PRESSED SILICO-ALUMINUM BRICKS AND SHAPES – A timeless option despite the year

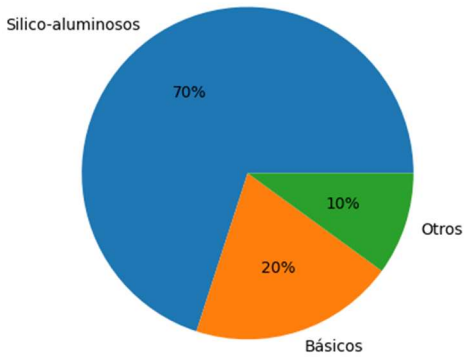
May 2026

Introduction:

While refractory concretes have gained prominence due to their ease of installation and design flexibility, **refractory bricks** continue to be widely used in industry. This is due to key advantages such as their dimensional stability, manufacturing quality control, low variability in service, and predictable behavior. In critical applications where reliability is paramount, bricks remain a viable solution. **We will analyze the main characteristics and advantages that keep this time-honored resource for combating heat and flames relevant**.

Refractory bricks come from different chemical compositions and processes in the proportions detailed in the following chart:

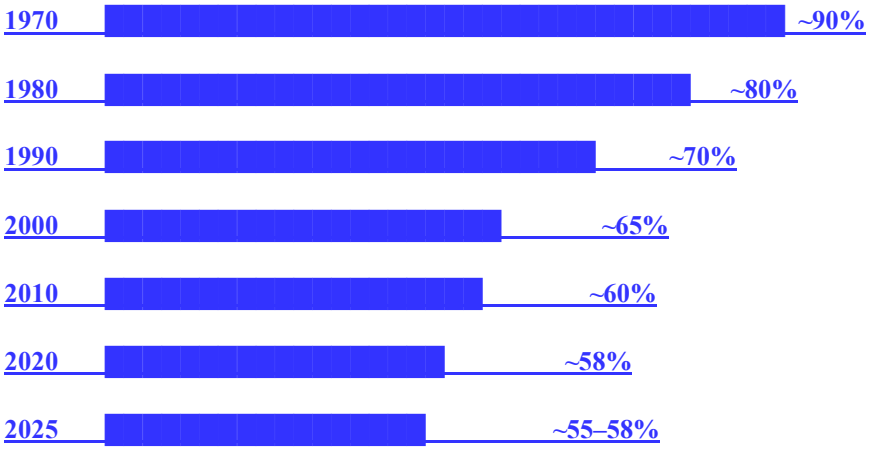
Estimated participation of pressed bricks



- **Silic-aluminous** (SiO_2–Al_2O_3)
- **Basico** (MgO, CaO)
- **Specials** (SiC, ZrO_2, Cr_2O_3)

Estimated Participation in Silica-Alumina tipe:

Year Participation estimated between all refractory bricks



In 55 years, there has been a loss of almost 40% in the market share of silica-alumina bricks. This means that currently, only 60% of what was produced in 1970 is being manufactured. They have been replaced by new concrete technologies and ceramic fibers in the case of insulation.

In any case, these products still maintain a **market share of around 55%, which keeps them relevant.**

Remember that we are only analyzing the layer covered with between 25 and 60% alumina. If we considered all the refractory materials, these numbers would be even lower.

Silica-aluminates Refractory Bricks:

Despite the broad chemical-physical scope of the definition of refractory bricks, in this analysis we will limit ourselves to the study of **low and medium alumina (25-60% alumina) Silico-aluminous bricks** and in turn to the subdivision:

- **Dense Refractory Bricks:** They are characterized by their high density (from 1.8 to 2.7 kg/dm³), high strength, low porosity, and high fire resistance. Therefore, they are designated by their alumina content, which is directly proportional to their maximum thermal resistance. **For example, Type 45 refractory brick means 45% alumina.**
- **Insulating Refractory Bricks**: These are lightweight, highly porous materials with densities between 0.5 and 1.6 kg/dm³. Their function is to impede heat transfer, so their defining characteristic is conductivity. They are named according to their maximum refractoriness, expressed in Fahrenheit (English units) and with two zeros removed. **For example, IFB Type 23 insulation means firebrick insulation that withstands 2300°F (1260°C)**.

Technical interpretation

- **Dense are dominant** because are part of the resistant furnace structure.
- **Insulating complements** (back-up lining), reducing thermic loses.

Definición Normativa

Brick tipe	Main Standars
Insulating (20–32)	ASTM C155 / NTC 815 / NTP 331.027
Dense (25–60% Al_2O_3)	ASTM C27 + Trials Standards (C20, C133, etc.)

Advantages and Disadvantages of Bricks compared to other solutions:

- **Advantages:**

✓ Greater dimensional stability.
✓ Improved installation with interconnected blocks.
✓ Reduced demand for specialized equipment or tools.
✓ Greater assurance of consistent quality (not dependent on factors such as water, mixing, etc.).

