Isolite®

EXPANDED POLYSTYRENE – FIRE RETARDED

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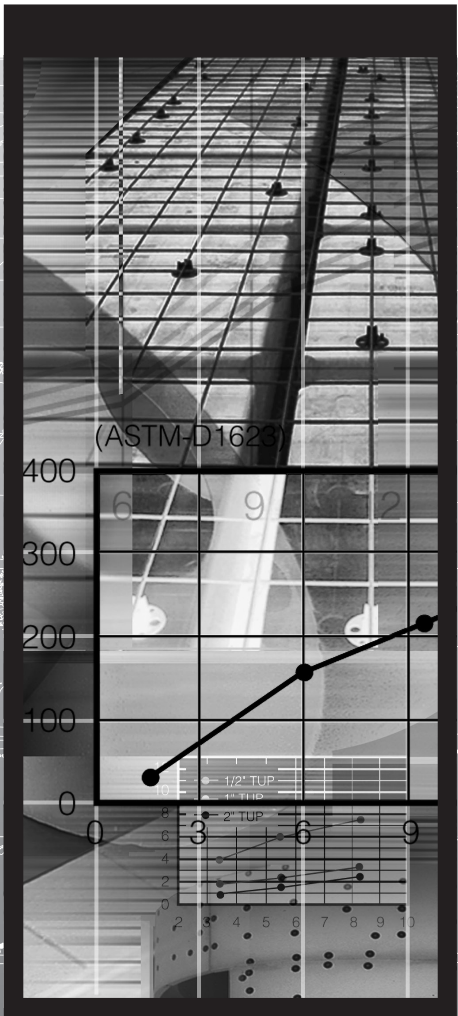
Technical Data Manual



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RMAX® Isolite® expanded polystyrene

Isolite® is the brand name for RMAX block moulded flame retardant modified grade of EPS (expanded polystyrene).

It is a closed cell, resilient, lightweight rigid cellular plastics material produced in a range of densities between 10 kg/m³ and 35 kg/m³.

The main applications for products manufactured from Isolite® are:

- thermal insulation systems (wall, roof and sub-floor)
- rendered external cladding[1]
- ceiling panels and other decorative surfaces
- void fillage and blockouts
- pipe insulation
- protective packaging
- floatation and buoyancy applications

Manufacturing process

Pre expansion

Expanded polystyrene is supplied as plastic (Polystyrene) beads in which an expanding (or blowing) agent, usually pentane, has been dissolved. In the presence of steam the thermoplastic polystyrene softens and the increasing vapour pressure of the expanding agent causes the beads to expand up to 50 times their original volume. During this stage the degree of expansion is controlled to achieve the desired density.

Conditioning

From the pre-expander the beads are gently transported to large hoppers for ageing. The time of ageing is set to cool and stabilise the beads and allow for infusion of air to replace the expanding agent in the cells.

Moulding

After conditioning, the beads are charged into a closed mould where they are further expanded and fused together by steam heating.

Finishing

The freshly moulded blocks of Isolite® are passed through temperature controlled ovens to remove moisture and expanding agent, and to provide blocks of constant dimensional stability and dryness.

Environment aspects

RMAX Isolite® EPS contains no hydrofluorocarbon (HFC) or hydro chlorofluorocarbon (HCFC) blowing agents that might cause depletion of ozone in the upper atmosphere. The Ozone Depleting Potential of RMAX Isolite EPS is zero (ODP=0).

When used as insulation and cladding EPS provides a reduction in energy use and costs for cooling in summer or heating in winter. Over the lifetime of its use in such applications EPS is carbon negative – saving much more in energy than was used to make the raw material.

EPS is 100% recyclable – RMAX recycles off-cut and unused material into finished products whilst maintaining the required physical properties of those products.

Waste EPS can also be processed into raw materials for other processes. RMAX re-processes EPS into compact Polystyrene which is then used in plastic products from picture frames to garden seats and fence posts. Some EPS recycle material is used for soil conditioning and aeration.

For more information on EPS and the environment please contact your nearest RMAX office.

Manufactured to a standard

Isolite® EPS is manufactured to AS 1366, Part 3-1992, Rigid Cellular Plastic Sheets for Thermal Insulation, Rigid Cellular Polystyrene, in six classes. The standard designates a colour to identify each of the six classes:

Class L: Blue	Class M: Black
Class SL: Yellow	Class H: Green
Class S: Brown	Class VH: Red

The standard specifies the minimum physical property limits for each of the six classes (See Table 1) and methods for determination of compliance.

Quality control

To meet with the compliance requirements of the standard, the RMAX quality control system monitors and controls each stage of the manufacturing process and assures that Isolite® conforms to AS 1366, Part 3-1992 within 95% confidence limits by on site testing of density and key physical properties.

Comprehensive physical testing for product development and quality assurance is carried out in the company's own laboratory, which is NATA accredited.

Properties of Isolite®

The physical properties are primarily determined by the moulded density for well made oven cured EPS.

(See Fig.1 to 4).

However, these properties will be affected by raw material and manufacturing variations, and for this reason AS 1366, Part 3-1992 specifies the classes in terms of performance properties rather than density.

The standard lists Nominal Density for each class (See Table 2), but these densities should be regarded as a guide only as the physical properties shown in Table 1 may be achieved by EPS of other densities.

Note 1 – Rendered cladding must be done to a minimum standard using cement based polymer modified render and alkali resistant fibreglass mesh.

