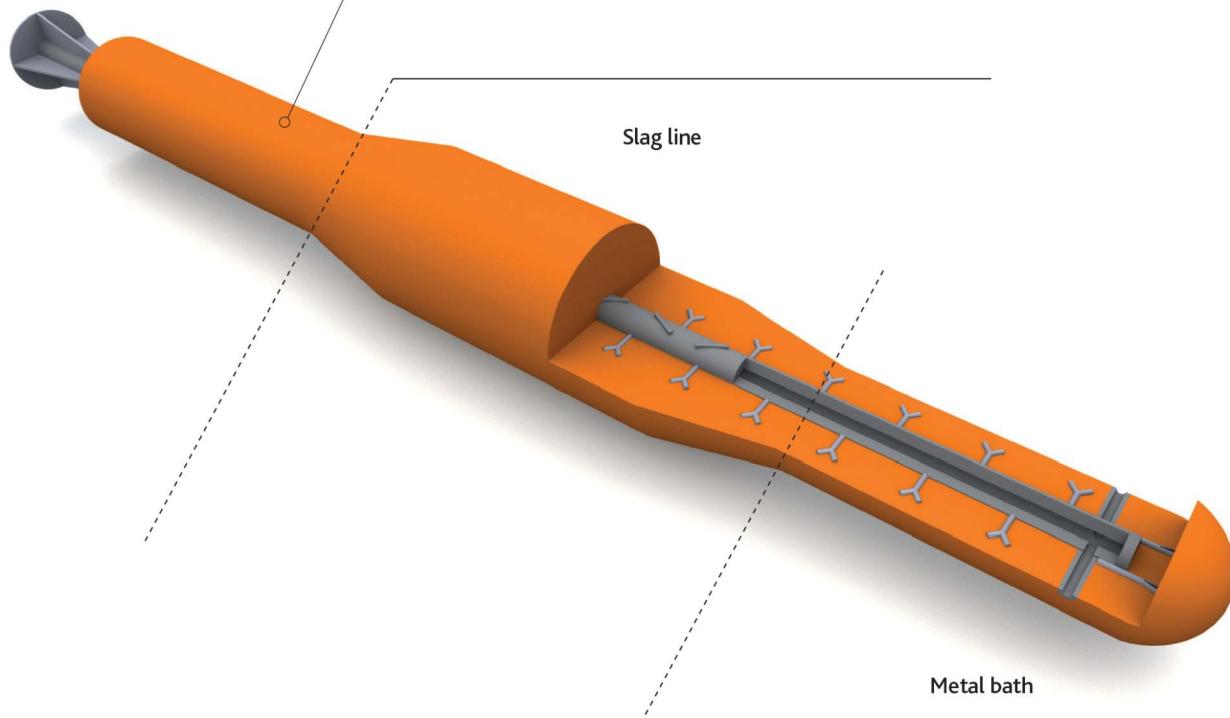
We provide complete project management services including consultation, planning, delivery scheduling, supervision, site management and also direct training for customer personnel.