Disadvantages:

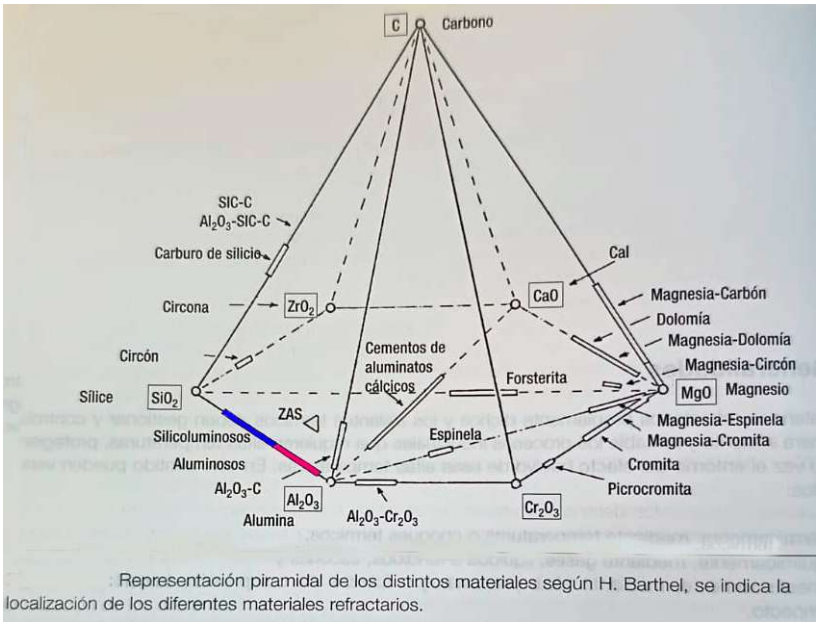
✓ Lower performance in specific applications compared to concrete.
✓ Longer installation time for major applications (compared to poured concrete, and significantly slower compared to shotcrete).
✓ More difficult repairs of minor damage, as scooping out concrete would prevent rebuilding a significant section of brickwork.
✓ Higher costs than concrete when including product and installation (depending on the specific case).

Chemical compositions and ranges of silico-aluminous bricks:

These building blocks define their chemistry in chemical diagrams that can consider two, three, or more of the chemical compounds that compose them, for example, silica (SiO2), alumina (Al2O3), or other oxides such as ferric, vanadium, magnesium, etc.

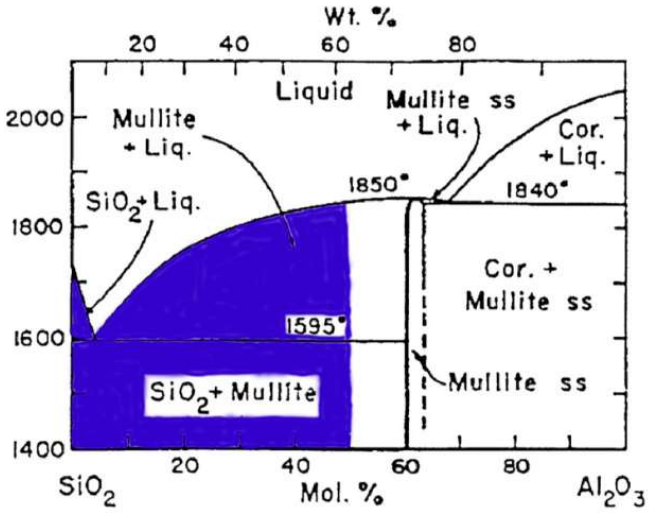
To visualize this, the diagrams have been simplified from quaternary and higher phases to the most well-known, the binary diagram, which allows us to understand the solid-liquid phases, assuming that they are ideal materials with only two oxides and that the rest are nonexistent, which obviously does not exist in nature; it is an ideal.

Below, we see the different phase diagrams and the location of the silico-aluminous materials:



Representación piramidal de los distintos materiales según H. Barthel, se indica la localización de los diferentes materiales refractarios.

Multi-phase diagram – location of silico-aluminous and aluminous compounds



Binary diagram (Silica-alumina) - Location of low-medium alumina bricks.

Main Raw Materials

⚙ Typical summary by range, of dense bricks

Tipe	Main raw material
25–35% Al_2O_3	Clay + Chamote.
35–45% Al_2O_3	Clay + chamote + Kaolín
45–60% Al_2O_3	Chamote + bauxite + Kaolín

⚙ Typical summary by range, of insulating bricks

Tipo	Main Raw Material
23–26	Clay + porogenics (sawdust, rice hulls, cellulose, vermiculite, perlite, etc.)
26–28	Kaolín + some bauxite + porogenics

