Пайдаланылған әдебиеттер тізімі

1. ГОСТ ISO 9001-2018 сапа менеджменті жүйелері
2. ГОСТ 16504-2011 өнімнің мемлекеттік стандартқа сәйкестігін сынау жүйесі. Өнімнің сапасын сынау және бақылау.
3. ГОСТ 24297-2017 өнімнің кіріс бақылауы.
4. ГОСТ 18105-2018.бетондар. Беріктікті бақылау және бағалау қағидалары
5. ГОСТ ИСО 12491-2011. құрылыс материалдары мен бұйымдары. Сапаны бақылаудың статистикалық әдістері.
6. МЕМСТ 26633.2-2015 бетондар. Ылғалдылықты анықтау.
7. МЕМСТ 26633.3-2015 бетондар. Судың сіңуін анықтау.
8. МЕМСТ 26633.5-2015 бетондар. Су өткізбеушілікті анықтау әдістері.
9. МЕМСТ 23858-2019.темір-бетон конструкцияларының түйіспелі арматурасының түйіспелі қосылыстары. Ультрадыбыстық сапаны бақылау әдістері.
10. МЕМСТ 25192-2012 Бетон. Жіктеу және жалпы техникалық талаптар.
11. ГОСТ Р 54501-2011. сапаны бақылаудың кешенді жүйесі.

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EXPANDED POLYSTYRENE FOR INSULATION OF REINFORCED CONCRETE STRUCTURE

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Expanded polystyrene is solid foam or thermoplastic product that has characteristics such as low weight, insulation properties and durability. The thermal qualities of expanded polystyrene improve with its strength (density). EPS has a variety of applications such as for thermal insulation boards in building constructions and packaging products. EPS insulation foam is also used in closed cavity walls, roofs and floor insulation. It is the automatic choice for electronic goods cushioning and packaging. Manufacturers rely heavily on EPS due to its insulation and shock absorption capacity, as well as its ability to prevent or minimize product damage during the transportation of sophisticated equipment. EPS is easy to install on the construction site. Besides construction and packaging, EPS is also used to make protective crash helmets for sports personnel and others. EPS is manufactured through a polymerization process and is a derivative of ethylene and benzene. EPS uses two molding processes: Block molding – produces large blocks of EPS that later cut into shapes or sheets for using packaging and building/construction applications; Shape molding – produces parts that are made as per custom design; used mainly for the packaging of electronic products. EPS is completely recyclable, which means less demand for raw materials and low energy consumption. [1]

Generally, polystyrene is a synthetic aromatic polymer made from the monomer styrene, which is derived from benzene and ethylene, both petroleum products. Polystyrene can be solid or foamed. Polystyrene is a colorless, transparent thermoplastic, which is commonly used to make foam board or beadboard insulation and a type of loose-fill insulation consisting of small beads of polystyrene. Polystyrene foams are 95-98% air. Polystyrene foams are good thermal insulators and are therefore often used as building insulation materials, such as in insulating concrete forms and structural insulated panel building systems. Expanded (EPS) and extruded polystyrene (XPS) are both made from polystyrene, but EPS is composed of small plastic beads that are fused together and XPS begins as a molten material that is pressed out of a form into sheets. XPS is most commonly used as foam board insulation. Expanded PolyStyrene (EPS) is a white foam plastic material produced from solid beads of polystyrene. It is primarily used for packaging, insulation, etc. It is a closed-cell, rigid foam material produced from: Styrene – which forms the cellular structure, Pentane – which is used as a blowing agent. Both styrene and

pentane are hydrocarbon compounds and are obtained from petroleum and natural gas byproducts.