Solutions for Every Areas of the Lances

Upper Bath

Standard

CALDE™ CAST F 50 G10



Lances for Steel Treatment

Slag line

CALDE™ CAST UB 88 G10 RSH

CALDE™ CAST UB 92 G10 RSH

Lances for Steel Bubbling

Slag line and metal bath

CALDE™ CAST LB 85 G8 RSH

CALDE™ CAST UB 90 RSH

CALDE™ CAST UC 84

CALDE™ CAST UT 85

Repairs

Fine cracks

CALDE™ PATCH PC 96 U

Standard

CALDE™ CAST LC 95 SP

Desulphurisation Lances for Pig Iron

Slag line and metal bath

Lower temperature

CALDE™ CAST MF 45 CFM RSH

Higher temperature

CALDE™ CAST FM 50 G12 RSH

High-stressed conditions

CALDE™ CAST MF 50 CFM RSH

Lances for Steel Treatment

Metal bath

CALDE™ CAST UB 85 G8

CALDE™ CAST UB 92 G10 RSH

Technical Data

Product name	Usage	Formula design			Chemical analysis (%)		Permanent linear change (%)	CCS (N/mm²)
		Max. grain size (mm)	Main component	Binding System	Al₂O₃	CaO		
CALDE™ CAST F 50 G10	UB	12	Chamotte	Hydraulic	49	6	+0.80 (1400°C)	35 (1400°C)
CALDE™ CAST FM 50 G12 RSH	DS	12	Chamotte	Hydraulic	49	2.80	-0.35 (1200°C)	55 (1200°C)
CALDE™ CAST LB 85 G8 RSH	SB	8	Bauxite	Hydraulic	84	1.30	-0.17 (1400°C)	80 (1400°C)
CALDE™ CAST MF 45 CFM RSH	DS	15	Chamotte	Hydraulic	46	2.90	-0.10 (1400°C)	80 (1400°C)
CALDE™ CAST MF 50 CFM RSH	DS	10	Chamotte	Hydraulic	50	3.10	+1.50 (1400°C)	100 (1200°C)
CALDE™ CAST UB 88 G10 RSH	SB + ST	10	Bauxite	Hydraulic	87	0.30	-1.26 (1600°C)	150 (1600°C)
CALDE™ CAST UB 90 RSH	SB	6	Bauxite Corundum	Hydraulic	88	0.80	+1.30 (1600°C)	160 (1600°C)
CALDE™ CAST UB 92 G10 RSH	SB + ST	10	Bauxite	Hydraulic	89	0.30	-1.60 (1600°C)	150 (1600°C)
CALDE™ CAST UC 84	SB	6	Corundum	Hydraulic	83.50	0.80	+0.40 (1600°C)	115 (1600°C)
CALDE™ CAST UT 85	SB	6	Tabular Alumina	Hydraulic	84.60	0.70	+0.20 (1600°C)	120 (1600°C)
REPAIRS								
CALDE™ CAST LC 95 SP	Casting / Vibrating	6	Corundum	Hydraulic	95	2.30	+0.35 (1600°C)	50 (1600°C)
CALDE™ PATCH PC 96 U	Patching / Coating	0,5	Corundum	Chemical	96	-	-	-

DS	Desulphurisation pig iron
SB	Steel Bubbling
ST	Stell treatment
UB	Upper Bath

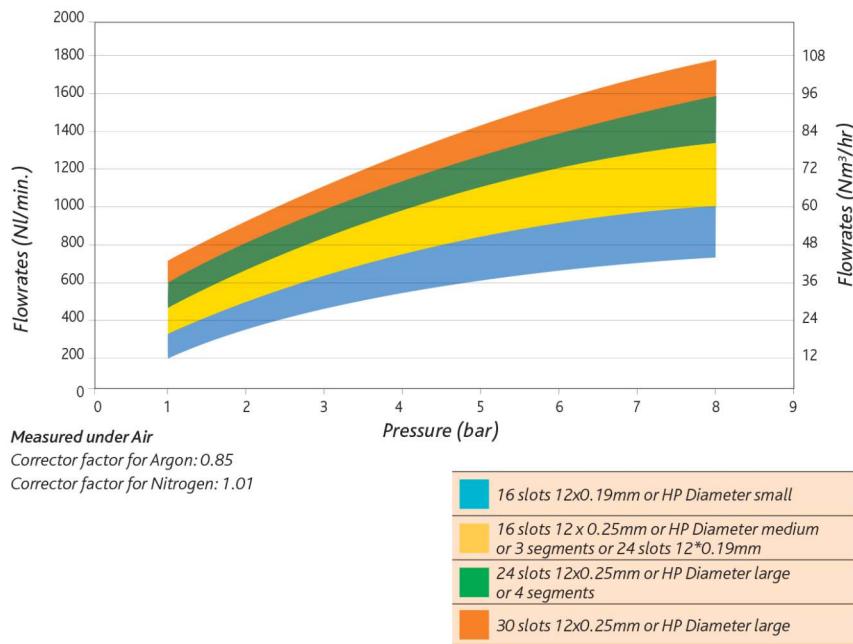
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Solutions for Purging Plugs

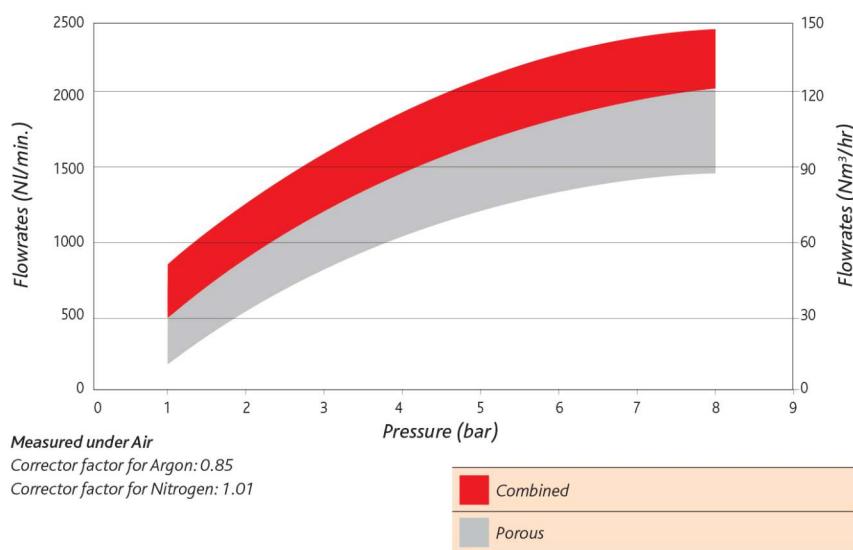
In the segment of the Secondary Metallurgy, we have enjoyed more than 50 years successful activity in the worldwide steel industry. For Purging Systems, we offer a full range of solutions that result in an improved and efficient lining life. Our offer includes as well directional as non-directional porosity. In the steel market, we are considered as a reference supplier. We have developed many new products and concepts resulting in a complete program for a large variety of applications for purging facilities such as for steel treatment, hot metal ladle treatment and for the use in the ferrous foundry industry. Our worldwide presence and expertise allows us to propose the most suitable and cost effective solutions.