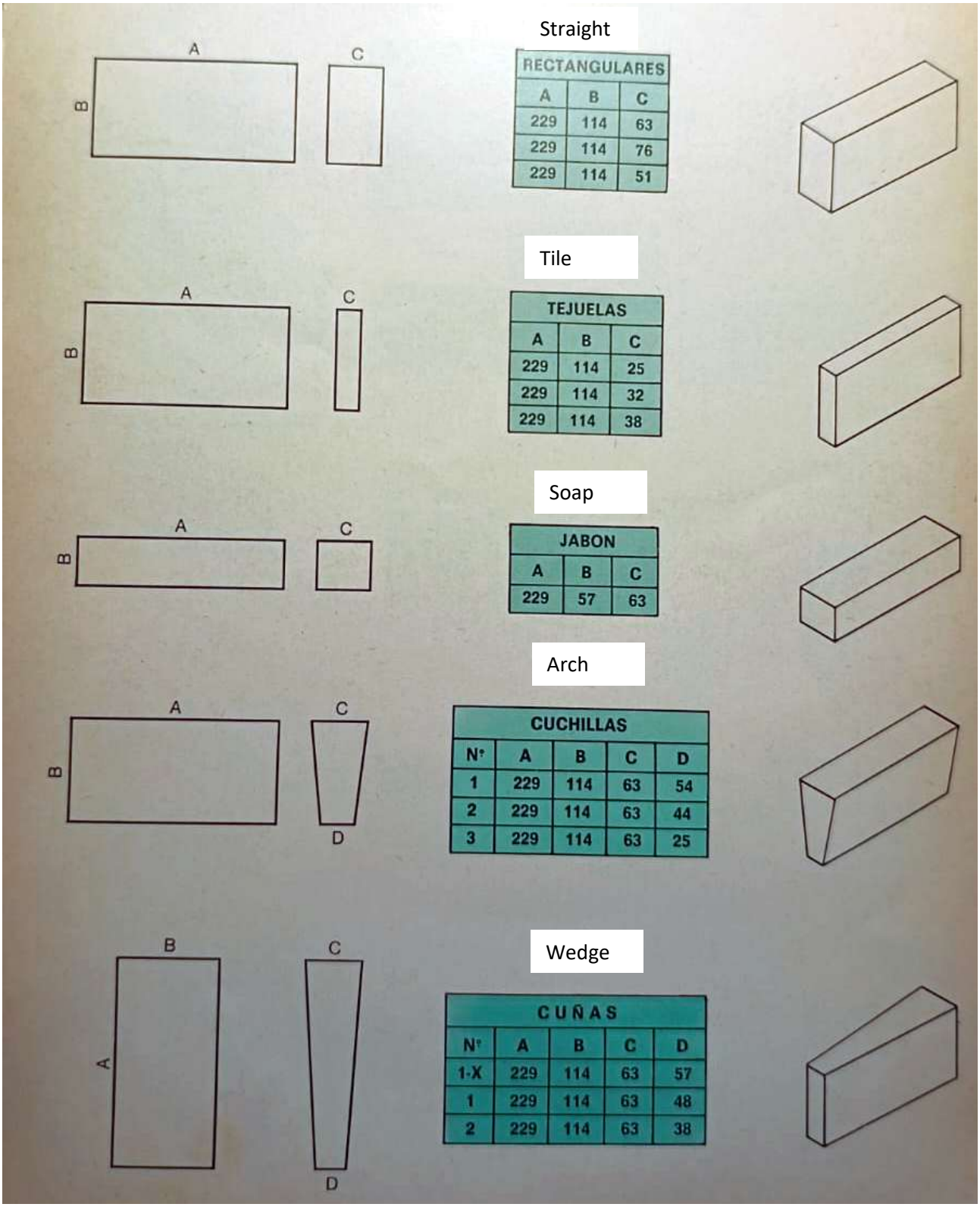
Types and characteristics of refractory and insulating bricks:

Description	% Alumina	Bulk Density	Cold Crushing Stress (ccs)	Clasification Temperature (RUL)
Refractarios	%	gr/cm2	Mpa	°C
SR-LR-38	**38%**	2,10-2,15	32	1340
SR-LR-42	**42%**	2,15-2,17	35	1360
SR-LR-45	**45%**	2,17-2,20	40	1380
SR-LR-60	**60%**	2,20-2,30	> 45	> 1400
SR-LR-80	**80,5%**	2,65-2,70	90	> 1500
SR-LRC-60 Universal Curve	60,0%	2,20-2,30	> 40	> 1400

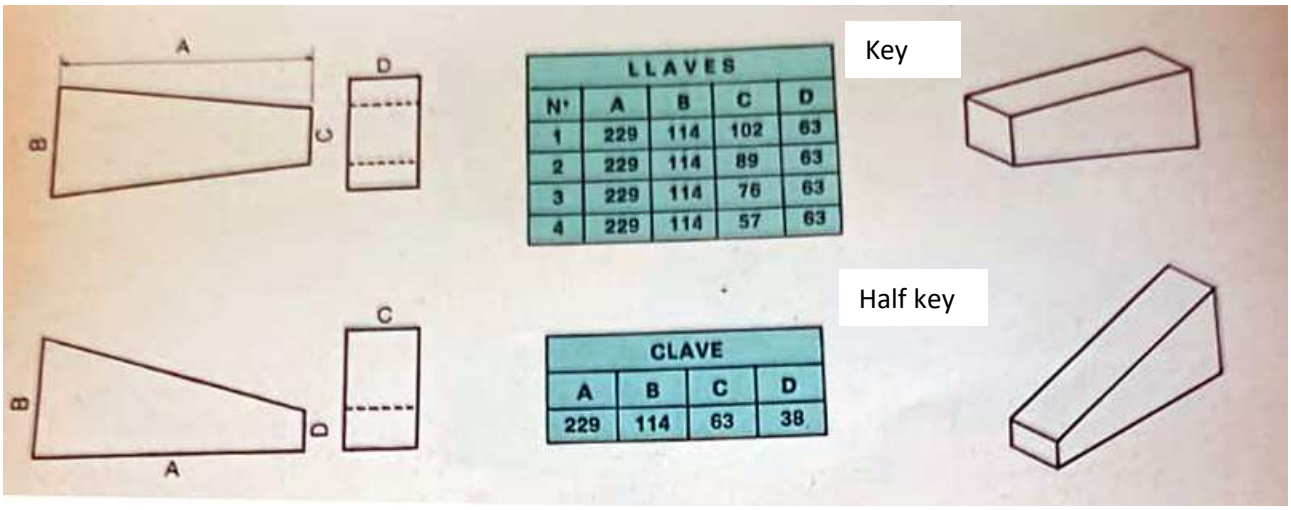
Description	% Alumina	Bulk Density	Thermal Conductivity	Clasification Temperature (RUL)
Aislantes	%	gr/cm2	W/m.k	°C
SR-LA-23	40-42%	2,20-2,30	**0,18-0,22**	1300
SR-LA-26	55%	0,6-0,8	**0,25**	1400
SR-LA-28	67%	0,9	**0,33**	1500
SR-LA-30	70%	1	**0,43**	1550

