

PRODUCT NAME

Constrained Boundary Multimodulus (CBM) loudspeaker cabinet material

MANUFACTURER

US Enclosure Company

PRODUCT DESCRIPTION

CBM is an advanced composite Wall for loudspeaker cabinets.

The Wall's Inner Core:

Contains 25% or more air by volume to primarily cushion sonic impact, insulate thermally, and provide high stiffness-to-weight over materials in composite components. Outside of the loudspeaker cabinet application, an additional important future application is in bumper cores for automobiles. A 4-in.-thick section of foam at 2 to 4 lb/ft³ can absorb the energy of a 5-mph impact.

The Wall's Outer Layers:

The outer material is known for its high-molecular-weight which offers outstanding toughness and durability. The material easily produces large, complex-shaped products which meet DoT and OSRA and PE-3408, currently the highest strength rating specifications.

This material has outstanding abrasion resistance and a low coefficient of friction. Impact strength is high, and chemical resistance is excellent. The material does not break in impact strength tests using standard notched specimens; double-notched specimens break at 20 ft-lb/in. The material resists chemical attack and staining and is unaffected by aqueous solutions of inorganic salts or mineral acids and bases, even at high temperatures. It is not attacked by most organic chemicals, and there is no solvent for the resin at room temperature. This resin can be attacked, however, by halogens, fuming nitric acid and other active oxidizing agents, and by aromatic and chlorinated hydrocarbons at high temperatures.

COMPOSITION

CBM is a solid, non-porous material homogeneously composed of US Enclosure proprietary composite materials

COLORS

Almost unlimited working palette using dyes incorporated during manufacture.

PERFORMANCE PROPERTIES

Typical performance properties of CB Multimodulus are shown in Table 1

CBM surfaces are very resistant to impacts, gouging, etc. CB Multimodulus is an inert and non-toxic material. Under normal temperature conditions found inside loudspeaker cabinets, it does not emit gases. When burned the smoke generated is optically light and does not contain toxic halogenated gases. Because of these properties, CBM can be used in public spaces.

FACTORY REQUIREMENTS

Sealants and adhesives are compatible with CBM Multimodulus.

MAINTENANCE for Unpainted, factory-colored CBM.

Avoid prolonged exposure to strong chemicals such as acids, bases, and organic solvents. Spills should be cleaned up promptly. Refer to attached Table 2 for additional details regarding chemical exposures, clean up, and general maintenance. CBM Multimodulus is not hazardous by OSHA Hazard Communication definition

LEGAL

This information corresponds to our current knowledge on the subject.

It is offered solely to provide possible suggestions for your own experimentation. It is not intended however to substitute for any testing you may need to conduct to determine for yourself the suitability of our product for your purpose. This information may be subject to revision as new knowledge and experience becomes available, since we can not anticipate all variations in actual end-use of this information and product.

TABLE 1
Figures may be median result

Property	Typical Results	Test Method for Results
Density of Constrained Boundry Layer Wall Loudspeaker Enclosure	45 pounds per cubic foot .6887938 grams per cubic cm Specific Gravity .688	ASTM D-792

Outer Layer Density is 59 pounds per cubic foot / 0.9390 grams per cubic cm; specific gravity is .939. Thus the outer Layer is similar to MDF but can be shaped into any design and has the benefits of a constrained boundary layer. Inner layer density is about 10 pounds per cubic foot.

NOTE: The following are for the solid material. The constrained boundry layer construction vastly improves some of these values.

Physical Property	Typical Value / Unit	Test Based On:
Yield Tensile Strength	20 MPA	ASTM D-638
Tensile Modulus	287 MPA; 41,615 psi	ASTM D-638
Flexural Modulus 1% Secant	613 MPA, 89,000 psi	ASTM D-790
Flexual Strength	197 MPA	ASTM D-790
IZOD Impact	No Break J/M	ASTM D-4020
Impact Strength	145 ft-ibs	ARM @ -40C, ¼" thick
Tensile Impact	843 kJm ²	DIN 53448
Enviromental Stress Crack	> 500 Resistance, F50, Condition B	ASTM D-1693
Temperature Heat Distortion	66 psi at 53C	ASTM D-648
	264 psi at 40C	ASTM D-648
Melting Point	127 C	
Hardness	93 Shore D	ASTM D-2240
Linear Expansion	20 C x 10 – 5	
Elongation at Break	765	ASTM D-638
Strain at Yield	20%	
Flammability	HB	UL 94
Volume Resistivity	16 log, ohm cm	ASTM D-257
Dielectric Strength	25 MV/m	ASTM D-257
Dissipation Factor	0.00003 1 khz	ASTM D-257
Dielectric Constant	2.3 1 khz	ASTM D-257
HDT	45 @ 0.45 Mpa degrees C	

All physical properties were measured on specimens using our manufacturing method.

Values given above are typical and should not be used as specification limits.

Tensile testing was conducted at 50 mm/minute crosshead speed. Reported tensile strength refers to the maximum load reached during test.

