SolutionPartner

Expandable Polystyrene

LG Chem
LG Polymers India

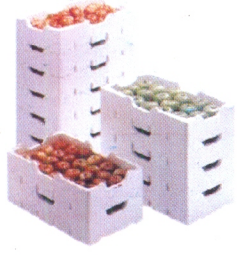
Wide range of Applications

Sheets

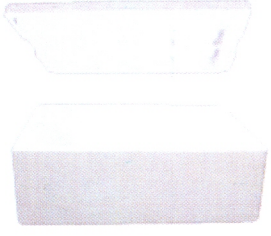
Bean Bags

Carvings & Garlands

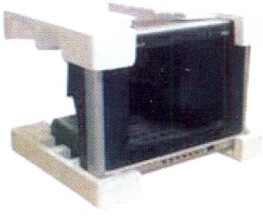
Cups



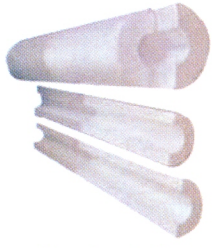
Food Packaging



Fish Box

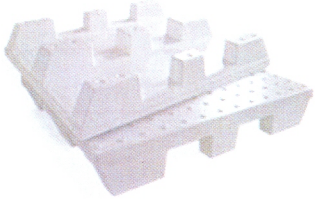


Packaging

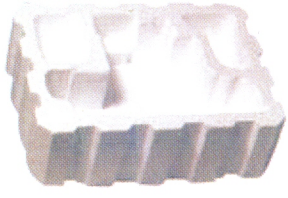


Pipe Insulations

Helmets

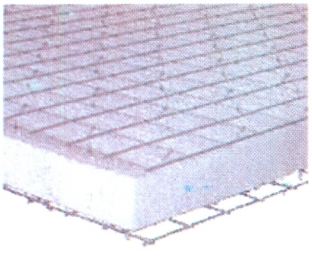


EPS Pallets



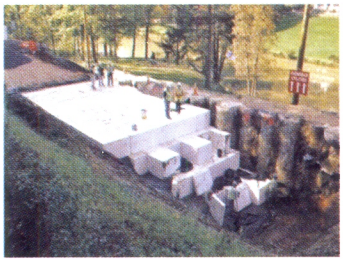
Shape Molding

Construction Applications



3D-Panel

Sandwich Panel



Roads

EPS Grades & Applications

General EPS grades			
Grade	**Bead Size Range Dia (mm)**	**Recommended Density (g/l)**	**Major Applications**
LGE – 121	1.4 - 2.5	16.0	Low density blocks , Garlands, Decorative beads , Bean Bags.
LGE – 221	1.0 - 2.0	15.0	Low density blocks, Floats.
LGE – 321	0.9 - 1.2	15.0	Medium density blocks, Low density thick wall Shape Moldings, Cold storage insulations.
LGE – 325	0.6 - 1.2	16.0	Medium / High density blocks , Shape Moldings.
LGE – 422	0.6 - 1.0	16.0	Medium wall thickness Shape Moldings, Fish boxes
LGE – 422LD	0.6 - 1.0	15.0	Low density blocks.
LGE – 522	0.4 - 0.7	20.0	Thin wall Shape Moldings, High density blocks.
LGE – 522LD	0.4 - 0.7	18.0	
LGE – 624	0.3 - 0.5	45.0	Thin wall disposable cups and trays.
Self Extinguishing Grades (Test Procedure:- IS 4671 Standard)			
LGE – 255 SE	1.0 - 2.0	16.5	Self extinguishing insulations.
LGE – 355 SE	0.9 - 1.2	17.0	
LGE – 455 SE	0.6 – 1.0	18.0	
LGE – 555 SE	0.4 - 0.7	22.0	Self extinguishing Shape Moldings.

LD - Low Density, SE - Self Extinguishing

Recommended Density – 1st Pass Pre-expansion.