Standard Shapes and Special Shapes:

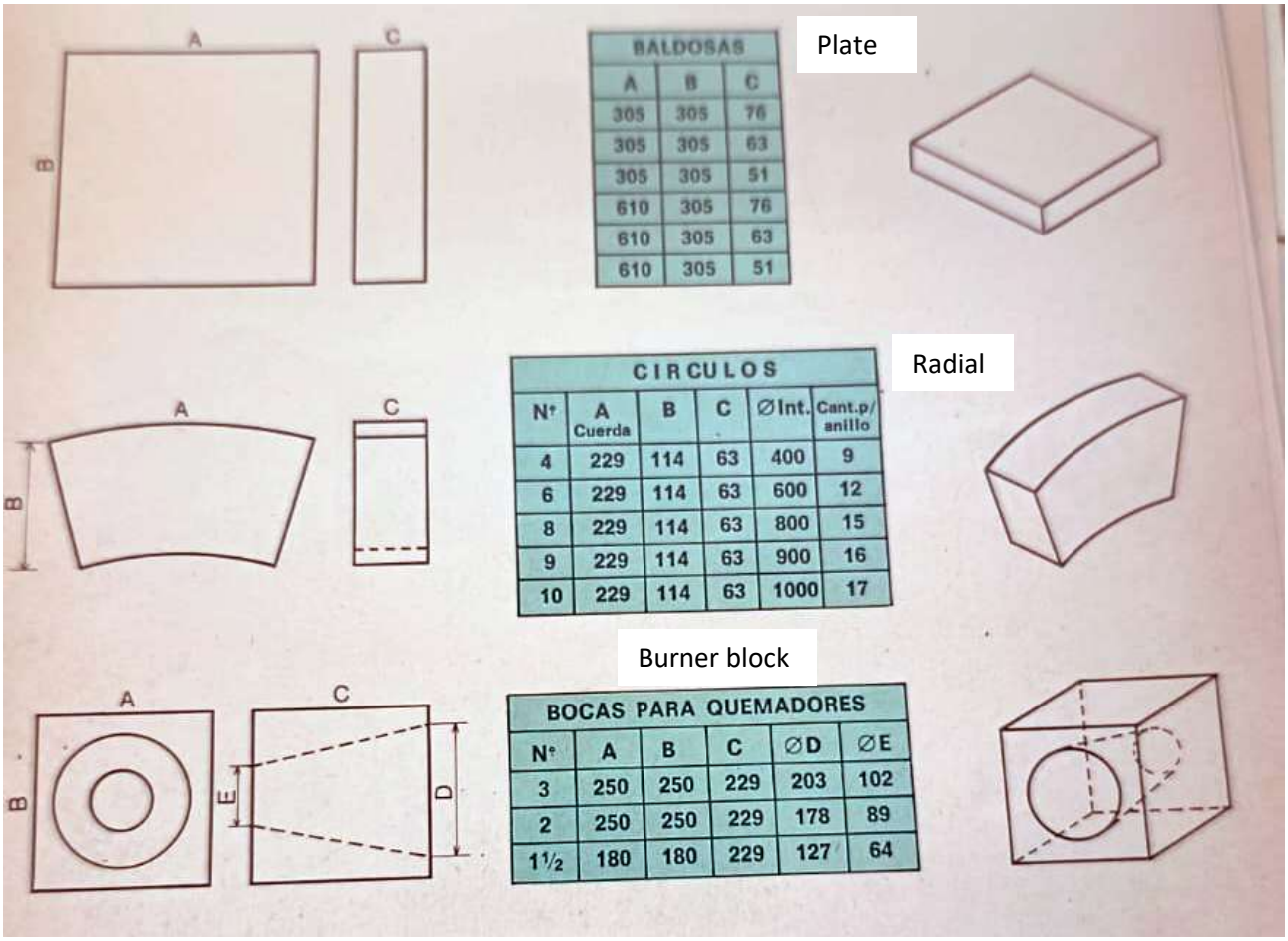
While there are often differences in the shapes produced by each manufacturer, there are some basic commonalities regarding standard shapes. We will illustrate these standardized shapes here, as well as any special shapes that a manufacturer may produce:



