KEDEL
ECO-FRIENDLY PLASTIC PRODUCTS

01282 861325

MECHANICAL PROPERTIES OF KEDEL'S EXTRUDED STYRENE STRUCTURAL FOAM

PROPERTIES	TEST METHOD	RESULTS	REMARKS
Tensile strength MPa	ISO 527	30.0	-
Elongation at break %	ISO 527	2.5	
Modulus of Rupture MPa	BS 373	59.8	3 point bending
Modulus of elasticity MPa	BS 373	2430.0	-
Stress at proportional limit MPa	BS 373	50.5	-
Compression strength parallel to grain MPa	BS 373	56.7	-
Compression strength perpendicular to grain MPa	BS 373	20.7	-
Screw retention kN	BS 6984	2.5	1.5 inch No 6 screw 22mm depth
Nail retention kN	BS 6948	0.88	2.5 x 38mm wire nail, 22mm depth
Impact strength kJ/m2	BS 373	0.85	3 point bending
Impact height M	BS 373 BS 373	0.66 0.38	For 20 x 20, span 280mm, tup 3.3 lb For 24 x 28, span 280mm, tup 4.4kg.
Water absorption %	ISO 82	0.14	40 x 40 x 7.5
Coefficient of thermal expansion 1/°C	DIN 62-53491	5 X 10 -5	-
Toxic Gas Factor - Only two detected from eight tested	SNES 714CO2, CO, HCI, HCN, H2SSO2, NOX, AMMONIA	0.7 2.6	Carbon dioxide Carbon monoxide 0 - 3 low toxicity
Classification of flame spread	BS 476	Class 1	-
UV stability	ASTM E383-B	Good	No change in mechanical strength 375MJ/m2
Vicat softening point	ISO 306	91oC	-

Density g/cc	-	0.56	-

PROPERTIES OF KEDEL'S EXTRUDED STYRENE STRUCTURAL FOAM - COMPARED WITH TIMBER

PROPERTIES	STRUCTURAL FOAM	BEECH	DOUGLAS FIR
DENSITY g/cc	0.56	0.64	0.48
ELASTIC MODULUS MPa	2430	11900	13400
RUPTURAL MODULUS MPa	59.80	103.00	85.00
WORK TO MAXIMUM LOAD KJ/M3	101	104	68
TENSILE STRENGTH MPa	30.00	7.00	2.30
COMPRESSION STRENGTH (parallel) MPa	56.70	24.50	49.90
COMPRESSION STRESS AT PROPORTIONAL LIMIT (perpendicular to grain) MPa	20.70	3.70	5.50
IMPACT HEIGHT TO CAUSE FAILURE (22.7kg tup dropped on 2" x 2" and 28" span) M	0.70	1.04	0.79

SAFETY DATA SHEET

Product:	**Extruded Styrene Foam**

1. Identification of Substance/Preparation and Company

Product name:	Synthetic Wood
Product type:	Polystyrene Foam
Supplier:	Kedel Limited
Address:	Daisy Mill (Gate 3) Unit B, Daisy Street, Waterside, Colne, Lancashire, BB8 8ER

2. Composition/ingredients

Substance:	**Styrene homopolymer** - CAS NO. 9003-53-6 **Talc** - CAS no. 14807-96-6 **Impact Modifier** - Polystyrene component CAS No. 9003-53-6 - Rubber component CAS No. 25038-36-2 **EPS** - CAS No. 9003-53-6 Polystyrene CAS No. 109-66-0 Pentane

	UV Stabilisers - CAS no. 2440-2-4 - CAS No. 52829-07-9 - CAS No. 2082-79-3

3. Hazards Identification:

Human health hazards:	Not classified as dangerous under EC criteria
Safety hazards:	Not classified as dangerous under EC criteria
Environmental hazards:	Not classified as dangerous under EC criteria

4. First Aid Measures:

First Aid - inhalation:	No specific measures
First Aid - eye:	Flush eye with water
First Aid - ingestion:	No specific measures

5. Fire Fighting Measures:

Specific hazards:	Carbon monoxide may be evolved if incomplete combustion occurs.
Extinguishing media:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media:	Water in a jet
Protective equipment:	Full protective clothing and self-contained breathing apparatus.

