

Vermiculite insulating boards for back-up insulation in the aluminium industry

V-1100 (375) · V-1100 (475) · V-1100 (600) VIP-12

Description

The SKAMOL V-1100 and VIP-12 is a range of vermiculite based insulating boards recommended for the aluminium industry and especially aluminium electrolysis cells. They are highly resistant to cryolite penetrations and fluorides, and not wetted by molten aluminium. Especially VIP-12 has been designed to function as a semi-barrier layer in aluminium electrolysis cells. The application of V-1100 and VIP-12 is energy saving and thus cost effective.

V-1100 and VIP-12 combine high strength with low thermal conductivity and are designed for a maximum service temperature of 1100°C.

SKAMOL vermiculite boards cover several grades in various combinations of bulk density, insulation properties and compressive strength. Standard grades include:

- V-1100 (375)
- V-1100 (475)
- V-1100 (600)
- VIP-12

Application

The V-1100 and VIP-12 vermiculite insulating boards are clean to handle and easy to install. The product composition allows for easy cutting and shaping of both board types on site using ordinary wood-working tools. Jointing mortar recommended is SKAMOL FL-06, see separate data sheet.

V-1100

V-1100 boards are not attacked by molten aluminium and are highly resistant to cryolite penetration and fluorides. Therefore V-1100 is ideal as back-up insulation in aluminium electrolysis cells, where it can be applied alone or as combi-boards (V-1100 glued on calcium silicate boards) for easy installation. V-1100 can also be used as hot-face insulation for covering electrolysis cells during start-up. Additionally, V-1100 can be applied in the secondary aluminium industry, for example as back-up insulation of the walls in holding furnaces, and in launders as back-up insulation and as top lid.

VIP-12

VIP-12 is specially developed as a highly cryolite resistant and aluminium non-wetted insulating board for application in aluminium electrolysis cells. VIP-12 will protect more vulnerable cathode bottom insulation beneath, as it promotes the formation of a protective glass layer in a similar way as the barrier bricks situated above VIP-12.

Standard sizes

SKAMOL V-1100 and VIP-12 boards are available in the following standard sizes:

Metric:		
	Length x width:	Thickness:
V-1100 (375)	1000 x 610 mm	25 – 100 mm
V-1100 (475)	1000 x 610 mm 1000 x 305 mm	25 – 90 mm
V-1100 (600)	1000 x 610 mm 1000 x 305 mm	20 – 75 mm
VIP-12	1000 x 305 mm 610 x 305 mm	25 – 60 mm 25 – 85 mm
US/British:		
V-1100 (375)	36" x 24"	1" through 4"
V-1100 (475)	36" x 24" 36" x 12"	1" through 3½"
V-1100 (600)	36" x 24" 36" x 12"	¾" through 3"
VIP-12	36" x 24" 24" x 12"	1" through 2¾" 1" through 3¾"

Derivatives cut from standard boards, and special shapes to meet specific design requirements are made on request. Extensive know-how on special shapes and designs is available.

Dimensional tolerances

Length and width ± 2.5 mm (0.10")
 Thickness ± 1.0 mm (0.04")

SKAMOL vermiculite insulating boards

Back-up insulation up to 1100 °C (2012 °F)

Grade		V-1100 (375)	V-1100 (475)	V-1100 (600)	VIP-12
Maximum service temperature					
	°C	1100	1100	1100	1100
	°F	2012	2012	2012	2012
Bulk density, dry					
	kg/m ³	375	475	600	1200
	lbs/cu.ft.	23	30	37	75
Compressive strength (EN 1094-5: 1995)					
@ room temperature	MPa	1.3	2.5	4.2	9.5
	lbs/sq.in.	189	363	609	1378
Modulus of rupture (EN 993-6: 1995)					
	MPa	0.5	0.8	1.6	2.8
	lbs/sq.in.	73	116	232	406
Total porosity					
	%	85	81	76	56
Specific heat					
	kJ/(kg×K)	0.94	0.94	0.94	1.0
	BTU/(lb×°F)	0.224	0.224	0.224	0.24
Coefficient of reversible thermal expansion (BS 1902: section 5.3: 1990)					
@ 20°C-750°C (68°F-1382°F)	K ⁻¹	11×10 ⁻⁶	11×10 ⁻⁶	11×10 ⁻⁶	10×10 ⁻⁶
	°F ⁻¹	6.1×10 ⁻⁶	6.1×10 ⁻⁶	6.1×10 ⁻⁶	5.6×10 ⁻⁶
Resistance to thermal shock (EN 993-11: 1998)					
heating to 950°C (1742°F)	cycles	>20	>20	>20	-
Linear reheat shrinkage (EN 1094-6: 1999)					
12 h at 1000°C (1832°F)	%	1.0	1.0	1.0	1.0
Pyrometric cone equivalent (ASTM C24-89 ORTON cones)					
	°C	1300	1300	1300	1330
	°F	2372	2372	2372	2426
Thermal conductivity (ASTM C-182)					
mean temp.@ 200°C	W/(m×K)	0.12	0.14	0.16	0.25
@ 400°C		0.15	0.17	0.18	0.27
@ 600°C		0.16	0.19	0.20	0.29
@ 800°C		0.19	0.20	0.22	0.30
@ 392°F	BTU/(sq.ft.×h×°F/ft)	0.83	0.97	1.11	1.73
@ 752°F		1.04	1.18	1.25	1.84
@ 1112°F		1.11	1.32	1.39	1.98
@ 1472°F		1.32	1.39	1.53	2.05
Chemical analysis, typical					
	%				
Silica	SiO ₂	46	46	46	52
Titanium dioxide	TiO ₂	0.7	0.7	0.7	1.6
Ferric oxide	Fe ₂ O ₃	5.5	5.5	5.5	3.8
Alumina	Al ₂ O ₃	7.0	7.0	7.0	23
Magnesium oxide	MgO	19	19	19	8.9
Calcium oxide	CaO	3.5	3.5	3.5	1.5
Sodium oxide	Na ₂ O	0.2	0.2	0.2	0.2
Potassium oxide	K ₂ O	10	10	10	5.6
Loss on ignition 1025°C (1877°F)	LOI	7.0	7.0	7.0	3.0
Colour					SAND
HS Tariff number					
(Harmonized Commodity Description and Coding System)					6806.90.00

Data are average results of tests conducted under standard procedures and are subject to variation. Data contained in this data sheet are supplied in good faith as a technical service and are subject to change without notice. Misprint and errors excepted.

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