Table 1: Physical properties requirements of EPS, according to AS 1366, Part 3-1992

		Class						
Physical property	**Unit**	**L**	**SL**	**S**	**M**	**H**	**VH**	**Test Method**
Compressive stress at 10% deformation (min.)	kPa	50	70	85	105	135	165	AS 2498.3
Cross-breaking strength (min.)	kPa	95	135	165	200	260	320	AS 2498.4
Rate of water vapour transmission (max.) measured parallel to rise at 23°C	$\mu g/m^2.s$	710	630	580	520	460	400	AS 2498.5
Dimensional stability of length, width, thickness (max.) at 70°C, dry condition 7 days	percent	1	1	1	1	1	1	AS 2498.6
Thermal resistance (min.) at a mean temperature of 23°C (50mm sample)	$m^2.K/W$	1	1.13	1.17	1.20	1.25	1.28	AS/NZS 4859.1
Flame propagation characteristics:								AS 2122.1
– median flame duration (max.)	SD	2	2	2	2	2	2	
– eight value (max.)	SD	3	3	3	3	3	3	
– median volume retained	percent	15	18	22	30	40	50	
– eight value (min.)	percent	12	15	19	27	37	47	
1 W/m.K=6.93 Btu in/ft²h.°F								

Table 2: Other physical properties of EPS not specified in AS 1366, Part 3-1992

		Class						
Physical property	**Unit**	**L**	**SL**	**S**	**M**	**H**	**VH**	**Test Method**
Density – nominal	Kg/m^3	11	13.5	16	19	24	28	N/A
Compressive strength at 1% deformation (max.)	kPa	14	23	31	42	58	72	ASTM D1621
Compressive strength at 5% deformation (max.)	kPa	33	59	68	95	134	164	ASTM D1621
Flexural Strength (min.)	kPa	60	150	178	218	304	337	ASTM C203
Elastic Modulus (min.)	kPa	1450	2200	3100	4250	5850	7250	
Water Absorption by total immersion (max.)	Volume %	4.0	4.0	4.0	3.0	3.0	2.0	ASTM C272
Buoyancy Force	Kg/m^3	989	986.5	984	981	976	972	N/A
Coefficient of Thermal Expansion	m/m deg K	6.3×10^{-5}	6.3×10^{-5}	6.3×10^{-5}	6.3×10^{-5}	6.3×10^{-5}	6.3×10^{-5}	ASTM D696

Mechanical properties

The density dependency of the main physical properties of Isolite® can be seen in (Fig.1 to 4): Compressive stress, Cross-breaking strength (flexural strength), Tensile strength and Shear strength.

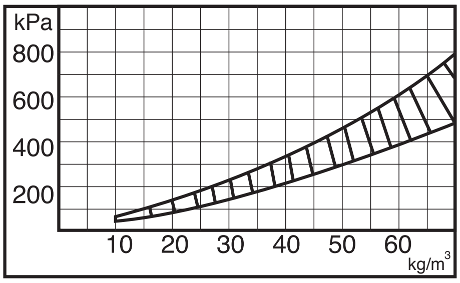

Figure 1: Compressive stress at 10% deformation v density

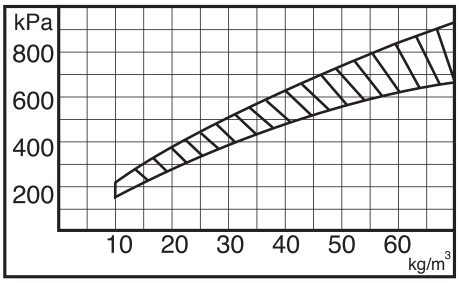

Figure 3: Tensile strength v density

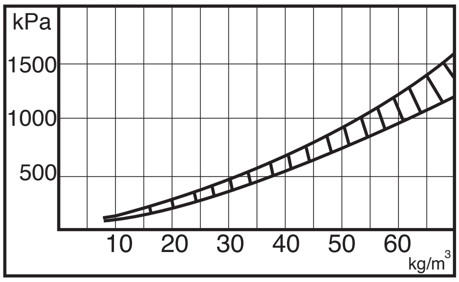

Figure 2: Cross-breaking strength v density

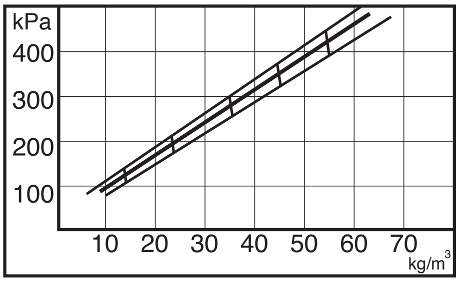

Figure 4: Shear strength v density at 23°C

Compressive creep

It is common to report only the compressive stress at 10% deformation but the latter is often taken from complete stress-strain curves as shown in (Fig.5). Although it appears to deform elastically over a range of comprehensive loads, Isolite® that has been stressed will, with the release of all stress, retain some permanent deformation.

(Fig.1 to 5) can be useful for short term loads where some deformation is acceptable. For long term loads (Fig.6), showing compressive creep under constant loads versus time, should be used.

It should be noted that compressive strength in AS 1366, Part 3-1992 is a performance characteristic at 10% deformation and should not be taken as a universal design loading recommendation.

