



# Basic refractories for Steel ladle







## The chemical physical properties of the products

The tables hereinafter show the main average properties of the products. These properties, verified by internal testings, are merely indicative and should not be used as guaranteed values for tender technical specifications.

In case of special requirements, technical specifications containing the guaranteed values and those detailing the various properties may be agreed with the Customer during sales negotiations.

The individual properties are determined according to ISO Recommendations and Standards Pre Recommendations (Pre Recommendations - Revision June, 1990).

In default of recommendations from the two above Bodies or should special tests be required, special rules or company methods may be adopted. Such rules and methods shall be specified and agreed upon with the Customer.

## Brick dimensions (shapes)

The refractory bricks are produced in the great many shapes required for the correct lining of each plant in which they are to be installed.

SANAC is able to produce both the shapes envisaged by the main international standardization rules and the special shapes for specific uses.

The Design Service is at the Customer's disposal to provide him with the most profitable solutions.



## Dimensional Tolerances

The dimensional tolerances of bricks generally conform with the PRE/R23 Recommendation (“Dimensional tolerances of dense and insulating refractory products”).

Particular tolerances, if any, should be indicated at the time of the en-quiry and be the subject of tender technical specifications.

## Sorting and checkig

The bricks, removed from the furnaces, after heat treatment, are classified and checked (“Inspection by attributes”) with respect to their dimensional characteristics and their outward appearance (fissures, cracks, chipped edges, stains, etc.). Furthermore, on a statistical basis, controls are carried out on the chemical-physical properties, such as mainly:

- Chemical analysis
- Refractoriness
- Bulk density
- Porosity
- Cold crushing strength
- Modulus of rupture
- Refractoriness under load (R.U.L.)
- Linear thermal expansion
- Permanent linear change
- Thermal shock
- Permeability to gases.

These tests are made on a routine basis in the Quality Control laboratory of each works.

Special test are carried out by the Central Laboratory of Research. The production control is effected in accordance with Assurance Quality System.

## Quality



The qualitative standard of a refractory material has reached such a determinant influence level as to condition the operational results. It is therefore evident the absolute necessity to carry into effect a severe policy of quality in manufacturing.

This policy is imposed by the ever-increasing stresses to which the material is subjected during the operation as well as by the level of high specialization and differentiation reached by refractory products.

In the manufacturing process, therefore all those measures are adopted which are necessary to attain the right quality level and to keep it constant, namely:

- precise processing instructions for each phase of the production process and detailed quality manuals from the raw material control up to the finished products;
- provision of a structure able to produce according to the criteria of the "Quality Assurance".

All our works, as well as all our laboratories, are conform to Assurance Quality System in accordance with UNI EN ISO 9001, certified by DNV as shown at side.

## Services

### RESEARCH AND DEVELOPMENT

Industrial progress, greatly advances in the latest years, imposes more and more severe conditions to refractory linings and demands materials of more and more sophisticated qualities in order to meet the requirements of better performances under every technical and economical aspect.

In order to take active part in this quick developing process, in addition to the individual Works Laboratories charged with the production control and testing (from raw materials to finished products), SANAC owns a Central Laboratory of Research which employs several highly-qualified specialists.

This unit is fitted with all the most modern equipments necessary to the most advanced technological requirements in the sector, it carries out its activity in applied research, in the production and development of new products, in the improvement of the existing products and relevant manufacturing processes. The Central Laboratory of Research is in Vado Ligure.

### DESIGN ENGINEERING AND TECHNICAL ASSISTANCE

The Design Engineering and Technical Assistance Service constitutes an integrated system set up in order to cover all stages from design engineering up to construction and installation. Design engineering is carried out with the C.A.D. system. The Service is in fact a company sector whose function is to find out and solve all problems connected with refractory materials.

It operates on site in close touch with the user and studies the most valid solutions under the technical and economical aspect, thus reaching a precise detailed design engineering of the individual components of a lining.





## Know-how

SANAC technology is active all over the world. In fact, SANAC puts its own experience at the disposal of other producers of refractory materials.

Many are the know-how agreements stipulated with foreign countries. The collaboration supplied by the Company mainly consists of:

- setting out of the most up-to-date production cycles;
- supervision of plant final design engineering;
- supervision of plant erection and start-up;
- supply of complete know-how;
- training of the Customer's technical personnel in order to hit the production targets.

From Company's profile it is possible to identify the principles which are at the base of its activity and which explain its constant progress in a world-wide refractory industry.

### EXPERIENCE

More than seventy years of determinant activity on the market means that not only a production technology but also and above all an application technology has been required.

### INNOVATION

The Research Centre, which is the link between production and utilization, constitutes a fundamental propulsive factor in the improvement of materials.

### ASSISTANCE

SANAC's technical services constantly design new solutions and test their technical and economical validity by verifying every operating condition with the Customer and actively cooperating to the correct management of linings, thus achieving a close integration between design, construction and operation of same.