Gas flowrates

Gas flow under different pressures for slot plugs, HP plugs and segment plugs.



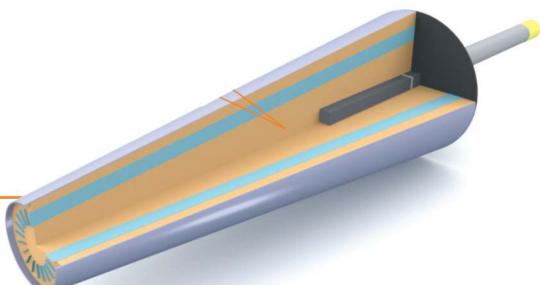
Gas flow under different pressures for slot plugs, HP plugs and segment plugs.



Solutions for Purging Plug Designs

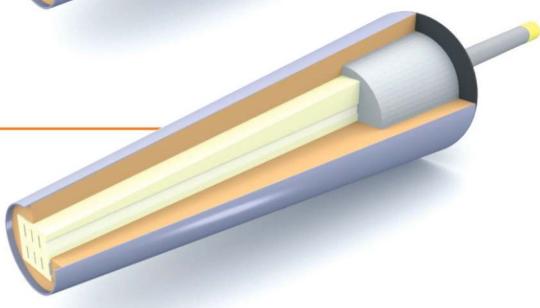
Slot plugs

Directional porosity:
high level of flexibility of gas flow



Segment plugs

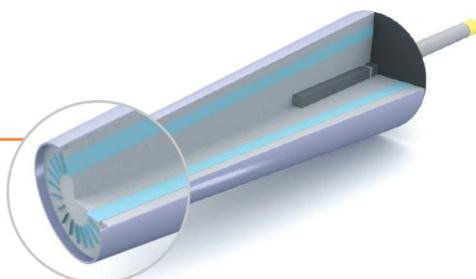
Directional porosity
with burned plates inside



Combined Systems

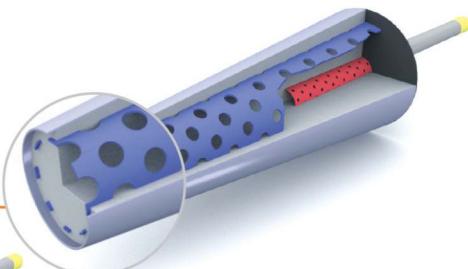
SL-P plugs

100% porous plus slots



HP-P plugs

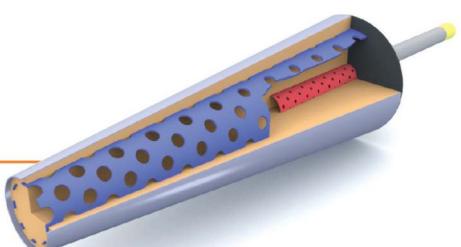
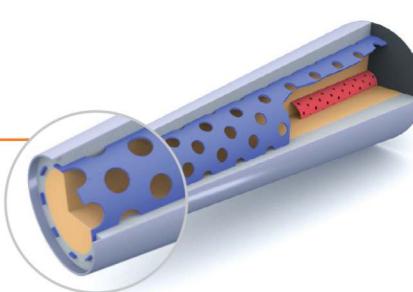
100% porous plus HP-ring channel



HP2^(A) / HP 3 plugs^(B)