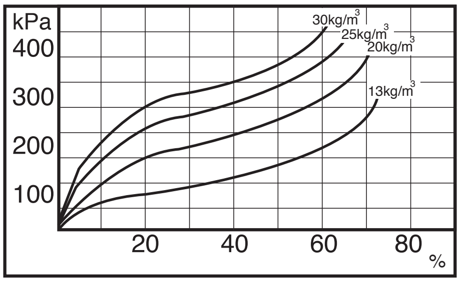

Figure 5: Stress v compressive strain

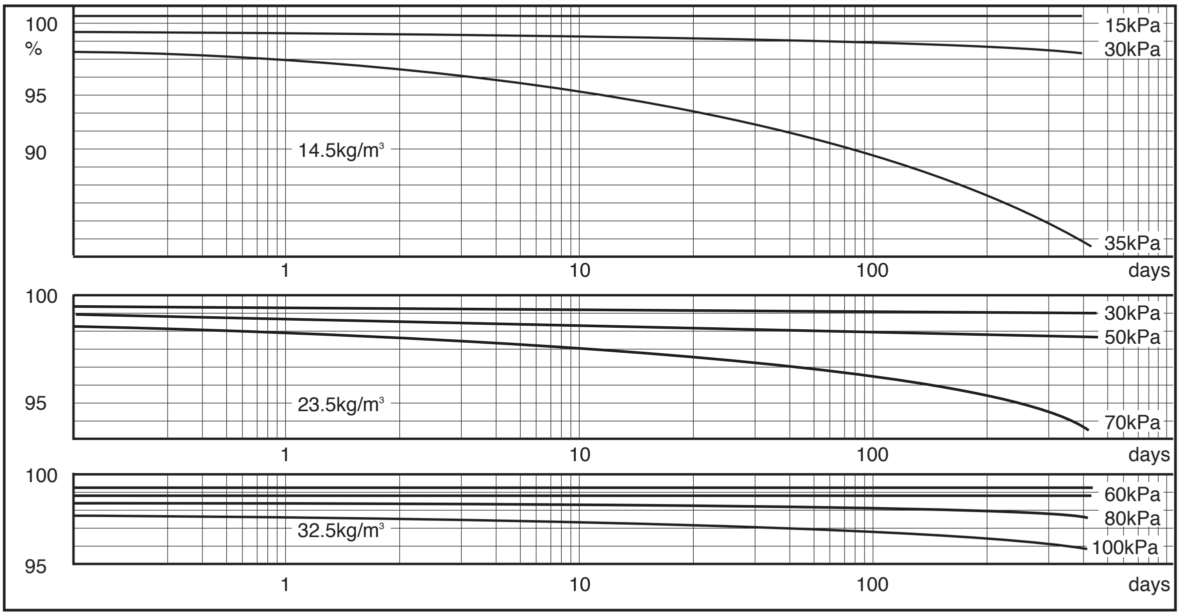

Figure 6: Compressive creep: stress strain curves for extended periods of time

Floatation properties

The density of Isolite® is low compared with water, with a nominal density range from 10 to 25 kg/m³ compared with water at 1000 kg/m³. The water buoyancy per cubic metre of Isolite® is determined by subtracting its kg/m³ density from 1000. The result is the weight in kilograms which a cubic metre of Isolite® can support when fully submerged in water.

Thermal properties

The low thermal conductivity (k value) of Isolite® characterises its exceptional insulating properties. (See Fig.7).

As (Fig.8) shows, EPS has a remarkably high R-value compared with most other insulating materials used in similar applications.

Isolite® EPS gains its thermal resistance from the stabilised air trapped within its cellular structure; it contains no hydrofluorocarbon (HFC) or hydro chlorofluorocarbon (HCFC) blowing agent that might cause depletion of ozone in the upper atmosphere.

Design thermal properties

As AS 1366, Part 3-1992 is a **minimum** conformance standard, the thermal resistances quoted will be achieved, as a minimum, in 97.5% of cases in a statistical sample, when tested at a mean sample temperature of 23ºC.

Thermal resistance varies with mean insulation temperature, where mean insulation temperature is the average of the temperature on either side of the insulation.

For design purposes the average thermal resistance is a better guide than the minimum thermal resistance.

A full listing of design thermal conductivity values for each class of EPS at differing mean temperatures is shown on Table 9.

Low temperature operation

Isolite® does not become brittle at sub-zero temperatures. The testing of specimens at -75ºC for 48 hours demonstrates no loss of impact resistance compared with specimens tested at +23ºC.

Isolite® is able to withstand temperature cycling and thereby assure long term performance without the loss of structural integrity of physical properties; core specimens taken from 20 year old freezer rooms show virtually no deterioration.

Unlike some other insulating materials, the k value of Isolite® decreases at lower average mean temperatures (See Fig.9).

High temperature operation

The effect of elevated temperatures on the mechanical properties is an accelerating decline in the values shown in (Fig.1 to 5) until at approximately 85ºC the so-called zero strength is reached.

Isolite® should not be continuously exposed to temperatures in excess of 80ºC as expansion and blistering may occur.