Influence of Ambient / Seasonal Effects

Coastal Areas - High relative humidity in air, needs longer maturation time

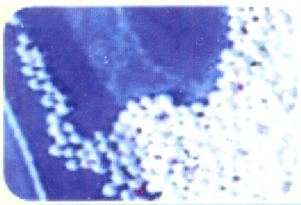
Non Coastal Areas

Summer - High temperatures, Shorter maturation time

Winter - Low temperature, Longer maturation time

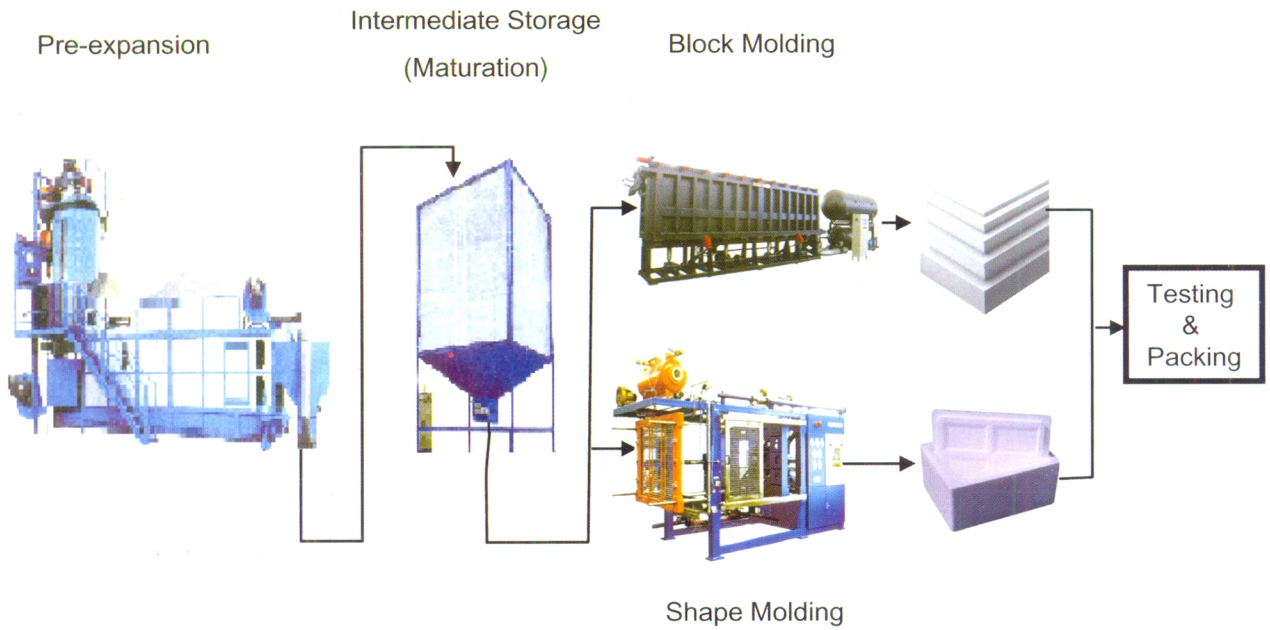
Note

1) *The values mentioned in above table are obtained during pre-expansion under specific conditions and are only for reference.*
2) *Information contained in this publication is true & accurate at the time of publication & to the best of our knowledge. LGPI does not accept any liability whatsoever arising from the use of this information or application or processing of any of the products described here in. Information published here cannot be considered as a suggestion to infringe the patents.*

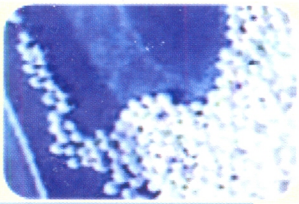


Expandable Polystyrene (EPS) is a lightweight, rigid Cellular Plastic that is made from Suspension Polymerization of Styrene Monomer. The Polymerization process produces translucent spherical beads.

EPS Processing - Flow Diagram



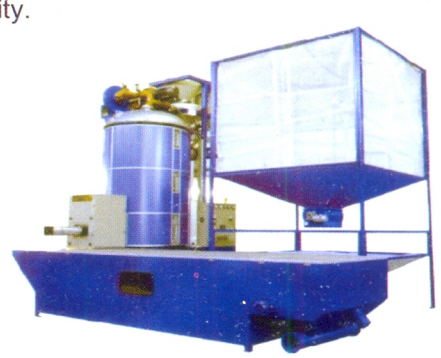
EPS beads when exposed to steam above 90 °C, expand around 40 times of their original volume. These expanded beads are allowed to mature before moulding into blocks or shapes. The moulded product is a closed cell Polystyrene foam which is strong, solid and light weight.