Standard main shapes



Standard main shapes



Other common shapes

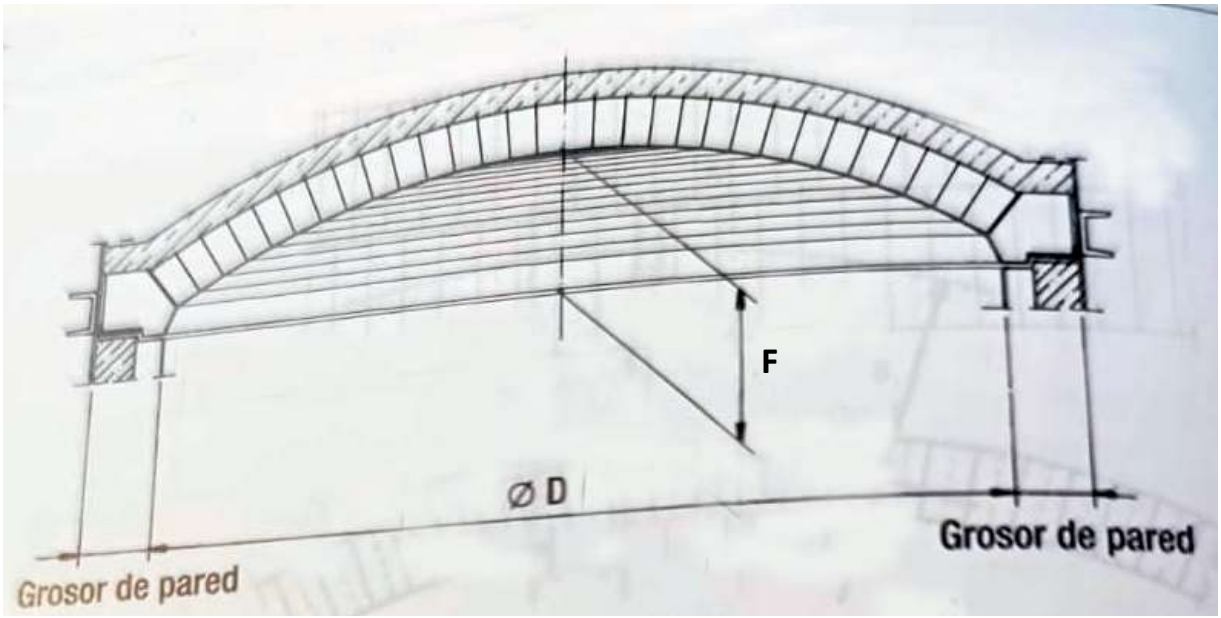
Special shape “Universal Curve” for crucibles furnaces or special making

Most common uses of refractory and/or insulating bricks

The construction of refractory linings using silica-alumina bricks is widely known among bricklayers and even among workers hired by construction companies who possess skills in brick masonry. The main uses are:

- ✓ **Cement: Rotary Kilns**
- ✓ **Petrochemical: Process kilns**
- ✓ **Energy: Boilers and Ovens**
- ✓ **Metallurgy: Thermal Treatement furnaces. Crucible furnace**
- ✓ **Iron and Stell Industry: Coke ovens and Sinter plants.**
- ✓ **Incineration: Combustion chambers.**
- ✓ **Frequent use in controlled wear areas and structural backings**

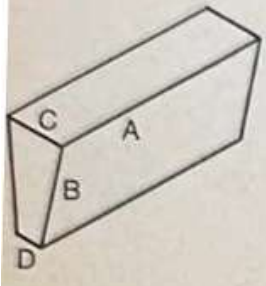
Some Typical Applications of Silico-aluminum Bricks



Furnace Arch with a determined arrow “F”

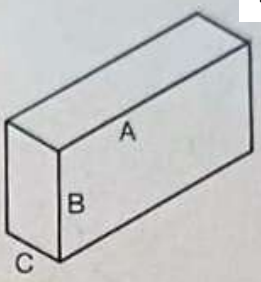
Usage tables for calculating bricks for building arches and curved buildings