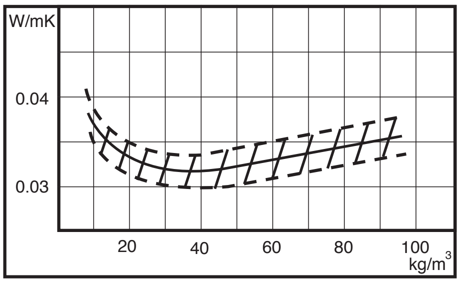

Figure 7: Thermal conductivity (k value) at 10ºC v density

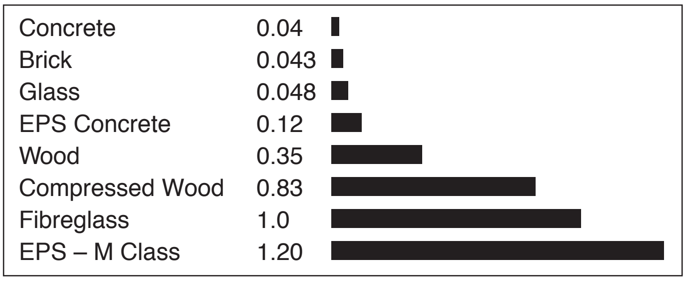

Figure 8: Typical R-values, various insulating materials 50mm thick

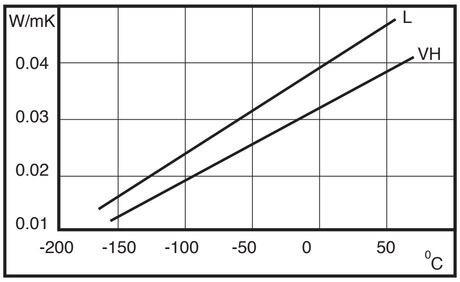

Figure 9: Indicative thermal conductivity v temperature

Table 3: Moisture gain of EPS by liquid water absorption

Time Period	Test Condition	% by volume
1 day	ASTM C-272	2.5
7 days	Submersion	3.0
7 days	10 metre submersion	3.0
90 days	Submersion	6.0
550 days	Submersion	7.8
1000 days	Burial in wetted soil	1.7

Table 4: Typical thermal performance by EPS thickness after vapour induced moisture gain

Moisture Gain (% by volume at 25mm)	R-value retention%			
	25mm	50mm	75mm	100mm
2	96	98	99	99
4	92	96	97	98
6	89	94	96	97
8	86	92	95	96
10	84	90	93	95
12	82	89	92	94
14	80	88	91	93

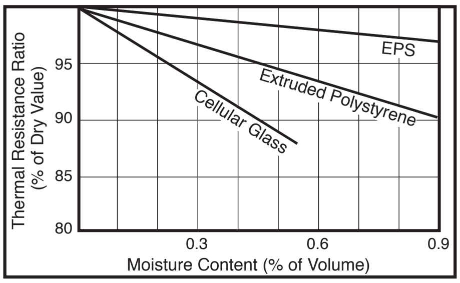

Figure 10: Thermal resistance v moisture content curves for EPS, extruded polystyrene and cellular glass

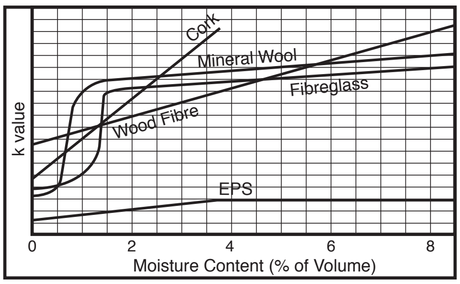

Figure 11: The effect of moisture on k values, various insulating materials

Effect of moisture on thermal conductivity (k value)

The dimensional stability and mechanical properties of Isolite® are not affected by water but because absorbed water will increase the k value, as with all insulating materials, care should be taken in designing insulated structures to take account of water and water vapour that may be present.

While Table 3 shows that certain amounts of water are absorbed by EPS under various conditions, Table 4 demonstrates that the loss of R-values in EPS as a result of this moisture absorption is minimal. Overseas research [Ref(i)] has revealed that the decay in thermal resistance caused by moisture is considerably less for EPS than for either extruded polystyrene foam or cellular glass. (See Fig.10). As with other building materials care should always be taken to keep Isolite® dry before and during installation.

Water vapour transmission properties

Although Isolite® has a low water vapour transmission rate it is not considered a vapour barrier. This breathability characteristic reduces any tendency towards the formation of vapour dams.

As (Fig.11) shows, of all the material used for insulation purposes, EPS is one of the most resistant to the adverse affects of moisture.

In applications where high humidity and high temperature differentials are likely a vapour barrier should be installed. Normally the vapour barrier should be installed on the warm side of the structure with the insulation as near as possible to the cold side.

Acoustic properties

Because Isolite® has a closed cell structure, it offers only a limited absorption of airborne sound. Structure borne sounds, transmitted through such structures as walls and pipes, may be effectively isolated by the use of floating floor systems. For this type of sound insulation, Isolite® with the required dynamic stiffness can be obtained by compressing the sheets by 50 to 60 percent and then allowing them to recover to 80 to 90 per cent of their original thickness.

Chemical properties

Table 5 (next page) shows Isolite® is resistant to virtually all aqueous media including dilute acid and alkalis. In addition, it is resistant to water-miscible alcohols such as methanol, ethanol and i-propanol, and also to silicon oils. Isolite® has limited resistance to paraffin oil, vegetable oils, diesel fuel and vaseline.

These substances may attack the surface of Isolite® after long term contact. Isolite® is not resistant to hydrocarbons, chlorinated hydrocarbons, ketones and esters.

Paint containing thinners and solutions of synthetic adhesives naturally fall in to the same category, and this should be taken into account in any painting or bonding operation.

Anhydrous acids such as glacial acetic acid or fuming sulphuric acid destroy Isolite®.