## Resin-Bonded Magnesite Bricks For Ladle

BRICKS MATERIALS											
NAME OF PRODUCTS	CHEMICAL ANALYSIS ON RAW MATERIAL				C % fixed	PHYSICAL PROPERTIES				THERMAL CONDUCTIVITY	
	MgO	CaO	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>		B.D.	A.P.	C.C.S.	M.R.	at 500°C	at 1.000°C
	%	%	%	%		gr/cm <sup>3</sup>	gr/cm <sup>2</sup>	gr/cm <sup>2</sup>	Kg/cm <sup>2</sup>	W/mK	
LCP201TE	97,35	1,35	0,55	0,50	5,0	3,09	5,0	350	90	4,1	3,4
LCPO16RB	95,75	1,40	0,70	0,65	5,5	2,96	5,0	400	90	4,1	3,4
LCPO89S	97,15	1,40	0,60	0,45	6,5	3,06	6,0	400	90	6,4	4,9
LCM65RB	95,80	2,10	0,50	0,40	6,5	2,99	5,0	350	90	6,4	4,9
CP130	96,90	1,95	0,40	0,20	7,0	3,06	5,0	400	90	8,1	7,4
LCP211S	97,35	1,35	0,55	0,50	7,0	3,04	5,0	400	90	5,5	4,2
CP008S	97,40	1,70	0,35	0,10	8,5	2,99	5,0	400	90	8,7	6,9
CM076S	92,10	1,95	2,35	0,80	10,0	2,83	6,0	350	80	11,4	8,4
CM9RB	94,70	2,15	0,75	0,40	10,0	2,92	5,0	350	80	11,4	8,4
CM9RBS	94,70	2,15	0,75	0,40	10,0	2,92	5,0	350	80	11,4	8,4
MAGSIV97	94,70	2,15	0,75	0,40	10,0	2,92	5,0	350	80	11,4	8,4
CM10ERB	94,70	2,15	0,75	0,40	10,0	2,92	5,0	350	80	11,4	8,4
CM10P	94,65	2,00	0,80	0,40	10,0	2,92	5,0	350	80	11,4	8,4
CM125RB	95,35	2,00	0,70	0,35	10,0	2,93	5,0	350	80	11,4	8,4
CM125RQS	95,30	2,00	0,70	0,35	10,0	2,91	5,0	350	80	11,4	8,4
CP101	96,65	1,75	0,65	0,45	10,0	3,01	5,0	350	80	11,4	8,4
CP10RSS	95,35	2,20	0,60	0,30	10,0	2,89	5,0	350	80	11,4	8,4
CP11ES	95,30	2,00	0,70	0,35	10,0	2,89	5,0	350	80	11,4	8,4
CP12E45RBS	95,70	2,00	0,75	0,45	10,0	2,99	5,0	350	80	11,4	8,4
CP12LRBS	97,40	1,70	0,35	0,10	10,0	2,96	5,0	350	80	11,4	8,4
CP12RBS	95,85	1,95	0,60	0,25	10,0	2,97	5,0	350	80	11,4	8,4
CM98RB	97,20	2,25	0,20	0,05	10,0	2,95	5,0	350	80	11,4	8,4
CP124	95,70	2,00	0,75	0,45	10,0	2,99	5,0	350	80	11,4	8,4
CP204SE	94,90	1,50	0,85	0,55	10,0	2,93	5,0	300	80	9,8	7,2
CP177	97,00	2,20	0,20	0,20	10,0	2,99	5,0	350	80	9,8	7,2
CP151TE	97,35	1,35	0,55	0,50	10,0	3,04	5,0	350	80	9,8	7,2
CP151S	97,35	1,35	0,55	0,50	10,0	3,02	5,0	350	80	9,8	7,2
CP161EE	97,25	1,30	0,50	0,60	10,0	2,98	5,0	350	80	9,8	7,2
CP236	97,60	1,25	0,45	0,40	10,0	3,02	5,0	350	80	9,8	7,2
CP198	97,25	1,90	0,30	0,20	10,0	3,01	5,0	300	80	9,8	7,2
CP102S	97,35	1,35	0,55	0,50	10,5	3,02	5,0	350	80	10,0	7,4
MAGSIV97	94,05	1,50	0,90	0,75	11,0	2,88	5,5	350	80	10,2	7,7
CP009S	97,40	1,70	0,35	0,10	12,0	2,98	5,0	350	80	12,2	9,2
CM051	92,10	1,95	2,35	0,80	14,0	2,81	6,0	350	80	12,9	9,8
CP14E45RSS	96,00	1,80	0,70	0,45	14,0	2,96	5,0	350	80	12,9	9,8
CP14RSS	95,75	1,95	0,60	0,25	14,0	2,90	5,0	350	80	12,9	9,8
CP14ZRSS	96,30	1,80	0,55	0,25	14,0	2,94	5,0	350	80	12,9	9,8
CP105	96,65	1,75	0,65	0,50	14,0	2,95	5,0	350	80	12,9	9,8
CP767	95,75	1,80	0,80	0,55	14,0	2,95	5,0	350	80	12,9	9,8
CP787	97,15	1,60	0,35	0,50	14,0	2,99	5,0	350	80	12,9	9,8
CP14ZRB	95,45	2,05	0,55	0,35	14,0	2,92	5,0	350	80	11,2	8,5
CP153TE	97,35	1,35	0,55	0,50	14,0	2,99	5,0	300	80	11,2	8,5
CP153S	97,00	1,45	0,60	0,70	14,0	2,97	5,0	300	80	11,2	8,5
CP162EE	97,25	1,30	0,50	0,60	14,0	2,92	5,0	350	80	11,2	8,5
CP241SE	94,80	1,50	0,85	0,55	14,0	2,92	5,0	350	80	11,2	8,5
CP214ER	97,70	1,55	0,35	0,15	14,0	2,98	5,0	300	80	11,2	8,5
CP077S	97,30	1,65	0,35	0,25	15,0	2,95	5,0	350	80	15,1	11,6
CP15EZ5RBS	97,20	1,65	0,35	0,35	15,0	2,96	5,0	350	80	15,1	11,6

