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Increased demand for rigid PU foam for building insulation

A large number of countries are tightening up their regulations on energy saving for buildings as a result of climate change and rising energy costs. For example, under the revised EU directive on improving energy efficiency in buildings, from 2021 onwards it will only be possible to construct new buildings as “almost zero-energy buildings”. Bayer MaterialScience (BMS) is therefore currently witnessing a strong rise in demand for rigid polyurethane foam for heat insulation in more and more countries. The background for this is that, even in much thinner layers than are needed for expanded polystyrene and mineral wool – the two other most common insulating materials – this material delivers the required high level of insulation.

"Bayer MaterialScience is responding to the growing demand with customised polyurethane raw materials and systems, optimised process technologies for manufacturing polyurethane insulating materials and, as part of our EcoCommercial Building Program, integrated energy and material concepts for buildings," explains Frank Grunert, head of marketing for the EMEA and LATAM regions in the Polyurethanes segment of BMS.

Buildings today are responsible for around 30 % of global greenhouse gas emissions and more than 40 % of global energy consumption. Some 70 % of heating energy is lost through roofs, facades and basements in uninsulated properties, with windows contributing a further 15 %. The following figures show what effective heat insulation can do. An uninsulated building from 1960 consumes around 3,700 liters of heating oil per 100 square meters of living space and emits some 9,100 kilograms of CO2 a year. In contrast, the equivalent heating oil for a house insulated in accordance with the new German Energy Saving Ordinance is less than 350 liters and the CO2 emissions are only around 800 kilograms.

Increased living space thanks to PU heat insulation

Polyurethane insulating materials achieve a thermal conductivity grade as low as 024 to 026 because their thermal conductivity is much lower than that of conventional insulating materials. In some cases, they offer thermal protection that is more than twice as good, enabling use of an insulating layer up to 40 % thinner. If the external dimensions of a new building are fixed, the available interior space is therefore greater than for insulation using mineral wool or rigid polystyrene foam. To achieve the insulation level of 21-cm-thick polyurethane insulation with a thermal conductivity grade of 026, for example, mineral wool insulation (thermal conductivity grade 040) needs to be 32 cm thick. For a given masonry thickness and external wall limit, a wall suitably insulated with polyurethane would therefore be 11 cm thinner and the interior space much larger.

"The increase in living space made possible by polyurethane insulation raises real estate values, particularly in large cities with high prices per square meter, thereby directly compensating for the additional expense of improved polyurethane insulation," says Dr. Lutz Brassat, a technical expert on PU raw materials for insulating boards and block foam.

Heat insulation using rigid PU foam can save over 50 % of the energy required for an old building, and even a low-energy or passive house standard is possible. Extra costs can also be saved since, as a result of minimal insulation thicknesses, window sills can have thinner designs, for example, and no roof extension is normally necessary for roof insulation. The "slimline" polyurethane insulation leaves the architectural character of an old building virtually unchanged. For instance, windows insulated with this material continue to offer a high level of light.

PIR metal-faced sandwich panels – now also with B-s1, d0 classification

New, customised polyisocyanurate (PIR) foam systems from BaySystems (the PU systems business of BMS) now offer much improved fire resistance and develop much less smoke gas than is the case with established PIR systems. In the Single Burning Item test (SBI test, DIN EN 13823) with an appropriate joint structure, PIR metal-faced sandwich panels even achieve a B-s1, d0 classification, with s1 representing the lowest smoke gas development class, according to the company. "d0" means there are no burning droplets of material. "These panels are thus an alternative to inorganic core materials based on mineral wool that have until now been the preferred materials when the requirements of smoke class s1 needed to be met for construction projects," explained Dr. Rolf Roers, a specialist in polyurethane metal-faced sandwich panels at BMS. PIR sandwich panels are used in particular to construct industrial buildings such as warehouses, production halls and cold stores.

New concept for window profiles – heat losses halved

PU systems from BaySystems have played a key role in the development of Top Therm 90. This integrated concept for slimline, high-insulation window profiles and facades views windows and frames as a single unit in thermal and structural terms. The hot and cold sides of the frame profiles, which have a depth of only 90 mm, consist of a thin, weather-resistant shell made using the polyurethane casting system Baydur, while Baytherm polyurethane insulating foam ensures there is virtually no contact between them. This design reduces heat loss by around a half compared to the previous state-of-the-art technology. The Uf value – the

amount of heat that passes through one square meter of frame in the space of an hour – is just 0.8 W/m2•K, thereby enabling passive house requirements to be met despite a slimline design. Top Therm 90 was developed by a consortium of industrial partners and scientific institutes.

Polyurethane spray foams – thermal insulation and air and vapour barriers

As well as PU materials for prefabricated insulating panels, BaySystems has also developed customised polyurethane spray foam systems for on-site application. When insulating timber-framed buildings, for example, these systems also form an air barrier that prevents heat losses through the escape of warmed or conditioned air at leakage points. This enables significant reductions in energy consumption for heating, ventilation and air-conditioning systems. Industrial and flat roofs are another area of application. Polyurethane systems can be installed on existing flat roofs to improve thermal insulation and sealing, with the result that no costly demolition work is involved for the old roofs and therefore no landfill disposal is necessary either. Installation costs are generally compensated for by the energy savings resulting from improved insulation. In the United States, BMS has launched the energy savings Bayer High Performance Residential Program. This programme helps property developers, for example, with energy consumption analyses being performed for buildings so as to properly assess the heat insulation and then design the heating and air-conditioning system as appropriate.

EcoCommercial Building Program

The thermal insulation of rigid PU foam is also a key part of the EcoCommercial Building Program from BMS. This is a business model offering decision-makers in the construction industry energy-optimised, sustainable building solutions and customised products for new construction projects. These are developed with selected partners and range from integrated energy and material concepts to zero-emissions buildings. The focus of the programme includes public buildings such as kindergartens, schools, universities and office buildings. The Bayer CropScience children's daycare centre in Monheim, Germany, was constructed following the EcoCommercial Building method, for example. The centre can be operated on a zero-emissions basis, something that is in part made possible thanks to optimum thermal insulation with polyurethane.

BMS plans to exhibit these developments at K 2010 in Düsseldorf from 27 October to 3 November 2010 at its stand A75 in Hall 6.

Adresse:
http://www.gupta-verlag.com/general/news/exhibition-spotlight/8919/increased-demand-for-rigid-pu-foam-for-building-insulation