Prolonged exposure to UV light causes yellowing and embrittlement of Isolite®, which should therefore be protected from direct outdoor exposure.

RMAX® Isolite® expanded polystyrene

Table 5: RMAX Isolite® Chemical Resistance Table

Behaviour of Isolite® at 20°C + = resistant / = limited resistance - = non-resistant

Test Medium		Test Medium		Test Medium	
Acetic acid 50%	+	1,4-Dioxane	-	Petroleum	-
Acetic acid 100% (glacial)	-	Dwarf pine oil	-	Petroleum ether	-
Acetic anhydride	-	Ethane, gas	+	Phenol	/
Acetone	-	Ethanol	+	Phosphoric acid 87%	+
Acetonitrile	-	Ether (diethyl ether)	-	Potassium hydroxide conc.	
Acetonyl alcohol	+	Ethyl acetate	-	(caustic potash solution)	+
Acrylonitrile	-	Ethyl benzene	-	Propane liquid	-
Adhesive, water-soluble	+	Ethylene glycol	+	Propane, gas	+
Allyl alcohol	+	Ethylene oxide	-	i-Propyl alcohol	+
Aluminum acetate solution	+	Fertilizer salts	+	n-Propyl alcohol	+
Ammonia (aqueous)	+	Formaldehyde 30%	+	Propylene	-
Amyl acetate	-	Formic acid	+	Propylene Chloride	-
Amyl alcohol	+	Glycerol	+	Propylene glycol	+
Anhydrite	+	Glycol ether	-	Pyridine	-
Aniline	-	Glycols	+	Sand	+
Animals oils and fats	/	Gypsum	+	Seawater	+
Benzene	-	Heavy gasoline/petrol	-	Silicone oil	+
Benzyl alcohol	-	Heptane	-	Soda solution	+
Bitumen, solvent-free (air-blown)	+	Heptyl alcohol	+	Sodium carbonate	+
Bleach liquor (12% chlorine)	+	Hexachlorocyclohexane	-	Sodium carbonate solution	+
Borax solution	+	Hexane	-	Sodium chloride solution	+
Boric acid solution	+	Humic acide	+	Sodium chromate solution	+
Bromine, liquid	-	Hydrochloric acid up to 35%	+	Sodium hydrosulphite	+
Butadiene	-	Hydrofluoric acid 40%	+	Sodium hypochlorite solution	+
Butane	-	Hydrogen peroxide 3%	+	Sodium hypochlorite solution	+
Butanol	+	Isobutanol	+	(12.5% chlorine)	
Butyl acetate	-	Isopropanol	+	Sodium phosphate solution (dibasic)	+
n-Butyl alcohol	+	Lactic acid	+	Sodium phosphate solution (tribasic)	+
Calcium hypochlorite solution	+	Lanolin	/	Sodium sulphite solution	+
Carbon dioxide, solid	+	Light gasoline/petrol	-	Special boiling point spirits	-
Carbon monoxide	+	Lime	+	Styrene	-
Carbon tetrachloride	-	Lime water	+	Sugar solution 30%	+
Carbonic acid	+	Linseed oil	/	Sulphur dioxide	-
Caustic soda solution	+	Mercury	+	Sulphuric acid 50%	+
Cement	+	Methane, gas	+	Sulphuric acid up to 95%	+
Chlorine water	/	Methanol	+	Tartaric acid solution	+
Chlorofluorocarbons:		Methyl chloride	-	Tetrachloroethane	-
Difluorodichloromethane	-	Methyl ethyl ketone	-	Tetrahydrofuran	-
Difluoromonochloromethane	-	Methyl isobutyl ketone	-	Tetrahydronaphthalene	-
Monoflurotrichlorometha	-	Methyl isopropyl ketone	-	Touene	-
Triflurotrichlorethane	-	Methyl propyl ketone	-	Trichlorobenzene	-
Tetraflurodichloroethane	-	Methylene chloride	-	Trichlorethane	-
Chloroform	-	Milk	+	Trichloroethylene	-
Citric acid	+	Monochlorobenzene	-	Trichlorophenol	-
Cod liver oil	/	Naphthalene (vapour)	-	Tricresyl phosphate	-
Common salt	+	Natural gas	+	Triethylamine	-
Cottonseed oil	+	Nitric acid conc.	/	Triglycol acetate	-
Cyclohexane	-	Nitric acid 30%	+	Turpentine	-
Cyclohexanol	+	Nitrogen	+	Vaseline	-
Cyclohexanone	-	Noble gases	+	Vegetable oils and fats	+
Decahydronaphthalene	-	Olive oil	/	Vinegar, table	+
Dibutyl phthalate		Paints, water-soluble	+	Water	+
Dichlorobenzene		Paraffin oil	/	Water paints	+
Diesel fuel, heating oil	-	Peanut oil	+	Water glass	+
Diethyl ether	-	Pentane	-	Wax (bleached)	+
Diethyl ketone	-	Perchloroethylene		White spirit	-
Diethylene glycol	+	(tetrachloroethylene)	-	Xylene	-
Dimethylformamide	-	Petrol, super grade	-		

Electrical properties

The electrical characteristics of Isolite® (See Table 6) and air are similar. This applies to arc resistance, as well as other electrical properties. The EPS melts about the path of an arc as soon as the arc penetrates it. Dielectric loss of Isolite® is quite low.