LGPI-EPS is supplied in 25 kg HDPE bag with multi layer liner inside. The material should be stored at temperatures < 25° C for a longer shelf life. Once opened, the material should be used within a day. At higher temperature there is a considerable loss of blowing agent, resulting in gradual deterioration of processing performance, thus raising the minimum achievable density.

Pre - Expansion

Pre - expansion of beads is carried out in a continuous or batch Pre-expander with the help of dry saturated steam. Blowing agent impregnated, expand the beads to 40 times of their original volume on heating. Pre-expansion is done at 95 - 97 °C temperature.



Maturation

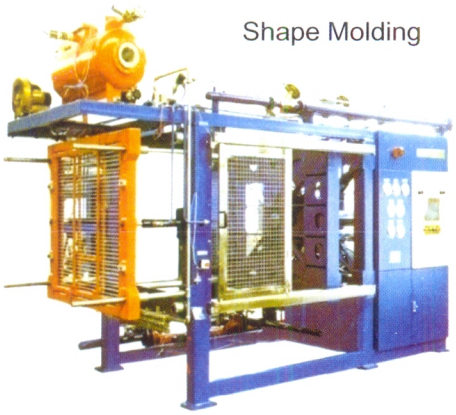
Pre-expanded EPS beads are never completely dry on leaving the Pre-expander since a small quantity of steam condensates on the bead.
Since a part of blowing agent escapes out of the bead after expansion, voids will be formed in the expanded beads.
To ensure free access and rapid diffusion of air into these voids, Pre-foamed beads are to be dried immediately after leaving the Pre-expander and allowed to mature. Drying can be done either in open air or in a fluidized bed dryer using warm air.

Moulding

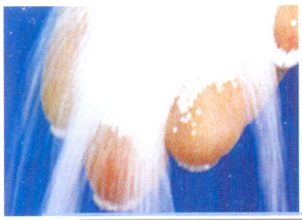
In the final stage of EPS processing, Pre-expanded beads are further processed for use in:

Block Molding

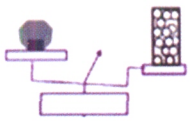
Shape Molding



Specialty thin-walled disposables



Handling and storage



- Should be stored in dry & well ventilated environment at temp < 25 °C, away from heat / hot surface to avoid pre puff formation.
- Packed material must not be exposed to direct Sunlight or for long periods to in-direct sunlight and must be protected from mechanical damage.
- At higher temperatures (> 25 °C) there is a loss of blowing agent which results in higher density.
- The storage areas should be provided with ventilation ports, protected with a mesh to avoid entry of rodents located at the lower most (Blowing agent used is heavier than air, will settle at bottom).
- If the storage temperature exceeds the recommended level, processing performance will gradually deteriorate and the minimum achievable density of moulded product will increase. Density will also be governed by the storage time - longer storage time gives higher density.
- Smoking, exposure to naked light and welding in the proximity is forbidden.
- Keep away from Fire and Sparks.
- Proper earthing to be provided for all equipment & conveying lines to avoid fire accidents due to **Static charge.**

Properties

Property	Units	Results		
Density range	g/l	15 - 20	20 - 25	25 - 30
Flexural Strength	kg/cm^2	2.0 - 2.5	2.5 - 3.0	3.0 - 4.0
Compressive Strength	kg/cm^2	0.8 - 1.0	1.0 - 1.6	1.6 - 2.0
Thermal Conductivity	w/m^{o}K	0.031 - 0.034	0.030 - 0.031	0.029 - 0.030
Melting range	^{o}C	100 - 120		
Self ignition point	^{o}C	300		
Water absorption				
1 day	Vol %	0.2 - 0.5	0.2 - 0.4	0.2 - 0.4
7 day	Vol %	0.3 - 0.8	0.3 - 0.7	0.3 - 0.7
240 days	Vol %	2.0 - 4.0	2.0 - 3.0	2.0 - 3.0
Appearance	-	Translucent solid beads		
Self Extinguishing Property for SE Grades	-	Self Extinguishing (as per IS 4671)		