## GUNNING MATERIALS

BRAND NAME	MAGGUN 87SIV	MAGGUN 88PS	MAGGUN 92P	MAGGUN 926	MAGGUN 89L5	MAGGUN 913	MAGGUN 89BES
Base components	Magnesia	Magnesia	Magnesia	Magnesia	Magnesia	Magnesia	Magnesia
Chemical analysis (%)							
MgO	89,6	86,7	91,3	87,1	89,5	91,1	87,2
Al <sub>2</sub> O <sub>3</sub>	-	-	0,7	1,0	-	-	-
CaO	3,4	1,8	3,3	3,4	2,5	3,6	1,8
SiO <sub>2</sub>	-	6,0	1,3	4,1	6,0	1,5	7,7
Fe <sub>2</sub> O <sub>3</sub>	0,7	1,0	0,1	1,2	1,0	0,1	1,0
P <sub>2</sub> O <sub>5</sub>	-	-	2,1	2,1	-	1,8	-
C	-	-	-	-	-	-	-
Grain size max (mm)	2	2	4	-	-	3	3
MAX. service temperature °C	1.750	1.700	1.750	1.750	1.750	1.750	1.750
Quantity required (t/m <sup>3</sup> )	2,42	2,35	2,50	2,40	2,40	2,50	2,40
Bulk Density gr/cm <sup>3</sup> after heating during : 24 h at 110 °C	2,40	2,37	2,65	-	-	-	2,42
Gunning method	dry	dry	dry	dry	dry	dry	dry
Water required %	10	10 ÷ 12	8 ÷ 12	8 ÷ 12	10	10 ÷ 12	10 ÷ 12
Main applications:	Ladle repairs	Ladle repairs	General uses				



## BASIC CEMENTS

BRAND NAME	MAGBOND	MAGBOND MC	MAGBOND QBB	MAGBOND 95ECO
Classification UNI EN 14:02				
Base components	magnesia	magnesia	magnesia	magnesia
Chemical analysis (%)				
MgO	87,9	92,4	92,9	92,9
Al <sub>2</sub> O <sub>3</sub>	-	-	-	-
CaO	2,0	2,1	3,0	2,2
SiO <sub>2</sub>	6,1	0,2	3,0	3,3
C	-	-	-	-
Max service temperature °C	1.750	1.750	1.750	1.750
Grain size max (mm)	0,3	0,2	0,2	0,2
Bonding strength (Kg/cm <sup>2</sup> ) after heating during:				
24 h at 110 °C	-	-	-	-
5 h at 1000 °C	-	-	-	-
5 h at 1400 °C	-	-	-	-
Water required (%)	34	-	20	20
Retentive time (h)	1	-	1	1
Characteristics	air setting	organic setting	air setting	air setting
Main applications	general uses	general uses	general uses	general uses

## BASIC CASTABLES

BRAND NAME	MAGCAST 741BM	MAGCAST 30SP	MAGCAST 97ECO	MAGCAST 196P	MAGCAST 95K
Classification UNI EN 14:02					
Base components	Magnesia	Magnesia	Magnesia	Magnesia	Magnesia
Chemical analysis (%)					
MgO	80,8	80,0	89,8	90,2	94,7
Cr <sub>2</sub> O <sub>3</sub>	-	-	-	-	-
CaO	-	-	1,9	0,7	2,1
SiO <sub>2</sub>	1,0	1,5	0,3	0,1	2,3
Fe <sub>2</sub> O <sub>3</sub>	-	-	0,1	0,5	0,1
Max service temperature (°C)	1.750	1.750	1.750	1.750	1.750
Quantity required (t/m <sup>3</sup> )	2,80	2,80	2,81	2,90	2,89
Permanent linear change (%) after heating during: 24 h at 110 °C 5 h at max service temperature	0,00 0,70	0,00 0,70	0,00 - 1,00	+/- 0,05 +/- 0,05	0,00 - 1,20
Bulk Density (g/cm <sup>3</sup> ) after heating during: 24 h at 110 °C 5 h at max service temperature	2,80 2,85	2,85 2,92	2,81 2,89	2,94 2,93	2,86 3,05
Cold crushing strength (Kg/cm <sup>2</sup> ) (modulus of rupture Kg/cm <sup>2</sup> ) after heating during: 24 h at 110 °C 5 h at max service temperature	500(60) 400(80)	500(60) 400(80)	500(60) 400(80)	- -	- -
Water required (%)	8	8	8,5	5,5-6	5
Application method	Casting	Casting	Casting	Casting	Casting
Thermal conductivity (Kcal/m h°C) at 500 °C at 1.000 °C	-	-	0,95 0,96	-	-
Main applications	General uses				