Table 6: Electrical properties (Nominal density 16kg/m³)

Frequency Hertz	Dielectric Constant	Dissipation Factor	Loss Factor	Volume Resistivity	Surface Restivity	Dialectric Strength
60	1.19	.0005	.0006			
1000	1.07	.0005	.0006	3.8×10^{13}	9.18×10^{6}	49
1000000	1.02	.0005	.0006			

Flammability properties

Expanded polystyrene products are combustible and should not be exposed to open flame or other ignition sources.

As with all other organic material, insulation products must be considered combustible and to constitute a fire hazard if improperly used or installed. The material contains a flame retardant additive to inhibit accidental ignition from small fire sources. Table 7 shows test results for Isolite® and other common building materials to provide a guide as to how these products compare.

Table 7: Comparative testing of Early Fire Hazard properties for selected materials

Material	Ignitability Index (0 -20)	Spread of Flame Index (0-10)	Heat Evolved Index (0-10)	Smoke Produced Index (0-10)
Isolite® with sisalation 450 facing	0	0	0	0 – 1
Isolite® sandwhich panel faced both sides with 0.65mm steel	0	0	0	0
Isolite® expanded polystyrene	12	0	3	5
Isothane® rigid polyurethane	18	10	4	7
An Australian Hardboard (4.75mm)				
– Bare	14	6	7	3
– Impregnated with fire retardant	0	0	0	7
An Australian Softboard (12.70mm)				
– Bare	16	9	7	3
– Impregnated with fire retardant	4	0	0	7
T&G Boarding (25 x 100mm)				
– Bluegum	11	0	3	2
– Oregon	13	6	5	3
Plywood, Coachwood Veneer (4.75mm)				
– Bare	15	7	7	4
– Impregnated with fire retardant	12	0	3	5

Resistance to fungi and bacteria

Fungus attack has not been observed on Isolite®, and it does not support bacterial growth. Surface spoilage (in the form of spilt soft drink, sugar, etc) can however supply the nutrient for fungal or bacterial growth.

Resistance to ants, termites, rodents and marine borers

Since it has no food value, Isolite® does not attract ants, termites, or rodents, however, it is not a barrier to them. Ants, termites and rodents will chew through Isolite® to reach food or establish a comfortable home.

Marine borers can attack EPS, as they do wood and Isolite® should be protected by an anti-fouling paint over a suitable primer.

Coefficient of linear thermal expansion

The coefficient of linear thermal expansion for Isolite® is 6.3 x 10-5 m/m deg K. It is constant across the range of densities used in Isolite products.

Toxicity

The heat of combustion of solid polystyrene polymer is 40,472 kJ/kg; combustion products are carbon dioxide, water, soot (carbon), and to a lesser extent carbon monoxide.

A CSIRO report [Ref (ii)] comments that the toxicity of gases associated with the burning of EPS is no greater than that associated with timber. Extensive research programs have been conducted overseas [Ref (iii)] to determine if thermal decomposition products of EPS present a toxicity hazard. The test results have revealed that the toxicity of the decomposition products appears to be no greater than for wood and decidedly less than other conventional building products.

Table 8: Maximum toxicity index

Material	Toxicity Index Due to:				
	HCN	CO	CO2	HC1	Total
Acrylic fibre	1.19	0.02	<0.01	–	1.21
Nylon	0.43	0.08	0.01	–	0.52
Wool	0.33	0.04	0.01	–	0.38
PVC	–	0.27	<0.01	0.29	0.36
Urea-formaldehyde foam	0.26	0.01	<0.01	–	0.27
Rigid polyurethane foam	0.05	0.05	<0.01	–	0.10
Polystyrene	–	0.09	0.01	–	0.10
White pine	–	0.09	0.003	–	0.09

Storage and handling

For recommendations on storage and handling Expanded Polsytyrene users should obtain a copy of 'Recommendations for Storage and Handling of EPS' available from any RMAX office.

References

(i) Wayne Tobiasson and John Ricard, US Army Cold Regions Research and Engineering Laboratory, 'Moisture gain and its thermal consequences for common roof insulations'.

(ii) P.R. Nicholl and K.G. Martin, 'Toxicity considerations of combustion products from cellular plastics'.

(iii) H.Th Hofmann and H. Oettel, 'Comparative toxicity of thermal decomposition products'.

Thermal conductivity design values (W/mK) k value

(a) Determine mean temperature of insulation in °C
  To = Temperature on outside surface of insulation
  Ti = Temperature on inside surface of insulation

$$T\ mean = \frac{To + Ti}{2}$$

(b) Select the class of EPS from AS 1366, Part 3-1992

(c) Look up relevant k value in the table for the mean temperature in °C Thermal conductivity quoted in W/mK