6. Handling and Storage:

Handling:	• Avoid contact with heated or molten product. • Do not breath dust or fumes or vapours from heated product. • Avoid generation or accumulation of dusts • Take precautionary measures against static discharges • Earth all equipment
Storage:	Must be stored internally
Storage temperatures:	Ambient
Product transfer:	No special measures

7. Exposure Controls/Personal Protection:

Occupational exposure limit:	No special requirements
Respiratory protection:	Not normally required. If risk of dust inhalation wear general purpose dust respirator
Hand protection:	No special requirements

Eye protection: Goggles:	when cutting or working material
Body protection:	Standard issue work clothes and safety shoes.

8. Physical and Chemical Properties:

Physical state:	Solid
Colour:	Various to suit requirements
Odour:	Odourless
Density:	Circa 0.5 to 0.65
Softening point:	91oC ISO 306
Flash point:	> 250oC
Solubility in water:	Insoluble

9. Stability/Reactivity:

Stability:	Stable
Conditions to avoid:	None known
Hazardous decomposition products:	None known

10. Toxicological Information:

Basis of assessment:	Information given is based on knowledge of the constituents and the toxicology of similar substances.
Acute toxicity - oral:	LD50:> 2000 mg/kg
Acute toxicity - dermal	LD50: >2000 mg/kg
Eye Irritation:	Not irritating
Skin Irritation:	Not irritating
Skin Sensitisation:	Not a skin sensitiser

11. Ecological Information:

Basis for assessment:	Information given is based on knowledge of the constituents and the ecotoxicology of similar substances.
Mobility:	Floats in water
Persistence/degradability:	Not readily biodegradable
Bioaccumulation:	Does not bioaccumulate
Ecotoxicity:	Not toxic at the limit of water solubility
Sewage treatment:	Not toxic at the limit of water solubility

12 Disposal Considerations:	
Product disposal:	Recover or recycle if possible. Otherwise incineration
Local legislation:	Not classified as chemical waste

13. Transport Information:	
	Not dangerous for conveyance under UN, IMO, ADR/RID AND IATA/ICAO codes.

NOTE: This information is based on our current knowledge and is intended to describe the product for the purpose of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Working with Kedel's Polystyrene Synthetic Wood

1.0 STORAGE

It is important to ensure that Kedel's Polystyrene Synthetic Wood is stored inside and is not exposed to direct sunlight or excessive temperatures (e.g. close to boilers etc).

If the product has been stored in a warehouse, it should be moved to the working area at least 24 hours prior to commencement of final cut.

1.2 GENERAL

Kedel's Polystyrene Synthetic Wood materials have many similar properties to various natural timbers when tested in the 'as made' condition. This means that some methods used for fabricating with wood can also be employed with Kedel's Polystyrene Synthetic Wood, making it an extremely versatile material. It must be noted that modifications to the cutting tools/blades may be necessary to ensure optimum cut/joint.

It is also important to remember that fixing used longitudinally to any profile will be weaker than those in a transverse direction.

It is recommended that all fixings are made from stainless steel/brass or are plated so as to retain the integrity of a long life, rot free maintenance free system or product.

2.0 GENERAL MACHINING

It is important that all drills, tools and cutters used to drill, cut or machine Kedel plastic wood are kept very sharp. Blunt tools will accelerate generation of heat, which in turn will lead to softening, and melting of Kedel's Polystyrene Synthetic Wood. Cutting tools must be selected which ensure swarf is removed immediately. Any build up of swarf will give heat generation and melt around the tool.

2.1 SAWING

Circular blades with tungsten carbide tipped blades, with a tooth pitch used for soft woods (i.e. 1-3 open type teeth per inch cross cut with positive cant) have been found to be most suitable for use with Kedel's Polystyrene Synthetic Wood. Saw speed should be

between 2,000 and 4,000 rpm and the blade should be passed through the profile as quickly as possible to avoid heat generation, whilst maintaining a quality cut.