## BASIC RAMMING

BRAND NAME	MAGRAM 97PR	MAGRAM 97PRE
<b>Classification UNI EN 14:02</b>		
Base components	magnesia	magnesia
Chemical analysis (%)		
MgO	93,6	93,7
Al <sub>2</sub> O <sub>3</sub>	-	-
CaO	2,2	2,2
SiO <sub>2</sub>	-	-
Fe <sub>2</sub> O <sub>3</sub>	-	-
Fixed Carbon (%)	5,0	5,0
Max service temperature °C	1.750	1.750
Quantity required (t/m <sup>3</sup> )	2,70	2,70
Grain size max (mm)	5	5
Water required %	-	-
Characteristics	ready	ready
Installation method	Ramming	Ramming
Main applications	Joint for B.O.F. general uses	Joint for B.O.F. general uses

## UNSHAPED BASIC PRODUCTS FOR SPECIAL USES

BRAND NAME	MAGFILL 80M	MAGGRAIN MF	MAGPLAST S
Classification ISO N° 1927	class IV	class IV	class IV
Base components	magnesia	magnesia	magnesia
Chemical analysis (%)			
MgO	94,5	95,0	91,8
Al <sub>2</sub> O <sub>3</sub>	-	-	-
CaO	2,0	1,0	1,9
SiO <sub>2</sub>	0,9	-	-
Fe <sub>2</sub> O <sub>3</sub>	0,1	-	0,5
Fixed Carbon	-	-	11,5
Max service temperature °C	1.750	1.750	1.750
Quantity required (t/m <sup>3</sup> )	2,20	2,10	2,50
Grain size max (mm)	4,0	0,2	3,0
Water required %	-	-	-
Characteristics	ready	dry	ready
Installation method	Filling	Compaction	Throwing
Main applications	general uses	general uses	B.O.F. repairs charge area

## Sanac's works

- 1. 13045 GATTINARA (VC)**  
Corso Garibaldi, 321  
Phone +39 0163 824711  
Fax +39 0163 89321
- 2. 17047 VADO LIGURE (SV)**  
Via Manzoni, 10  
Phone +39 019 28951  
Fax +39 019 882555
- 3. 54100 MASSA**  
Via Dorsale, 7  
Zona Industriale  
Phone +39 0585 799001  
Fax +39 0585 799031
- 4. 09032 ASSEMINI (CA)**  
Loc. Grogastu  
Zona Ind. Macchiareddu  
Phone +39 070 24651  
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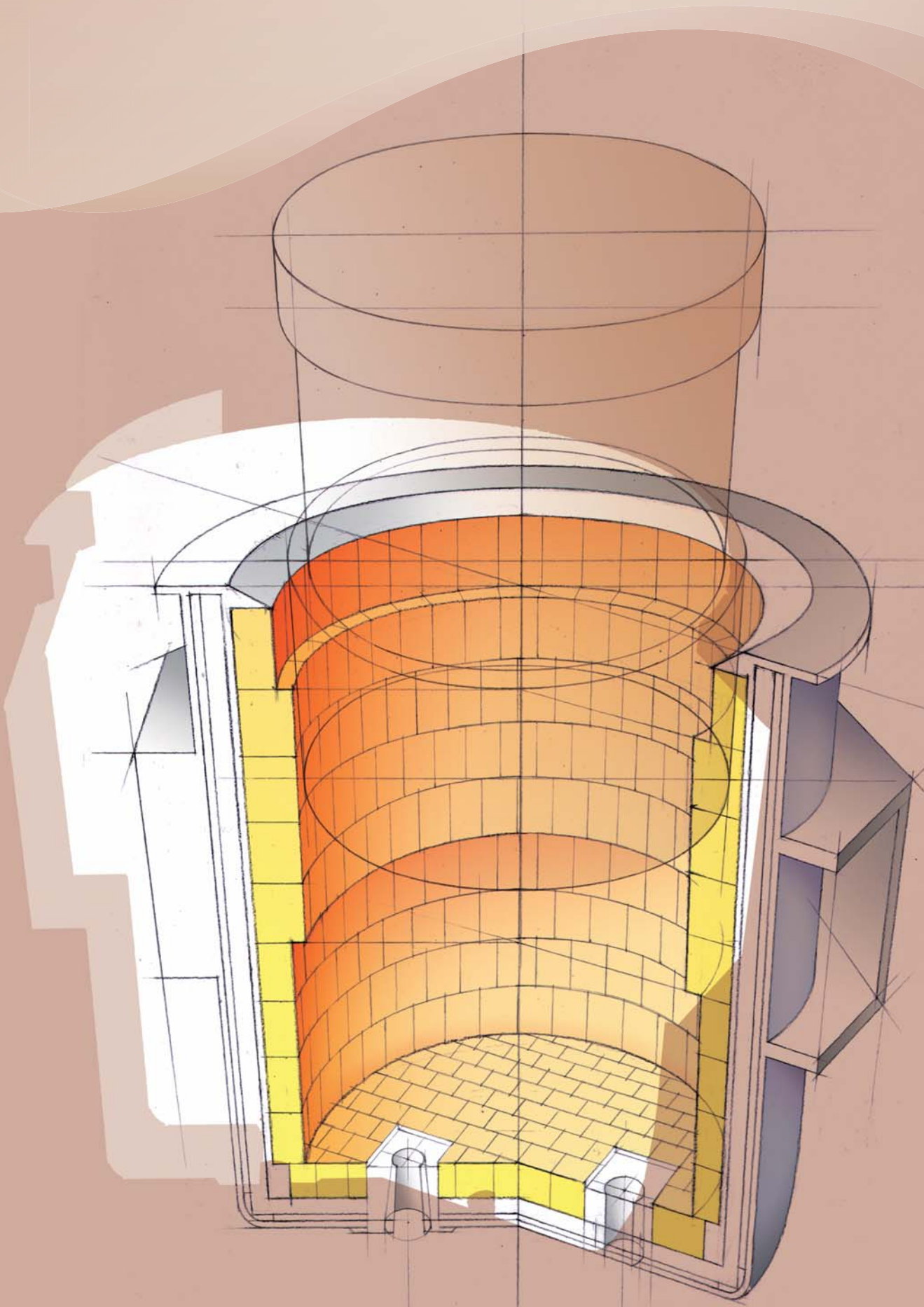
# Products