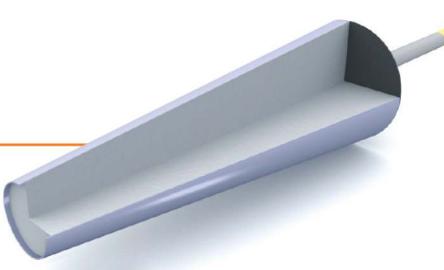
^(A) Dense outside and porous inside

^(B) Dense inside and porous outside,
with HP-ring between



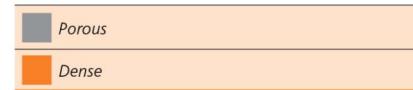
HP plugs

High performance
with directional porosity



Porous plugs

Non directional porosity
particularly devoted for foundries
and special steels

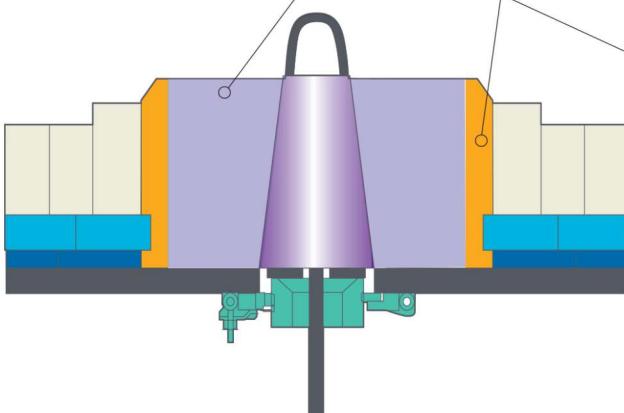


Installation Methods of Changeable Plugs

Brick lined installation

Pocket block

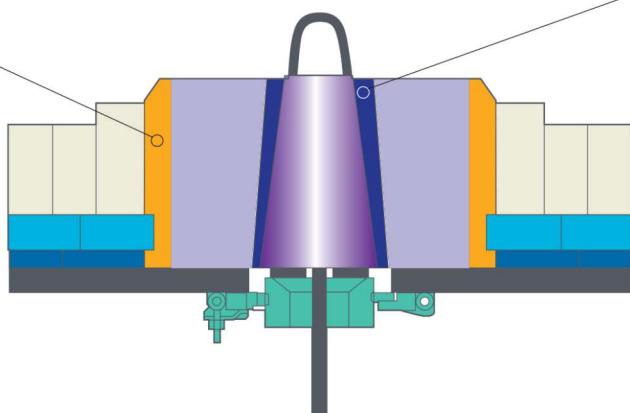
CALDE™ CAST 41
CALDE™ CAST LT 90 SP G8
CALDE™ CAST LT 96 SP



Blocking

RAMMING
CALDE™ RAM PC 94

CASTING
CALDE™ CAST LC 93
CALDE™ CAST LC 95 SP
CALDE™ FLOW MA 92



Sleeve

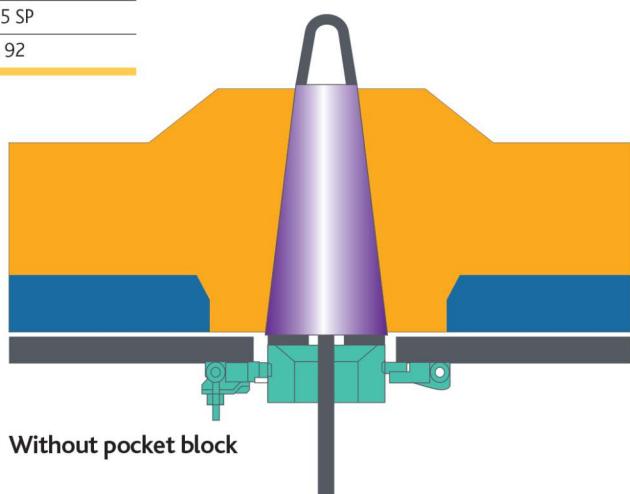
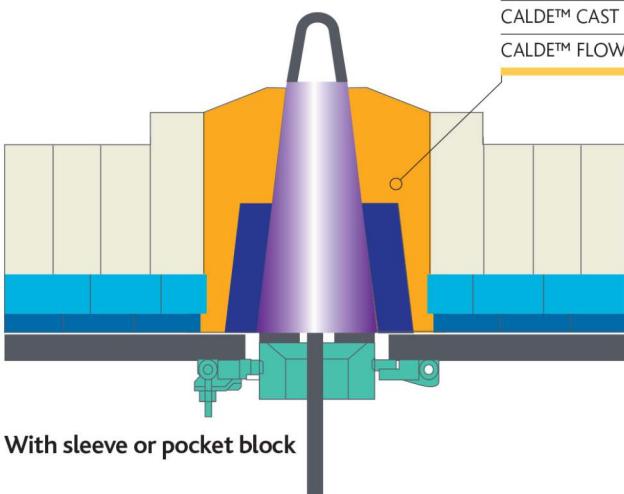
CALDE™ CAST 41
CALDE™ CAST LT 96 SP