TABLE 2

In general, resistant to non-oxidising alkalis, aqueous solutions of inorganic salts, mineral acids and bases even at high temperatures, organic solvents excluding chlorinated hydrocarbons. **Excellent resistance** (no attack) to dilute and concentrated Acids, Alcohols, Bases and Esters. **Good resistance** (minor attack) to Aldehydes, Ketones and Vegetable Oils. **Limited resistance** (moderate attack suitable for short term use only) to Aliphatic and Aromatic Hydrocarbons, Mineral Oils and Oxidizing Agents. **Poor resistance** and not recommended for use with Halogenated Hydrocarbons, fuming nitric acid or other active oxidizing agents or aromatic or chlorinated hydrocarbons at high temperatures.

HAZARD IDENTIFICATION:

NFPA Code: Fire 1, Health 1, Reactivity 0

HMIS Code: Fire 1, Health 0, Reactivity 0

CB Multimodulus is not hazardous by OSHA as shipped. However, operation such as sawing, routing, drilling and sanding can generate dust. High concentrations of dust can irritate eyes, nose, and respiratory passages and cause coughing and sneezing. Since no exposure limits are established for CB Multimodulus dust, US Enclosure recommends using common sense. CBM does not outgas at room temperatures. At higher temperatures, small amounts of solvents may be released, the amounts of which are dependant upon temperature, time, and other variables. Individuals with preexisting diseases of the lungs or skin may have increased susceptibility to the effects of overexposure. Carcinogenicity Information: None of the components present in this material at concentrations equal or greater than 0.1% are listed by IARC, NTP, OSHA, or ACGIN as a carcinogen.

FIRST AID MEASURES:

First Aid

Inhalation: No specific intervention is indicated as the compound is not likely to be hazardous by inhalation. However if large amounts of dust are inhaled, or if exposed to fumes from overheating or combustion, remove to fresh air. Consult a physician if breathing is difficult or if the symptoms persist.

Skin Contact: CB Multimodulus is not likely to be hazardous by skin contact but cleansing the skin after use is advisable.

Eye Contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Ingestion: No specific intervention is indicated as CBM is not likely to be hazardous by ingestion. Consult a physician if necessary.

FIRE FIGHTING MEASURES

Flammable Properties:

CB Multimodulus can be combusted only with difficulty. Autoignition near 700 degrees F

Hazardous gasses/vapors produced in a fire:

Carbon, Carbon Monoxide, Carbon Dioxide, H₂O liquid and vapors, possible Aldehydes and Alkanes including Acrolein and Formaldehyde.

Extinguishing Media:

Water, Dry Chemical, CO₂, Foam.

Fire Fighting Instructions:

Standard procedure for Class A fire. Keep personnel removed and upwind of fire. Wear self-contained breathing apparatus. No unusual fire or explosion hazards.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel): NOTE: Review Fire Fighting Measures and Handling (Personnel) sections before proceeding with clean-up. Use appropriate Personnel Protective Equipment during clean-up. Spill Clean-Up: Recover undamaged material for reuse and damaged material for reclamation. Avoid generating dust. Material can make walking hazardous.

HANDLING AND STORAGE

Handling (Personnel): Avoid breathing dust. Avoid breathing trapped residue fumes from manufacturing outgassing. Machining operations such as sawing, sanding or routing create friction and may result in temperatures high enough to release small amounts of fumes at the cutting tool surface.

EXPOSURE CONTROLS/PERSONNEL PROTECTION

Engineering Controls: Use ventilation that is adequate to keep employee exposure to airborne concentrations below recommended limits. Provide appropriate exhaust ventilation and dust collection at machinery.

Personal Protective Equipment: Eye/Face: Wear safety glasses during operations such as sawing, sanding, drilling or routing. Respirators: During grinding, sanding or sawing operations, if airborne particulate concentrations are expected to exceed permissible exposure limits, use a half face NIOSH approved air purifying respirator with type N100 filter. Respirators should be selected based on the form and concentration of the contaminant in air and in accordance with OSHA Respiratory Protection Standard CFR 1910.134. OSHA permissible exposure limit is 15mg/m³ Total Dust, 5 mg/m³ Respirable Dust. ACGIH Threshold limit value is 10 mg/m³.

Protective Clothing: Wear leather or cotton gloves when handling large pieces and during operations such as sawing, routing or drilling.

PHYSICAL AND CHEMICAL PROPERTIES

% Volatiles: 0 % at room temperature.
Solubility in Water Insoluble
Form Shaped Articles
Specific Gravity 0.68879

STABILITY AND REACTIVITY

Chemical Stability: Stable at room temperatures and storage conditions

Incompatibility with other materials: None reasonably foreseeable except 50%+ fluorine oxygen atmospheres or other strong oxidizing agents.

Decomposition: Thermal decomposition can release C, CO, CO₂, H₂O liquid and vapors, Olefinic and Paraffinic compounds, trace amounts of organic acids, ketones, alcohols, and possible Aldehydes and Alkanes including Acrolein and Formaldehyde.

Polymerization: Polymerization will not occur.

ECOLOGICAL INFORMATION

Ecotoxicological Information Aquatic- toxicity is expected to be low based on insolubility in water.

DISPOSAL CONSIDERATIONS

Waste Disposal Preferred options for disposal are (1) recycling, (2) incineration with energy recovery, and (3) landfill. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

TRANSPORTATION INFORMATION

Shipping Information DOT Not Regulated

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