Basic refractories  
for Steel ladle









## Shapes

### SAFETY LINING

#### SPLIT

Code	Dimensions (mm)			Vol. (dm <sup>3</sup> )		Pieces/pallet
	b	h	s			
T32	111	50	230	1,30	◇	-
T40	111	75	230	1,95	◇	-
11	93	76	230	1,75	◇	-

#### STRAIGHT

Code	Dimensions (mm)			Vol. (dm <sup>3</sup> )		Pieces/pallet
	b	h	s			
R65	115	65	230	1,71	● ◇	-
R76	115	76	230	2,01	● ◇	-

#### SIDE ARCH

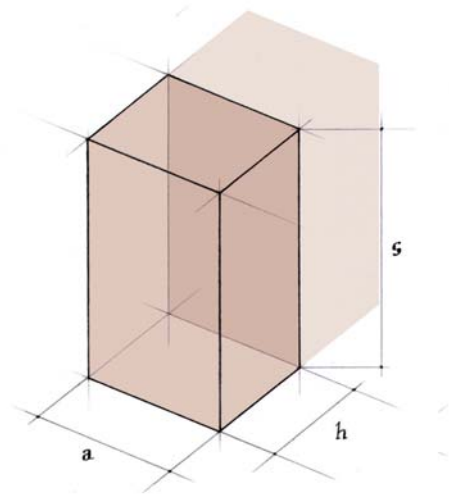
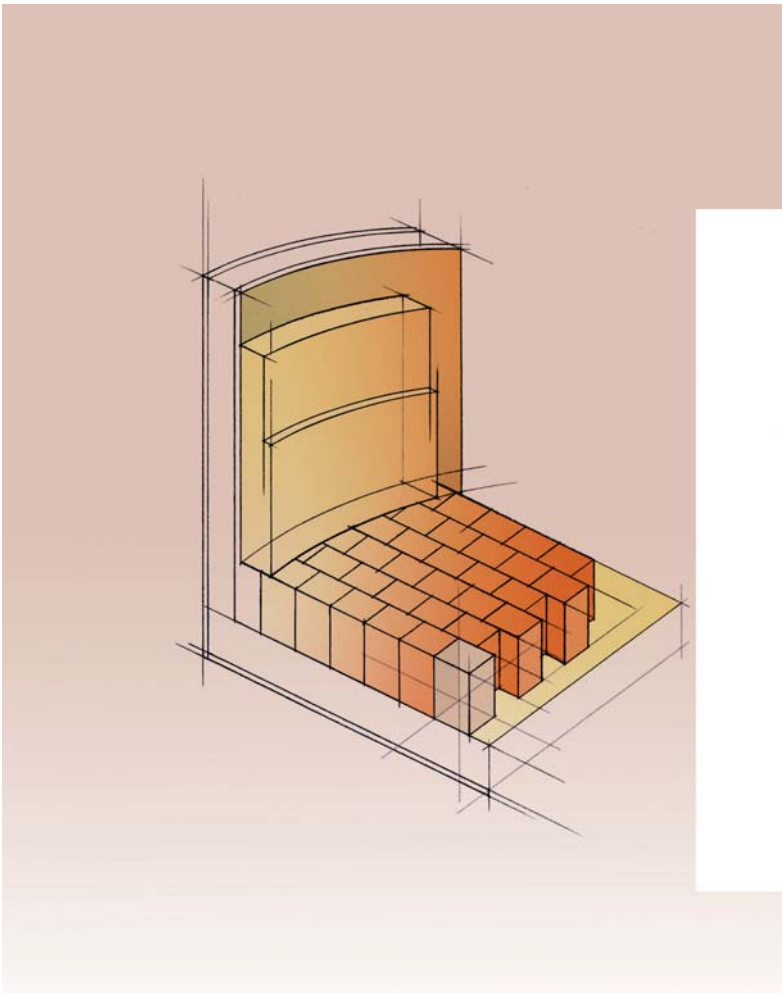
Code	Dimensions (mm)				Vol. (dm <sup>3</sup> )		Pieces/pallet
	a	b	h	s			
C3	115	112	42	230	1,09	◇	-
11M	115	111	50	230	1,30	◇	-
9M	115	111	75	230	1,95	◇	-
S75	108	93	76	230	1,75	◇	-
L76	103	97	76	230	1,75	● ◇	-
C6/76	76	70	76	230	1,28	●	-
C3/76	76	73	76	230	1,30	●	-