Monolithic installation

Blocking

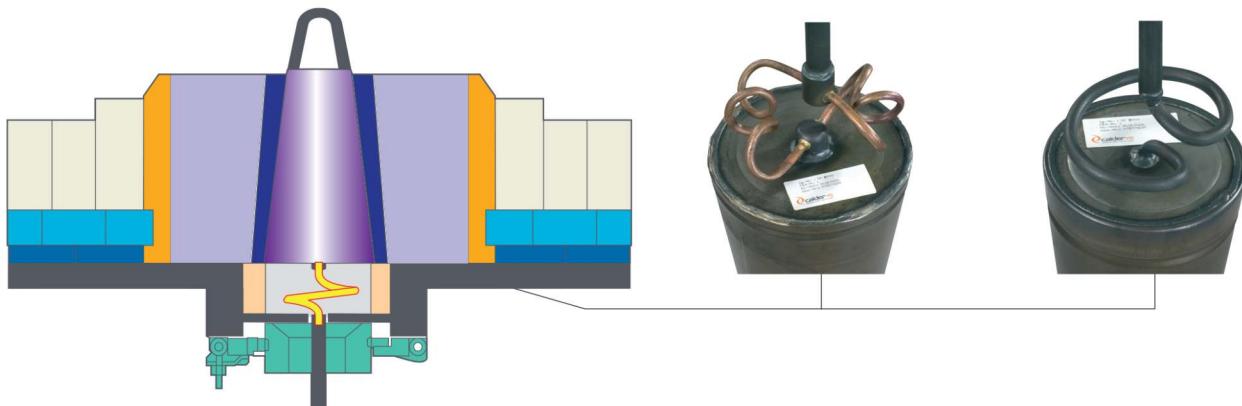
RAMMING
CALDE™ RAM PC 94

CASTING
CALDE™ CAST LC 93
CALDE™ CAST LC 95 SP
CALDE™ FLOW MA 92

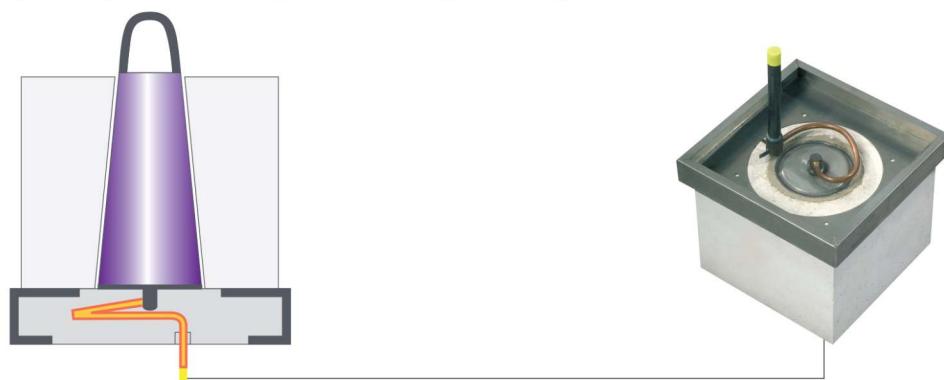


Safety Systems

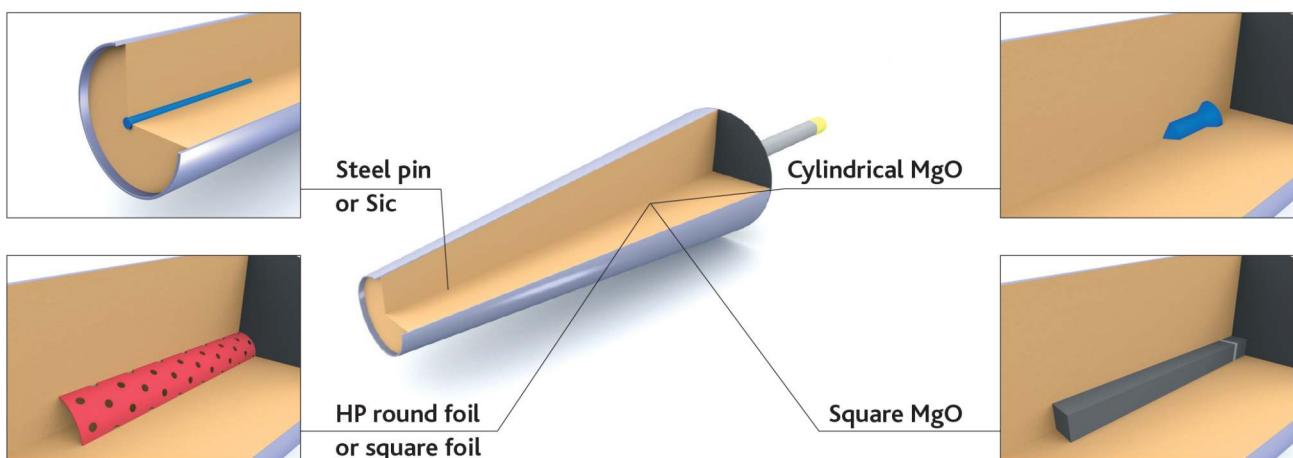
Breakout security with spiral gas delivery for changeable plugs