Arch



CUCHILLAS				
Nº	A	B	C	D
1	229	114	63	54
2	229	114	63	44
3	229	114	63	25

Straight

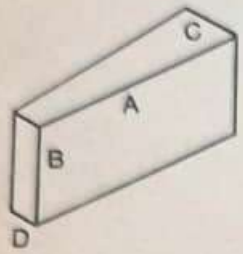


RECTANGULARES		
A	B	C
229	114	63

Diámetro Interior en mm	CANTIDAD NECESARIA POR ANILLO					Diámetro Interior en mm	CANTIDAD NECESARIA POR ANILLO				
	Cuchilla Nº 3	Cuchilla Nº 2	Cuchilla Nº 1	Rectos	Total		Cuchilla Nº 3	Cuchilla Nº 2	Cuchilla Nº 1	Rectos	Total
152	19	.....	.....	.....	19	1.118	.....	9	58	.....	67
178	18	3	.....	.....	21	1.143	.....	8	60	.....	68
203	17	5	.....	.....	22	1.168	.....	7	63	.....	70
229	15	8	.....	.....	23	1.194	.....	5	66	.....	71
254	14	10	.....	.....	24	1.219	.....	4	68	.....	72
279	13	13	.....	.....	26	1.245	.....	3	70	.....	73
305	12	15	.....	.....	27	1.270	.....	2	73	.....	75
330	10	18	.....	.....	28	1.295	.....	.....	76	.....	76
356	9	20	.....	.....	29	1.372	.....	.....	76	4	80
381	8	23	.....	.....	31	1.524	.....	.....	76	11	87
406	7	25	.....	.....	32	1.676	.....	.....	76	19	95
432	5	28	.....	.....	33	1.829	.....	.....	76	26	102
457	4	30	.....	.....	34	1.981	.....	.....	76	34	110
483	3	33	.....	.....	36	2.134	.....	.....	76	41	117
508	2	35	.....	.....	37	2.286	.....	.....	76	49	125
533	.....	38	.....	.....	38	2.438	.....	.....	76	56	132
559	.....	36	3	.....	39	2.591	.....	.....	76	64	140
584	.....	36	5	.....	41	2.743	.....	.....	76	71	147
610	.....	34	8	.....	42	2.896	.....	.....	76	79	155
635	.....	33	10	.....	43	3.048	.....	.....	76	87	163
660	.....	31	13	.....	44	3.200	.....	.....	76	94	170
686	.....	31	15	.....	46	3.353	.....	.....	76	102	178
711	.....	29	18	.....	47	3.505	.....	.....	76	109	185
737	.....	28	20	.....	48	3.658	.....	.....	76	117	193
762	.....	26	23	.....	49	3.810	.....	.....	76	124	200
787	.....	26	25	.....	51	3.962	.....	.....	76	132	208
813	.....	24	28	.....	52	4.115	.....	.....	76	139	215
838	.....	23	30	.....	53	4.267	.....	.....	76	147	223
864	.....	21	33	.....	54	4.420	.....	.....	76	154	230
889	.....	20	36	.....	56	4.572	.....	.....	76	162	238
914	.....	19	38	.....	57	4.724	.....	.....	76	169	245
940	.....	18	40	.....	58	4.877	.....	.....	76	177	253
965	.....	16	43	.....	59	5.029	.....	.....	76	185	261
991	.....	15	46	.....	61	5.182	.....	.....	76	192	268
1.016	.....	14	48	.....	62	5.334	.....	.....	76	200	276
1.041	.....	13	50	.....	63	5.486	.....	.....	76	207	283
1.067	.....	11	53	.....	64	5.639	.....	.....	76	215	291
1.092	.....	10	56	.....	66	5.791	.....	.....	76	222	298

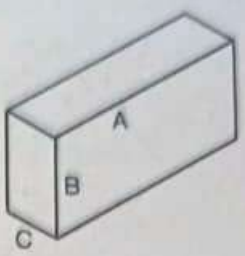
Table for the use of Straight + arches

Wedge



CUÑAS				
Nº	A	B	C	D
1-X	229	114	63	57
1	229	114	63	48
2	229	114	63	38

Straight



RECTANGULARES		
A	B	C
229	114	63

Diámetro Interior en mm	CANTIDAD NECESARIA POR ANILLO						Diámetro Interior en mm	CANTIDAD NECESARIA POR ANILLO					
	Cuña Nº 2	Cuña Nº 1	Rectos	Total	ALTERNATIVA Cuña Nº 1-X	ALTERNATIVA Rectos		Cuña Nº 2	Cuña Nº 1	Rectos	Total	ALTERNATIVA Cuña Nº 1-X	ALTERNATIVA Rectos
686	57	.....	.....	57	.....	.....	2.743	.....	91	68	159	.....	.....
711	55	3	.....	58	.....	.....	2.896	.....	91	75	166	.....	.....
737	52	7	.....	59	.....	.....	3.048	.....	91	83	174	.....	.....
762	51	10	.....	61	.....	.....	3.200	.....	91	90	181	.....	.....
787	48	14	.....	62	.....	.....	3.353	.....	91	98	189	.....	.....
813	46	17	.....	63	.....	.....	3.505	.....	91	105	196	.....	.....
838	44	20	.....	64	.....	.....	3.658	.....	91	113	204	.....	.....
864	42	24	.....	66	.....	.....	3.810	.....	91	121	212	.....	.....
889	40	27	.....	67	.....	.....	3.962	.....	91	128	219	.....	.....
914	38	30	.....	68	.....	.....	4.115	.....	91	136	227	227	.....
940	36	34	.....	70	.....	.....	4.267	.....	91	143	234	227	7
965	34	37	.....	71	.....	.....	4.420	.....	91	151	242	227	15
991	32	40	.....	72	.....	.....	4.572	.....	91	158	249	227	22
1.016	29	44	.....	73	.....	.....	4.724	.....	91	166	257	227	30
1.041	28	47	.....	75	.....	.....	4.877	.....	91	173	264	227	37
1.067	25	51	.....	76	.....	.....	5.029	.....	91	181	272	227	45
1.092	23	54	.....	77	.....	.....	5.182	.....	91	188	279	227	52
1.118	21	57	.....	78	.....	.....	5.334	.....	91	196	287	227	60
1.143	19	61	.....	80	.....	.....	5.486	.....	91	203	294	227	67
1.168	17	64	.....	81	.....	.....	5.639	.....	91	211	302	227	75
1.194	15	67	.....	82	.....	.....	5.791	.....	91	219	310	227	83
1.219	13	70	.....	83	.....	.....	5.944	.....	91	226	317	227	90
1.245	11	74	.....	85	.....	.....	6.096	.....	91	234	325	227	98
1.270	9	77	.....	86	.....	.....	6.248	.....	91	241	332	227	105
1.295	6	81	.....	87	.....	.....	6.401	.....	91	249	340	227	113
1.321	4	84	.....	88	.....	.....	6.553	.....	91	256	347	227	120
1.346	2	88	.....	90	.....	.....	6.706	.....	91	264	355	227	128
1.372	.....	91	.....	91	.....	.....	6.858	.....	91	271	362	227	135
1.524	.....	91	7	98	.....	.....	7.010	.....	91	279	370	227	143
1.676	.....	91	15	106	.....	.....	7.163	.....	91	286	377	227	150
1.829	.....	91	22	113	.....	.....	7.315	.....	91	294	385	227	158
1.981	.....	91	30	121	.....	.....	7.467	.....	91	301	392	227	165
2.134	.....	91	38	129	.....	.....	7.620	.....	91	309	400	227	173
2.286	.....	91	45	136	.....	.....	7.772	.....	91	317	408	227	181
2.438	.....	91	53	144	.....	.....	7.925	.....	91	324	415	227	188
2.591	.....	91	60	151	.....	.....	8.077	.....	91	332	423	227	196