EPS is very lightweight with very low thermal conductivity, low moisture absorption and excellent cushioning properties. One of the serious limitations of polystyrene foam is its rather low maximum operating temperature ~80°C. Its physical properties do not change within its service temperature range (i.e. up to 167°F/75°C) for long-term temperature exposure. Its chemical resistance is nearly equivalent to the material upon which it is based – polystyrene. EPS is 98% air and it is recyclable. The conversion of expandable polystyrene to expanded polystyrene is carried out in three stages: Pre-expansion, Maturing/Stabilization and Molding. Polystyrene is produced from crude oil refinery product styrene. [2] For manufacturing expanded polystyrene, the polystyrene beads are impregnated with the foaming agent pentane. Polystyrene granulate is pre-foamed at temperatures above 90°C. This temperature causes the foaming agent to evaporate and hence inflating the thermoplastic base material to 20-50 times its original size. After this, the beads are stored for 6-12 hrs allowing them to reach equilibrium. Then beads are conveyed to the mold to produce forms suited as per application. During the final stage, the stabilized beads are molded in either large blocks (Block Molding Process) or designed in custom shapes (Shape Molding Process). The material can be modified by the addition of additives such as flame retardant to further enhance the fire behavior of EPS. The EPS is a lightweight material with good insulation characteristics offering benefits such as: Thermal Properties (insulation) - EPS has very low thermal conductivity due to its closed-cell structure consisting of 98% air. This air trapped within the cells is a very poor heat conductor and hence provides the foam with its excellent thermal insulation properties. The thermal conductivity of expanded polystyrene foam of density 20 kg/m3 is 0.035 – 0.037 W/ (m·K) at 10 °C. Mechanical strength - Flexible production makes EPS versatile in strength which can be adjusted to suit the specific application. EPS with high compressive strength is used for heavy load-bearing applications, whereas void forming EPS with a lower compressive strength can be used. Generally, strength characteristics increase with density, however, the cushioning characteristics of EPS foam packaging are affected by the geometry of the molded part and, to a lesser extent, by bead size and processing conditions, as well as density. Dimensional Stability - EPS offers exceptional dimensional stability, remaining virtually unaffected within a wide range of ambient factors. The maximum dimensional change of EPS foam can be expected to be less than 2%, which puts EPS in accordance with ASTM Test Method D2126. Electrical Properties - The dielectric strength of EPS is approximately 2KV/mm. Its dielectric constant measured in the frequency range of 100-400 MHZ and at gross densities from 20-40 kg/m3 lies between 1.02-1.04. Molded EPS can be treated with antistatic agents to comply with electronic industry and military packaging specifications. Water Absorption - EPS is not hygroscopic. Even when immersed in water it absorbs only a small amount of water. As the cell walls are waterproof, water can only penetrate the foam through the tiny channels between the fused beads. View all EPS grades with low-none water absorption». Chemical Resistance – Water and aqueous solutions of salts and alkalis do not affect expanded polystyrene. However, EPS is readily attacked by organic solvents. Check out EPS grades with good chemical resistance». Weathering and Aging Resistance – EPS is resistant to aging. However, exposure to direct sunshine (ultraviolet radiation) leads to a yellowing of the surface which is accompanied by slight embrittlement of the upper layer. Yellowing has no significance for the mechanical strength of insulation, because of the low depth of penetration. Fire Resistance – EPS is flammable. Modification with flame retardants significantly minimizes the ignitability of the foam and the spread of flames. EPS Insulation is composed of organic elements – carbon, hydrogen and oxygen – and does not contain chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs). EPS is recyclable at many stages of its life cycle. Expanded Polystyrene is 100% recyclable and is designated by plastic resin identification code 6. However, the collection of EPS can be a major challenge as the product is very light. PS recyclers have created a collection system in which the EPS is shipped over short distances to a facility where the material is further processed by: Granulation – EPS is added into a granulator that chops the material into smaller pieces; Blending – the material is passed into a blender for thorough mixing with similar granules; Extrusion – the material is fed into the extruder, where it is melted. Color can be added, and the extruded material is then molded into a new value-added product. Several countries have established formal expanded polystyrene recycling programs throughout the world. Sustainability benefits associated with EPS are: EPS manufacturing does not involve the use of ozone-layer-depleting CFCs and HCFCs; No residual solid waste is generated during its manufacturing; It aids

energy savings as it is an effecting thermal insulation material which helps reduce CO2 emissions; EPS is recyclable at many stages of its life cycle; EPS is inert and non-toxic. It does not leach any substances into the groundwater [3].