Breakout security with spiral gas delivery for non-changeable plugs



Wear indicators



Accessories

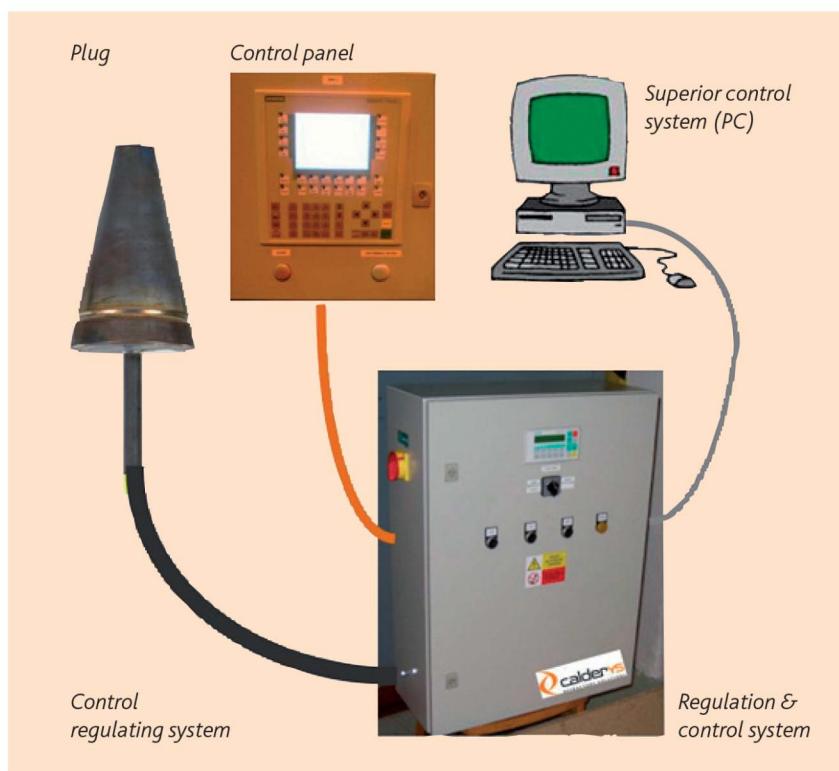
Adaptors for hydraulic extraction device



Hydraulic extraction device



Flow control unit



Code number for back tracking

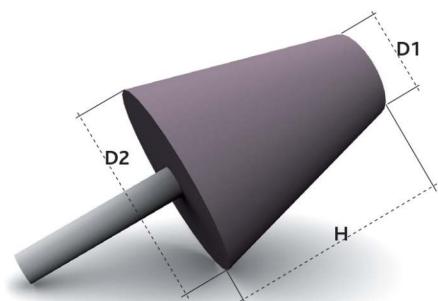


Bayonet closing system



Purging Plugs

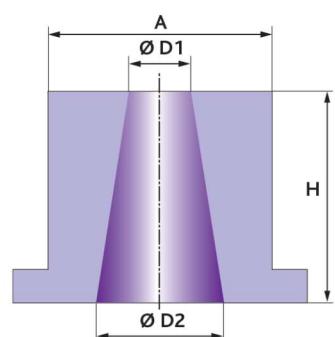
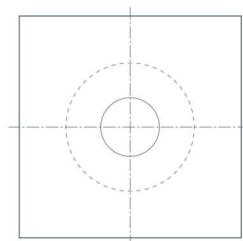
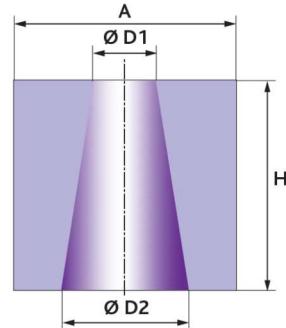
Type	H (mm)	ø D1 (mm)	ø D2 (mm)	Vol. (dm³)
5° series				
SP 6700	575	88	189	9.05
SP 6600	525	96	189	8.67
SP 6500	470	106	189	8.24
SP 6000	450	109	189	8.03
SP 6000/420	420	114	189	7.73
SP 6000/380	380	121	189	7.29
SP 7000	355	126	189	7.01
SP 3000	325	131	189	6.61
SP 3000/270	270	139	189	5.75
7° series				
SP 8000	480	106	224	10.70
SP 1500	380	129	224	9.52
SP 2000	320	144	224	8.64
SP 4000	270	154	224	7.66
8° series				
SP 5700	355	76	182	4.90
SP 5600	320	85	182	4.68
SP 5500	270	100	182	4.33
12° series				
SP 5000	278	59	182	3.45
SP 9000	165	59	128	1.18
SP 9000/130	130	72	128	1.05