Table 9: Thermal conductivity (W/mK) k value

Class – Temperature	L	SL	S	M	H	VH
0	.0398	.0370	.0360	.0349	.0337	.0321
1	.0391	.0372	.0361	.0350	.0338	.0322
2	.0393	.0374	.0363	.0351	.0339	.0323
3	.0394	.0375	.0364	.0353	.0341	.0325
4	.0396	.0377	.0366	.0354	.0342	.0326
5	.0397	.0378	.0367	.0356	.0343	.0327
6	.0399	.0380	.0369	.0357	.0344	.0328
7	.0401	.0382	.0370	.0358	.0346	.0330
8	.0402	.0383	.0372	.0360	.0347	.0331
9	.0404	.0385	.0373	.0361	.0348	.0332
10	.0406	.0386	.0375	.0362	.0349	.0333
11	.0407	.0388	.0376	.0364	.0351	.0335
12	.0409	.0389	.0378	.0365	.0352	.0336
13	.0410	.0391	.0379	.0367	.0353	.0337
14	.0412	.0393	.0381	.0368	.0354	.0338
15	.0414	.0394	.0382	.0369	.0356	.0340
16	.0415	.0396	.0384	.0371	.0357	.0341
17	.0417	.0397	.0385	.0372	.0358	.0342
18	.0419	.0399	.0387	.0373	.0359	.0343
19	.0420	.0401	.0388	.0375	.0361	.0345
20	.0422	.0402	.0390	.0376	.0362	.0346
21	.0423	.0404	.0391	.0378	.0363	.0347
22	.0425	.0405	.0393	.0379	.0364	.0348
23	.0427	.0407	.0394	.0380	.0366	.0350
24	.0428	.0408	.0396	.0382	.0367	.0351
25	.0430	.0410	.0397	.0383	.0368	.0352
26	.0432	.0412	.0399	.0384	.0369	.0353
27	.0433	.0413	.0400	.0386	.0371	.0355
28	.0435	.0415	.0402	.0387	.0372	.0356
29	.0437	.0416	.0403	.0388	.0373	.0357
30	.0438	.0418	.0405	.0390	.0374	.0358
31	.0440	.0419	.0406	.0391	.0376	.0360
32	.0441	.0421	.0408	.0393	.0377	.0361
33	.0443	.0423	.0409	.0394	.0378	.0362
34	.0445	.0424	.0411	.0395	.0379	.0363
35	.0446	.0426	.0412	.0397	.0381	.0365
36	.0448	.0427	.0414	.0398	.0382	.0366
37	.0450	.0429	.0415	.0399	.0383	.0367
38	.0451	.0431	.0416	.0401	.0384	.0368
39	.0453	.0432	.0418	.0402	.0386	.0370
40	.0454	.0434	.0420	.0404	.0387	.0371
41	.0456	.0435	.0421	.0405	.0388	.0372
42	.0458	.0437	.0423	.0406	.0389	.0373
43	.0459	.0438	.0424	.0408	.0391	.0375
44	.0461	.0440	.0426	.0409	.0392	.0376
45	.0463	.0442	.0427	.0410	.0393	.0377
46	.0464	.0443	.0429	.0412	.0394	.0378
47	.0466	.0445	.0430	.0413	.0396	.0380
48	.0467	.0446	.0432	.0415	.0397	.0381
49	.0469	.0448	.0433	.0416	.0398	.0382
50	.0471	.0450	.0435	.0417	.0399	.0383
51	.0472	.0451	.0436	.0419	.0401	.0385
52	.0474	.0453	.0438	.0420	.0402	.0386
53	.0476	.0454	.0439	.0421	.0403	.0387
54	.0477	.0456	.0441	.0423	.0404	.0388
55	.0479	.0457	.0442	.0424	.0406	.0390
56	.0481	.0459	.0444	.0425	.0407	.0391
57	.0482	.0461	.0445	.0427	.0408	.0392
58	.0484	.0462	.0447	.0428	.0409	.0393
59	.0485	.0464	.0448	.0430	.0411	.0395
60	.0487	.0465	.0450	.0431	.0412	.0396

RMAX® Isolite® expanded polystyrene

FAQs

What exactly is Expanded Polystyrene (EPS)?

It is a lightweight cellular material consisting of fine spherical shaped particles which are comprised of 98% air and 2% polystyrene. This air is trapped within a number of closed hollow cells in each particle.

How effective is Isolite® as a thermal insulation material?

Extremely effective essentially because stabilized air is such a good insulator.

The thermal performance of a material is measured in terms of its resistance to the flow of heat. This thermal resistance is expressed in R-values, the higher the number, the better the insulation.

The R-value of the most commonly used Class (Class SL) is 1.13 for every 50mm thickness. Thus, 44mm of this Class of EPS delivers an R-value of 1.0.

Does Isolite® absorb water?

EPS particles are closed cell and cannot absorb water. During the process of moulding a block, tiny channels are formed between the EPS particles. If the material is immersed in water these tiny channels can be filled with water. After immersion for more than 360 days, there may be up to 6% water content by volume which has entered the channels.

Even under such an adverse and rare condition of prolonged saturation, EPS suffers little adverse effect. It maintains its shape, size, structure, cohesion and physical appearance. The ability of EPS to resist the adverse effects of moisture is exemplified by its widespread use in floats, marinas and other applications, which involve full or partial submergence in water for prolonged periods of time.

Does Isolite® have a capillary action?

No. EPS does not have a capillary action. EPS is ideally suited when the insulation material is in contact with the ground.

Isolite® is said to breathe. What does this mean?

The breathability characteristic of EPS refers to its ability to allow any absorbed moisture to escape when conditions change. It therefore reduces any tendency towards the formation of vapour dams.

In applications where high humidity and temperature differentials are likely, a water vapour barrier such as plastic sheeting should be used. The vapour barrier is best installed on the warm side of the structural component, with the insulation as near as possible to the cold side.

Does age affect the thermal performance of Isolite®?

No. EPS consists of 98% air and 2% polystyrene, and nothing else. Because of its cellular structure EPS is dimensionally stable, and will not settle over time. EPS used and installed correctly does not deteriorate with age and as such is able to deliver constant R-values for the life of the building.

Is Isolite® strong?