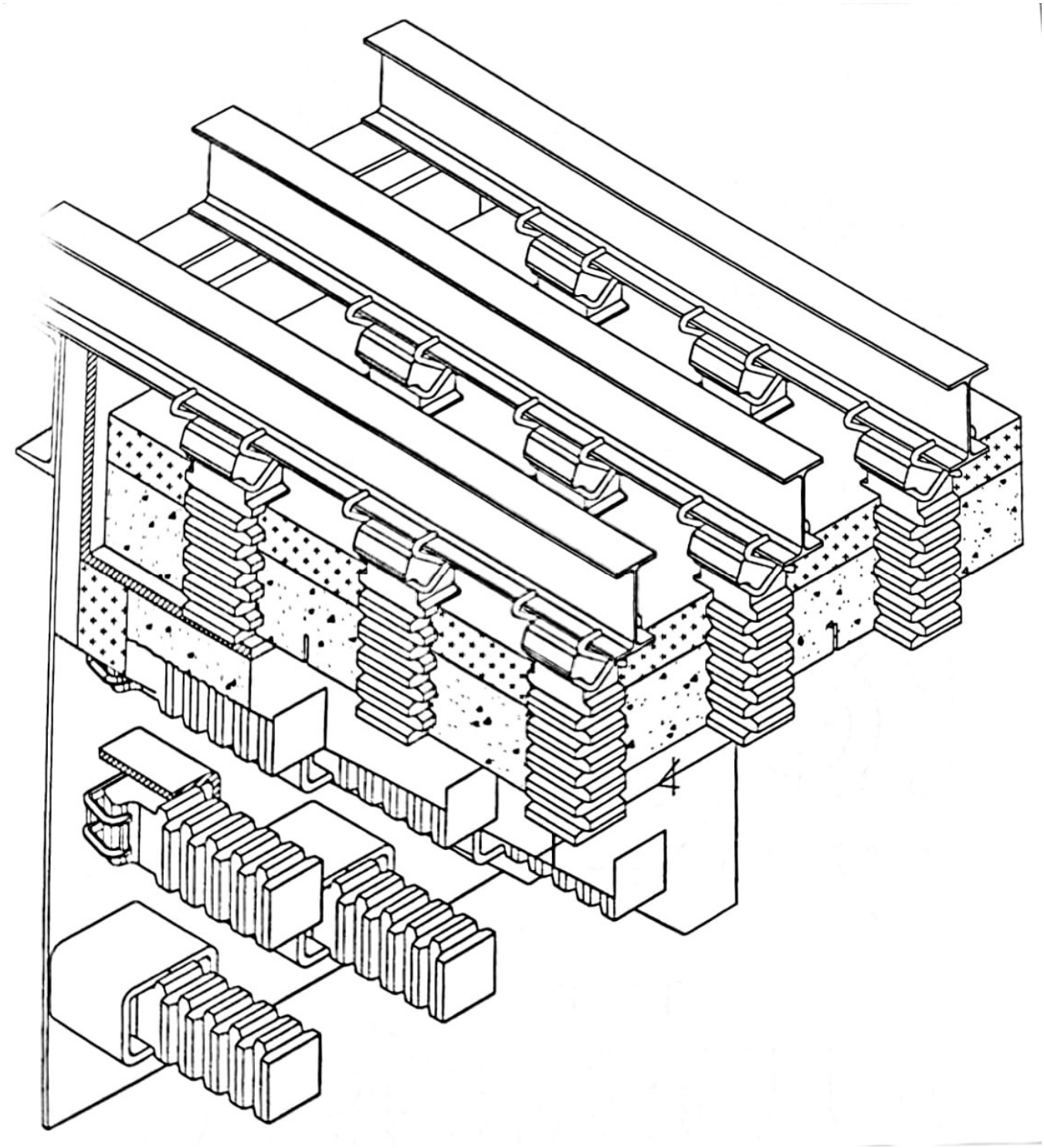
Table for the use of wedges + straights

Most common applications of silica-alumina bricks (dense and insulating), by industrial sector