Square Pocket Blocks for Purging Plugs without Sleeve

Type	H (mm)	A (mm)	$\phi D1$ (mm)	$\phi D2$ (mm)	Vol. (dm³)
5° series					
LQ 67	575	360	96	195	64.50
LQ 66	525	360	103	195	58.59
LQ 65	470	360	113	195	51.95
LQ 60	450	360	117	195	49.54
LQ 60/420	420	360	122	195	46.00
LQ 60/380	380	360	129	195	41.31
LQ 70	355	360	134	195	38.38
LQ 30	320	360	139	195	34.40
LQ 30/270	270	360	147	195	28.75
7° series					
LQ 80	480	360	113	230	50.69
LQ 15	380	360	138	230	38.93
LQ 20	320	360	152	230	32.18
LQ 40	270	360	164	230	26.69
8° series					
LQ 57	355	360	84	187	40.64
LQ 56	320	360	94	187	36.33
LQ 55	270	360	108	187	30.27
12° series					
LQ 50	270	360	74	187	31.15
LQ 90	157	320	68	134	14.77

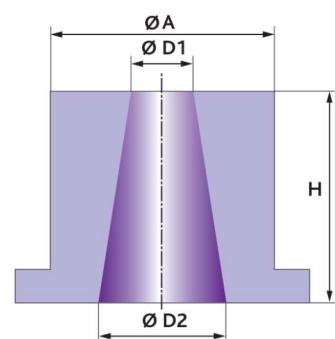
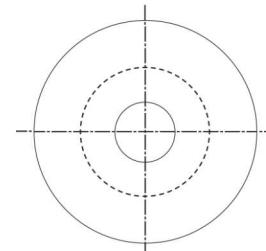
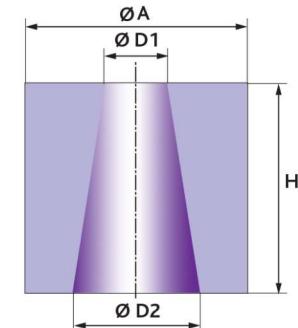
All pocket blocks are also available with flange.



Cylindrical Pocket Blocks for Purging Plugs without Sleeve

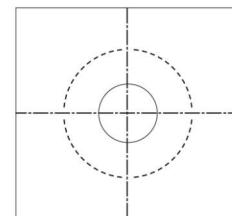
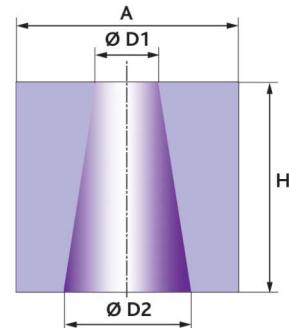
Type	H (mm)	A (mm)	$\varnothing D1$ (mm)	$\varnothing D2$ (mm)	Vol. (dm³)
5° series					
LRZ 67	575	360	96	195	48.60
LRZ 66	525	360	103	195	43.99
LRZ 65	470	360	113	195	38.88
LRZ 60	450	360	117	195	37.02
LRZ 60/420	420	360	122	195	34.32
LRZ 60/380	380	360	129	195	30.74
LRZ 70	355	360	134	195	28.50
LRZ 30	320	360	139	195	25.50
LRZ 30/270	270	360	147	195	21.24
7° series					
LRZ 80	480	360	113	230	37.34
LRZ 15	380	360	138	230	28.36
LRZ 20	320	360	152	230	23.28
LRZ 40	270	360	164	230	19.18
8° series					
LRZ 57	355	360	84	187	30.77
LRZ 56	320	360	94	187	27.43
LRZ 55	270	360	108	187	22.76
12° series					
LRZ 50	270	360	74	187	23.65
LRZ 90	157	320	68	134	11.32

All pocket blocks are also available with flange.