Sawing must always be done from the presentation face to cut through to the back face of the profile. Cutting through the back face to the front face will cause chipping which is difficult to dress out. Saw blades should be sprayed with silicone lubricant or lubricating grease to reduce friction.

2.2 DRILLING

Twist drills are the most suitable for Kedel's Polystyrene Synthetic Wood but speeds and feeds must be controlled to avoid melt of the swarf and clogging. Cordless drills with speeds of 400 - 900 rpm are preferred to high-speed drills. Titanium nitride coasted bits minimise the risk of this problem (e.g. Those supplied by Dormer etc.). Holes should be a minimum of 10mm from the profile edge.

2.3 PLANING

Whilst Kedel's Polystyrene Synthetic Wood can be planed, sometimes to pleasant cosmetic effect, the practise is not recommended because of reduction in strength, which will result from the loss of the outside skin. Asymmetrical removal of the outer skin is likely to cause bow and twist in the section.

2.4 ROUTING

Small longitudinal rebates may be routed but it is not recommended that the base of such slots incorporate radii corners. To rout the groves, standard sharp tungsten carbide tipped blades running at up to 22,000 rpm should be used. Spray silicone on blades and router bed. For routing depths in excess of 20mm, it is recommended that an air blast be used to clean the bit. For cross cutting, again standard tungsten carbide tipped saw blades should be used.

3.0 JOINTING AND FIXING

The type of jointing method to be used with Kedel's Polystyrene Synthetic Wood will depend on the application of the product and duty of the joint. It is likely that ajoint may often incorporate more than one method of fixing. Finger type and mortice and tenon type joints can be made, using standard wood working machinery, with the appropriate cutters, then glued. (See 3.3)

3.1 SCREWING

Twinflight, parallel thread, coarse pitch screws similar to those used with wooden particle boards or hi-low screws have been found to be more suitable for use with Kedel's Polystyrene Synthetic Wood than conventional taper thread woodscrews. The greatest strength is achieved when screws are inserted at right angles to the extrusion axis. Care must be taken to avoid stripping threads when driving screws in the direction of extrusion. This risk can be overcome by using torque limiting power drills and screwdrivers.

3.2 NAILING / PINNING / STAPLING

Nailing is not recommended for joining two or more pieces of Kedel's Polystyrene Synthetic Wood. If this type of fixing is required, e.g. to hold materials in place whilst

glue sets, then panel pins should be used. Drilling pilot holes may be necessary to avoid splitting depending on the thickness and density of the material. Stapling has been found to be an effective method of joining thinner sections of low density Kedel Polystyrene Synthetic Wood. Pneumatically powered guns should be used on these types of fixings.

3.3 SOLVENT FUSION / GLUING

Polystyrene cement manufactured by Stelmax Limited has been found to be excellent for 'cold solvent fusion' of Kedel's Polystyrene Synthetic Wood. The use of double sided tape is also possible, this being dependent on the bonding surfaces and grade of tape. Details of applications and recommendations are available on request.

3.4 HEAT FUSION WELDING

Kedel's Polystyrene Synthetic Wood can be 'hot welded' (hot plate welding) satisfactorily using machines employed for hot welding profiles.

Such machines incorporate thermostatically controlled PTFE coated heating plates, which are used to heat the surfaces to be joined. When the requisite temperature has been attained (180 - 220 c), the two surfaces are brought together and held under pressure so that they fuse together.

Some experimentation will be necessary to cover length loss due to melt back.

4.0 SURFACE FINISHING

In the event of any rough edges, use triple '0' steel wool and a soft wax such as beeswax.
The final finishing serves three purposes:
1) It removes the roughness and sharp edges on routed slots.
2) Produces an aesthetically appealing product.
3) End grain surfaces can also be sealed using a soft wax and buffing.

4.1 CLEANING

This must be done using a dilute detergent solution. Solvents must not be used.

All the information provided is for guideline use, for further in-depth technical advice, please contact our research & development team. Tel: 01282 861325