Nowadays in Kazakhstan, the majority of construction objects today are built from construction materials based on advanced technologies. They are more attractive compared to traditional ones due to their affordability and high durability. Polystyrene concrete has become highly popular as a kind of light concrete (gas-concrete and foam-concrete lie with the same category). It contains polystyrene granules as a filler. According to the European experience, applying polystyrene concrete provides for energy-saving. It is light, conserves heat and provides for great sound-proofing. Technological operations for producing polystyrene concrete mixture are quite basic: water is fed into the polystyrene concrete mixer followed by cement and chemical components. The mixture is blended for 1-2 minutes then polystyrene granules are added and the mixture is blended for 1 minute in order to get the homogenous mix. The total time for preparing the mixture including feeding and blending is at least 3-5 minutes. Then the mixture is transported and poured with the gerotor pump through the hose. Its design and mechanism provide for the necessary air volume during the production process [4]. BAS Beton ZHBI Pavlodar Company manufactures a wide range of products for the construction market of Northern Kazakhstan, i.e. reinforced concrete products, like: plates, rings, vibropressed materials, road construction materials, ready-mixed concrete, paving blocks, etc. Being a leader in this sphere in Pavlodar, BAS Beton ZHBI Pavlodar decided to extend the range of the products they manufacture, i.e. arrange production of commercial EPS concrete, EPS concrete blocks and products. The production line installed enables them to produce EPS concrete of various densities, ranging from the thermal insulation one to the constructional thermal insulation one. The line is equipped with an EPS expansion section, a mixing section, and an automated cutting unit.

References

1. The material selection platform. Ultimate Guide on Foam Insulation Material https://omnexus.specialchem.com/selection-guide/expanded-polystyrene-eps-foam-insulation
2. Nick Connor (2019, May 22). What is Expanded Polystyrene – EPS – Definition.https://www.thermal-engineering.org/what-is-expanded -polystyrene-eps-definition/
3. Siberian Constructing Technologies (2019, April 15). Kazakhstan, Pavlodar, Polystyrene concrete plant. https://www.sts-54.com/photo/polystyrene_concrete/7439/
4. CorrosionPedia (2018, November 5). Expanded Polystyrene (EPS). https://www.corrosionpedia.com/definition/2473/expanded-polystyrene-eps

ПОДСЕКЦИЯ 11.4. «ДИЗАЙН ЖӘНЕ ВИЗУАЛДЫ КОММУНИКАЦИЯ»

УДК 74.01/.09

ӨНІМНІҢ БРЕНД ДИЗАЙНЫН ЖАСАУ

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Қазіргі кезде, сатып алушы ондаған ұқсас өнімді таңдай алатын болса, өндіруші басқалар сияқты болмауы керек. Басқалардан ерекшелену, назар аудару, эмоционалды сүйіспеншілікті қалыптастыру қажет. Мұны кәсіби бренд дизайны арқылы жасауға болады.

Бренд дизайны-бұл брендтің көрнекі құрамдас бөлігі. Негізінен, танымал бейнені қалыптастыратын және компания мен оның өнімдерін саралауға мүмкіндік беретін элементтер жүйесі. Бренд дизайнының негізгі компоненттерінің тізіміне логотип, фирмалық стиль, қаптама және затбелгі, сайт дизайны, кеңістік пен навигациялық элементтердің дизайны кіреді. Кәсіпорынның қызмет саласына байланысты қосымша элементтер құрылуы мүмкін. Мысалы, компанияның брендтік дизайнын жасау көбінесе корпоративті форманы немесе брендті автомобильдерді құруды қамтиды.