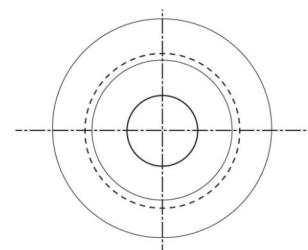
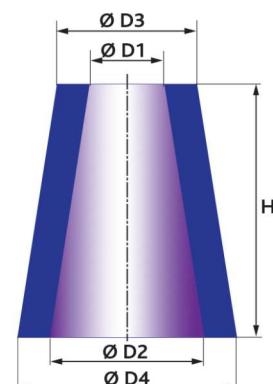
Square Pocket Blocks for Purging Plugs with Sleeve

Type	H (mm)	A (mm)	$\varnothing D1$ (mm)	$\varnothing D2$ (mm)	Vol. (dm³)
5° series					
LQH 60	450	360	210	286	36.41
LQH 70	355	360	193	238	33.01
LQH 30	320	360	198	238	29.49
LQH 30/270	270	360	204	238	24.61
8° series					
LQH 57	355	360	143	230	36.13
LQH 56	320	360	152	230	32.18
LQH 55	270	360	164	230	26.69
12° series					
LQH 50	270	360	164	230	26.69
LQH 90	157	320	164	202	11.93



Sleeves

Type	H (mm)	$\varnothing D3$ (mm)	$\varnothing D4$ (mm)	$\varnothing D1$ (mm)	$\varnothing D2$ (mm)	Vol. (dm³)
5° series						
H 6000	450	204	280	117	195	12.09
H 7000	355	187	233	134	195	4.71
H 3000	320	192	233	139	195	4.31
H 3000/270	270	198	233	147	195	3.63
8° series						
H 5700	355	137	224	84	187	3.89
H 5600	320	146	224	94	187	3.59
H 5500	270	158	224	108	187	3.09
12° series						
H 5000	270	158	224	74	187	3.97
H 9000	157	158	196	68	134	2.58



Technical Data

Product name	Usage	Formula design			Chemical analysis (%)					Material required (t/m³)	Porosity (%)	Permanent linear change (%)	CCS (N/mm²)		
		Max. grain size (mm)	Main component	Binding System	Al₂O₃	SiO₂	Fe₂O₃	CaO	MgO						
CALDE™ CAST 41	Plugs, Pocket Blocks, Sleeves	6	Tabular Alumina	Hydraulic	96	0.10	0.20	3.60	-	2.82	27	-0.10 (1200°C)	+0.20 (1600°C)	60 (1200°C)	65 (1600°C)
CALDE™ CAST LC 93	Plugs Installation and Repair Castable	6	Corundum	Hydraulic	93	4.50	0.10	1.80	-	2.97	19	+0.05 (1300°C)	-0.55 (1600°C)	60 (1300°C)	130 (1600°C)
CALDE™ CAST LC 95 SP	Installation and Repair Castable	6	Corundum Spinel	Hydraulic	95	0.10	0.10	2.30	2.30	2.90	19	-0.05 (1200°C)	+0.35 (1600°C)	35 (1200°C)	50 (1600°C)
CALDE™ CAST LT 90 SP G8	Plugs, Pocket Blocks	8	Tabular Alumina Spinel	Hydraulic	92	0.10	0.10	1.30	5	3.20	16	+0.10 (1200°C)	-0.15 (1600°C)	140 (1200°C)	200 (1600°C)
CALDE™ CAST LT 96 SP	Plugs, Pocket Blocks, Sleeves	6	Tabular Alumina Spinel	Hydraulic	96	0.10	0.10	1.40	2.20	3.25	-	+0 (1200°C)	-0.25 (1600°C)	140 (1200°C)	200 (1600°C)
CALDE™ FLOW MA 92	Installation and Repair	6	Tabular Alumina Spinel	Hydraulic	92	0.60	0.10	1.70	5.40	2.90	21	-0.10 (1200°C)	0.50 (1600°C)	60 (1200°C)	70 (1600°C)
CALDE™ RAM LT 98 RSH	Porous Plugs and Combined Plugs	1	Tabular Alumina	Hydraulic	97	0.20	0.10	1.90	-	2.65	30	+0.05 (1300°C)	+0.10 (1600°C)	40 (1300°C)	75 (1600°C)
CALDE™ RAM PC 94	Installation	4	Corundum	Chemical	95	1.40	0.10	1.50 (P₂O₅)	-	3.14	-	-0.30 (1200°C)	-1 (1600°C)	85 (1200°C)	110 (1600°C)

Porosity is measured at 800°C

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