#### RADIAL

Code	Dimensions (mm)				Vol. (dm <sup>3</sup> )		Pieces/pallet
	a	b	h	s			
S028	230	220	100	80	1,80	● ◇	-

## Wear lining

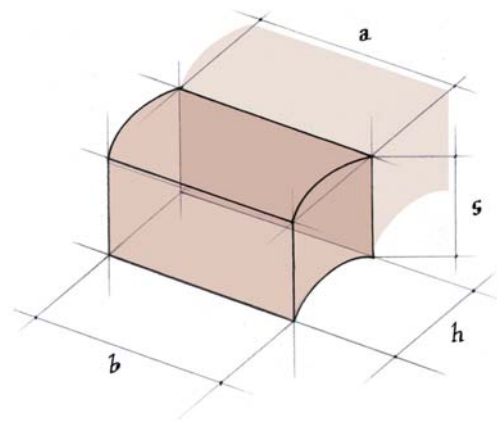
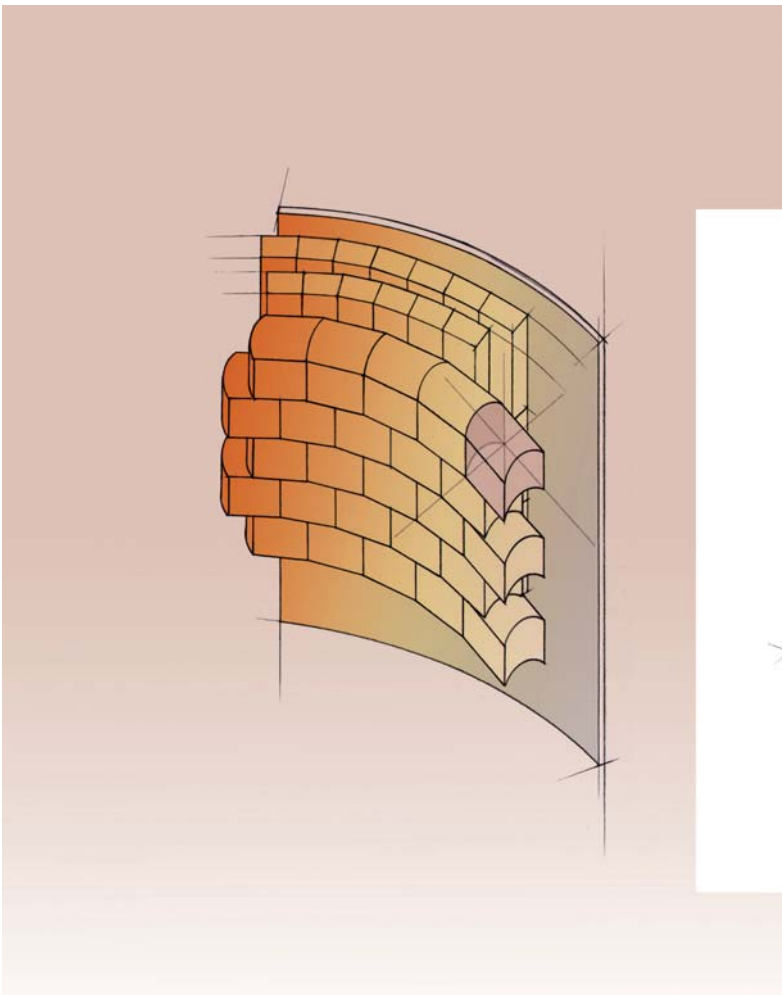
BOTTOM						
STRAIGHT						
Code	Dimensions (mm)			Vol. (dm <sup>3</sup> )		Pieces/pallet
	b	h	s			
25/0	250	150	100	3,75	●	168
35/0	350	150	100	5,25	●	100
B1	187	155	100	2,90	-	-
B2	210	197	123	5,09	-	-
4P0	250	187	100	4,68	●	108
5P0	250	220	100	5,50	●	90
3K100	345	172	100	3,95	-	-
K100	230	172	100	5,93	-	-