** The values mentioned in above table are obtained by the specimens made under specific conditions and are only for reference.*

Trouble shooting

Pre - Expansion

Problem	Cause	Remedy
Lumping	• Steam temperature too high • Blowing agent loss – due to prolonged / improper storage • Residence time too long • Ineffective steam distribution	• Reduce Steam Pressure / Temp • Try fresh material / improve the storage condition • Reduce the take off height • Clean steam distributor
Bead Shrinkage	• Steam temp. / Pressure too high • Feed rate less • Residence time too high • Less Blowing Agent • Air drier temperature too high	• Decrease steam pressure • Increase feed rate • Reduce the take off height • Try fresh material • Dampen the air pressure
Prefoam too wet	• Wet Steam • Excessive steam condensation	• Insulate steam lines, ensure steam traps are working • Check steam supply
Density Increase during Pre-expansion	• Low Steam Pressure • Wet steam • High feed rate • Low take off height	• Increase steam pressure • Drain the condensate • Optimize feed rate • Increase take off height
Density Increase In Silo	• Sharp bends in conveying lines • Conveying air velocity high/cold	• Eliminate / reduce sharp bends • Reduce air velocity / increase temperature

Moulding

Problem	Cause	Remedy
Mould shrinkage	• Too long steaming • Too high steam pressure • Too fast cooling • Less shot weight • Short filling of mould	• Reduce steaming time • Reduce steam pressure • Lower cooling time • Increase density • Clear feed jets
Mould bulging	• Less cooling time • Less maturation time • Improper cooling	• Increase cooling time • Increase maturation time • Check cooling system (filter choke)
Molds contain voids	• Incomplete filling • Poor venting • Too big beads	• Check and clear feed jets • Improve venting • Use smaller beads
Molds contains too much water	• Too low density • Too long steaming • Wet steam • Wet Pre-puff	• Increase density • Decrease steaming time • Drain condensate , ensure condensate free steam • Increase maturation time.
Poor Fusion	• Too long Maturation time • Insufficient steam time / pressure • Wrong steaming procedure • Insufficient filling	• Reduce Maturation time • Increase steaming time / pressure • Check steaming procedure • Improve filling
Localized fusion problem	• Condensate left out in the mould • Poor Mould venting • Nearby steam jets choked	• Increase mould preheating • Improve venting & filling • De-choke nearby steam jets

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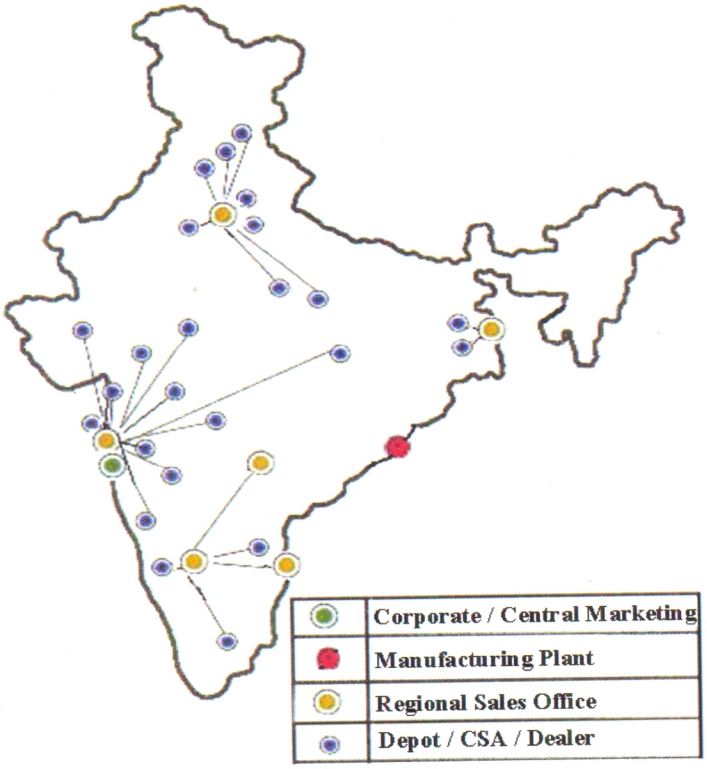

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