Yes. EPS is manufactured in a number of classes (or densities), and each class exhibits excellent compressive and flexural strength and dimensional stability characteristics at a very high strength to weight ratio.

The range of classes available enables specifiers to select the most appropriate balance between structural and insulation properties for any building application.

How effective is Isolite® as an acoustic insulation material?

Because EPS has a predominantly closed cell structure, it offers only a limited absorption of airborne sounds.

Is Isolite® resistant to chemicals?

It depends. It is resistant to virtually all aqueous media including dilute acids and alkalis and to methanol, ethanol and silicone oils. See the table of chemical resistance in this brochure.

It has limited resistance to paraffin oil, vegetable oils, diesel fuel and vaseline, which may attack the surface of EPS after long-term contact.

It is not resistant to hydrocarbons, ketones, esters, paints containing thinners, and solutions of synthetic adhesives.

Is Isolite® degraded by ultraviolet light?

Prolonged exposure to sunlight will cause a slight discolouration (yellowing) of EPS insulation and cause some surface embrittlement.

Even so, the thermal insulation properties will not be affected unless exposure results in loss of thickness of the EPS boards, although the friable surface can make bonding difficult. For this reason, EPS insulation should be covered to protect it from UV light if it is to be stored in the open for extended periods.

Is Isolite® durable?

Yes. Because EPS is an inert, organic material, it will not rot and is highly resistant to mildew. It also provides no nutritional value to ants, termites and rodents.

To prevent damage to EPS by pests and insects seeking to gain access to the other materials in buildings which provide a food source, EPS may be coated with a thin cement slurry.

Provided EPS does not suffer mechanical damage or failure of any fittings that may be used, it should have a life equal to that of the building in which it is installed.

Does Isolite® contain CFCs?

No. EPS is chlorofluorocarbon (CFC) and hydro chlorofluorocarbon (HCFC) free.

At no stage during the manufacture or application of EPS is the use of CFCs or HCFCs, or other compounds which are said to contribute to the destruction of the earth's ozone layer, required.

Does Isolite® burn?

Because EPS insulation boards contain a fire retardant additive, they do not present an undue fire hazard when correctly installed.

Like timber, particle board and other organic building materials, EPS will burn when in contact with a flame. Due to the presence of the fire retardant additive in EPS, this flame will self extinguish almost immediately after the fire source is removed.

Does Isolite® give off toxic fumes?

The level of toxicity of EPS in a fire situation is no greater than that of timber and other commonly used building materials; the same toxic gas, carbon monoxide is produced. Also produced are carbon dioxide and soot (carbon). There is no emission of such gases as hydrogen cyanide or hydrogen chloride.

Where can Isolite® be used in building construction?

In almost any application where insulation or a combination of insulation and strength are required.

As an insulation material, it is used in a number of roof, wall, ceiling, and sub floor systems ...often in combination with other materials such as steel (in sandwich panels commonly used for cold store construction), concrete (as an insulation core in tilt up wall panels) and gypsum and plasterboard (as skins for ceiling panels and other prefabricated components).

Is Isolite® subject to Australian Standards?

Yes. Manufacturers when stating the class of EPS and therefore its physical characteristics are required to manufacture to AS 1366, Part 3-1992. As such, the properties of EPS required for a particular application are guaranteed. Where the densities exceed the AS1366, Part 3-1992 grade levels RMAX has measured the properties and provides specification sheets for these high density grades.

Is Isolite® cost effective compared to alternative insulation?

Because of the high level of versatility of EPS and the wide range of applications for which it is suitable, its cost effectiveness compared to alternative materials can generally be accurately assessed only on a case by case basis.

In many applications however, particularly where an element of structural strength is required, EPS is the most cost effective insulation material available.

EPS (expanded polystyrene) is the only insulation material that in practical, economic and efficiency terms can be applied to all areas of building constructions – ceilings, roofs, walls, floors and under slab – to provide superior standards of thermal insulation. That's why EPS is the ultimate insulation.

RMAX Environmental EPS

RMAX and the Environment

EPS (Expanded Polystyrene) is highly energy efficient. The energy saved over the lifetime of an EPS insulation panel in reduced heating demand, more than compensates for the raw material used in its production.

The effective application of EPS insulation can cut carbon dioxide emissions by up to 50%. The energy used in its manufacture is recovered within six months by the energy saved in the buildings when EPS is used to insulate the building.

RMAX EPS products do not contain ozone depleting substances and none is used in its manufacture.

RMAX promotes the use of EPS, with its superior thermal insulation properties, for the construction of buildings to lower energy requirements and reduce the impact of new buildings on the environment.

RMAX EPS is free from ozone depleting substances in manufacture and composition. EPS is made without CFCs, HCFCs or HFCs. Manufacturing is done with blowing agents that have Zero Ozone Depleting Potential (ODP).

Recycling EPS

EPS products are recyclable and RMAX has established recycling facilities in all of its plants throughout Australia. RMAX is a member of PACIA (Plastics and Chemical Industries Association).

Energy Efficient Manufacture

The manufacture of EPS is a low pollution process. Steam is the key ingredient and the water is used many times. There is no waste in production as all off cuts or rejects are re-used.

RMAX – Innovation Working for You

RMAX is a company driven by innovation. We have pioneered Rigid Cellular Plastics product technologies, leading the development of innovative product solutions for our customers and international partners.

We are committed to working with our customers to deliver high quality creative solutions to construction problems. Contact us and see how our innovative approach using EPS in building construction can help you.

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