# Wall

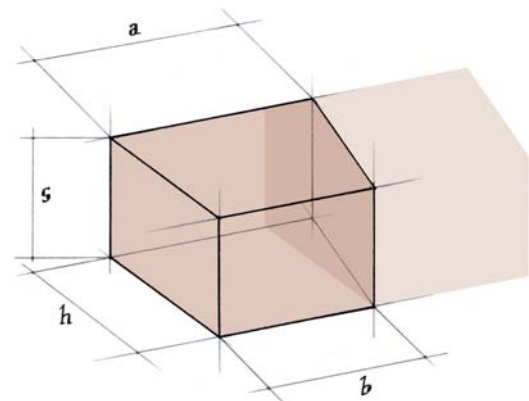
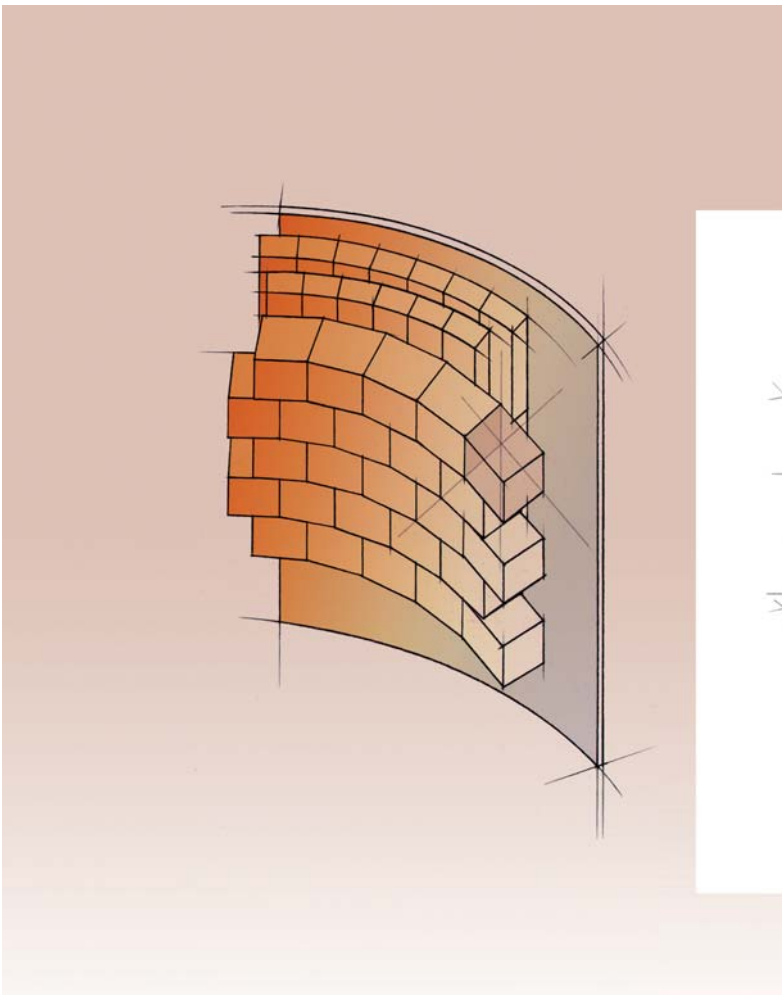
## SEMIUNIVERSAL

Code	Dimensions (mm)				Vol. (dm <sup>3</sup> )		Pieces/pallet
	a	b	h	s			
SU 445	209,5	195,8	101,6	100	2,06	●	252
SU 460	-	-	-	-	-	◇	-
SU 530	209,5	183,4	127,0	100	2,50	◇	-
SU 545	209,5	192,3	127,0	100	2,55	● ◇	162
SU 560	209,5	196,7	127,0	100	2,58	● ◇	162
SU 630	209,5	178,1	152,4	100	2,96	●	180
SU 645	209,5	188,7	152,4	100	3,04	● ◇	150
SU 660	209,5	194,0	152,4	100	3,08	● ◇	180
SU 736	209,5	178,9	177,9	100	2,46	●	144
SU 745	209,5	185,2	177,8	100	3,51	● ◇	144
SU 760	209,5	191,4	177,8	100	3,57	● ◇	120
SU 945	209,5	178,1	228,6	100	4,44	●	90