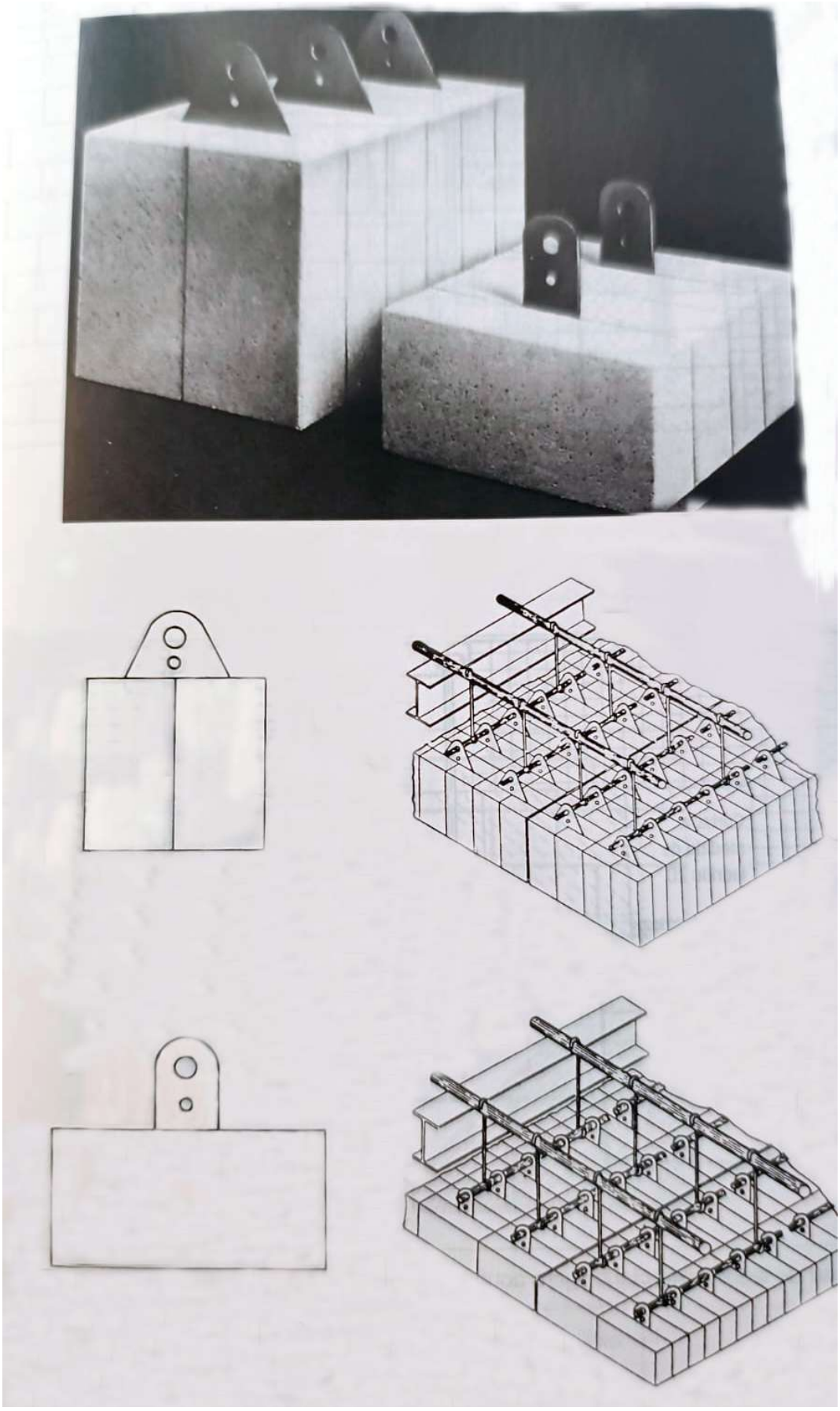
- **Cement : Rotative kilns**
- **Petrochemical: Process kilns**
- **Ceramic : High resistant furnaces zones.**
- **Energía: Boilers**
- **Mining: Calcination and melting concentrated mixes**
- **Metalurgic: Heat Treatement furnaces . Crucible furnaces**
- **Siderurgic: Coke Ovens and Sinter areas.**
- **Incinereration: Combustion chambers**
- **Frecuent use in wear zones and for estructural back up.**

Other practical applications, using pressed silica-aluminum shapes

Flat Roof Structure using ceramic anchor bricks : Supported by a structure of load-bearing profiles: This type of roof is then covered with concrete in several layers (refractory and insulating), but all "anchored and hung" through these special silicon-aluminum pieces.



Flat roof structure made of insulating bricks: In these cases it is necessary to pre-build "blocks" made up of several insulating bricks, attached to a metal anchor that will then be supported by metal bars or metal hooks that will hold and shape the flat roof of insulating bricks.



Conclusions:

The advent of new technologies in refractory and insulating linings, such as low- or ultra-low-cement concretes, chemically bonded concretes, and cement-free concretes; as well as progress in monolithic (preformed) constructions, and the advancement of ceramic fibers in all their forms, etc., has dealt a severe blow to traditional brick-only constructions. However, these advancements have by no means eliminated them. Even today, pressed silica-alumina bricks are used in certain applications or masonry solutions where they offer comparative advantages in terms of cost and quality: whether due to the cost of the new products, the simplicity of construction, or simply because they allow for maintaining brick stocks and preventing product expiration. **These bricks remain relevant and in use today, despite the passage of time.**

They have managed to survive technological advancement!

This is where we believe that **Soluciones Refractarias SRL** are here to provide the best solution for each case. Our company has all the resources to address these issues:

- Top-tier technical advice.
- State-of-the-art materials.
- Cladding design and thermal calculations.
- Installation of various materials.
- Convective hot air drying.

Our WEB : www.solucionesrefractarias.com.ar

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Related Links:

Video report (youtube)

Installation service

Installation Procedures

Specific products (Refractory bricks)

Special products for Insulation (K y JM)

All aspects concentrated in one place, our space !!!!