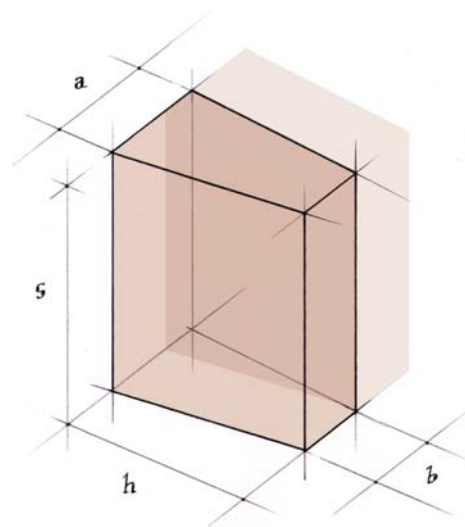
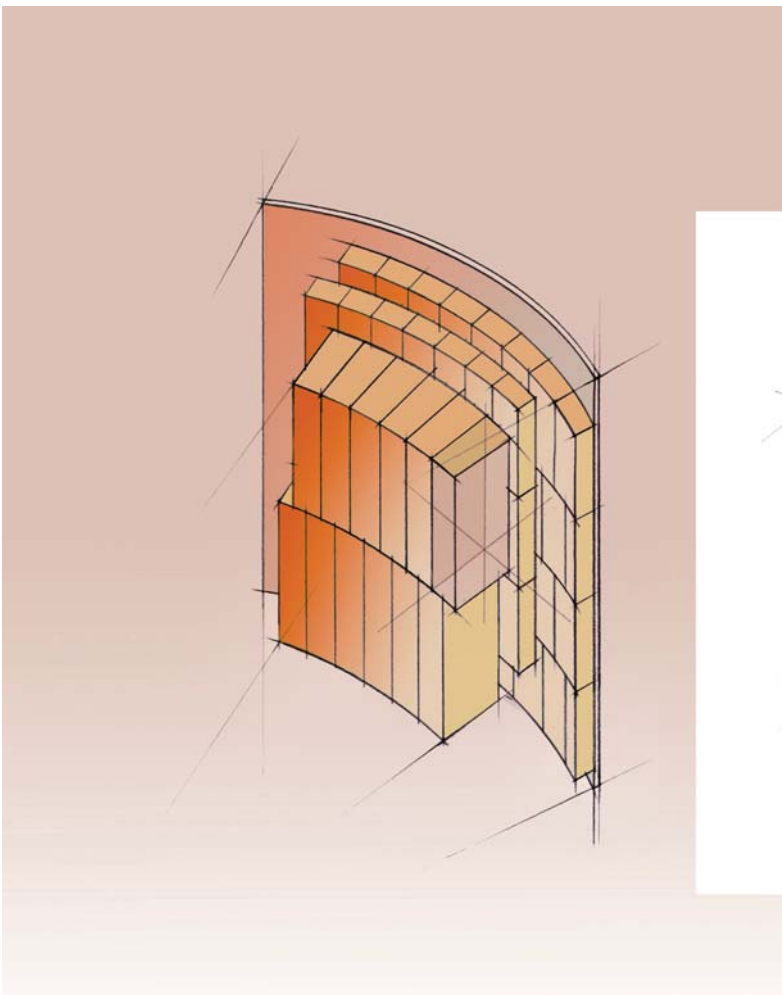
## MINI-KEYS

Code	Dimensions (mm)				Vol. (dm <sup>3</sup> )		Pieces/pallet
	a	b	h	s			
MK5/8	154	146	127,0	100	1,90	●	252
MK5/20	160	140	127,0	100	1,90	●	252
MK6/8	154	146	152,4	100	2,29	●	210
MK6/20	160	140	152,4	100	2,29	●	210
MK6/30	165	135	152,4	100	2,29	●	210
MK7/8	154	146	177,8	100	2,67	●	168
MK7/20	160	140	177,8	100	2,67	●	168
MK7/40	170	130	177,8	100	2,67	●	168
MK8/8	154	146	203,2	100	3,05	●	168
MK8/40	170	130	203,2	100	3,05	●	168



## SIDE ARCH

Code	Dimensions (mm)				Vol. (dm <sup>3</sup> )		Pieces/pallet
	a	b	h	s			
2P0	125	125	123	250	3,84	-	96
2P10	130	120	123	250	3,84	-	96
2P24	137	113	123	250	3,84	-	96
3P0	100	100	155	250	3,88	-	126
3P8	103	97	155	250	3,88	-	126
3P10	105	95	155	250	3,88	-	126
3P20	110	90	155	250	3,88	-	126
4P0	100	100	187	250	4,68	-	108
4P8	104	96	187	250	4,68	-	108
2/3 P12	66	54	187	250	2,81	-	180
3/4 P12	86	74	187	250	3,74	-	144
4P12	106	94	187	250	4,68	-	108
4P22	111	89	187	250	4,68	-	108
5P0	100	100	220	250	5,50	-	90
5P8	104	96	220	250	5,50	-	90
5P16	108	92	220	250	5,50	-	90
5P22	111	89	220	250	5,50	-	90







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