

## Sandwich Panel Performance Advantages

Together with the developing production technology and good quality materials, the sandwich panels with high bearing capacity can be manufactured. The bearing capacity depends on the form of the metal surfaces in addition to the density and thickness of the filling material of the panel, and the panels can easily carry the loads that are heavier than their own weights. With this capability, they are preferred as the coating material for the roof and walls of the buildings. In fact, it is the most ideal construction material that can be applied in all buildings with steel, wood or reinforced concrete construction. Furthermore, by means of the purline distances to be increased with an appropriate sandwich panel preference, it is possible to economize from both construction material and the total assembly time.



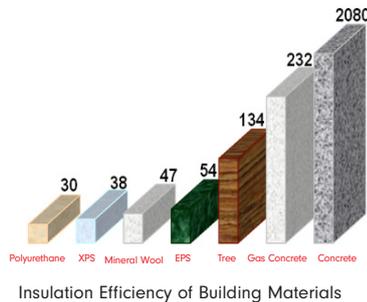
The number of the joint points will reduce in addition to the assembly workmanship of the surface being coated by using the sandwich panels, manufactured in lengths up to 18 meters, in the buildings. With the developed transportation and carriage means, the greater wall and roof surfaces can be coated in a short time. 10 min./m<sup>2</sup> assembly time for the walls and 8 min./m<sup>2</sup> assembly time for the roofs can be used as data. Whilst the sandwich panel does not restrict the volume of the structure or the height of the building, the limit values are determined according to the bearing construction.

Although the standard component and limited length opportunities of the sandwich panels, unlimited design opportunities are offered to the designers. The walls gain visual mobility by means of using variable colors or coating the panels in vertical, horizontal or angled positions. Even with the aid of the multi-purposed panels in the interior parts, the design possibilities of the designers improve.

The joint details cover the points connected from panel to panel and from panel to the bearing construction. Tight joints that fulfill the insulation functions can be provided through using double lamp-bush form in the wall panels and generally using lamp-bush form in the roof panels as well as using lateral overlay. What is expected from the joint points indeed is the air-tightness, thermal insulation and easy assembly possibility. What is required with easy assembly is the full settlement of the elements to each other without difficulty. As a result of the performed searches, it has been found out that the panels have 100 time better air-tightness capability than the most qualified windows. Furthermore, the panels used on the wall are manufactured as hidden screw and therefore, aesthetic appearance is provided without any visible screw.

With a careful planning, great expansion and renewals can be conducted without having any impact on the activities within the building. It enables the performance of longitudinal and lateral additions according to the construction of the structure. Also, since the panels can be disassembled and then assembled again, they offer practical advantages in terms of economy and application.

The sandwich panels quickly amortize their cost. In addition to the economical advantages offered during the assembly, the panels have more certain amortization advantages compared to other building materials with their energy saving thanks to the thermal insulation. Through reviewing the thermal conductivity values of the materials, the savings obtained from the thermal insulation can be easily determined comparatively. The polyurethane-filled sandwich panels have lower thermal transmission coefficient than all other similar thermal insulation materials and therefore, cause high insulation values and energy earning. Therefore, the resources are protected. Even electric generation can be possible by means of locating sun skylights on the panels. In addition to the transportation time and costs, since the sandwich panels are light and transmit less load to the bearing system of the structure, they reduce the basic construction costs too and have positive impact. Furthermore, they have low-cost maintenance besides their long-term utilization possibility. The modern coatings on the panels enable the sustainability of the sandwich panels since they provide protection against high level of corrosion and ultraviolet rays.



On the contrary to the materials such as concrete, gas concrete, etc. used in the walls of the structures, the polyurethane-filled sandwich panels meet the same thermal insulation and their thickness is smaller. Therefore, the area and volume within the building can be expanded in a measurable manner.



The contribution of the material in the expansion of the fire, even the resistance shown by the material against the fire which is also qualified as flammability capacity is called fire performance. A panel system formed of inflammable metal surface as well as polyurethane can be qualified as B,s2,d0 i.e. hard to burn according to EN 13501 norm, however evaluating the behavior of the fire to occur in the building over the fire performance of the wall coating material will be incomplete.

The products such as textile, furniture, joinery, etc. within the buildings are generally very sensitive against fire and cause the fire to be spread within the building in a short time. Therefore, each one of the safety parameters before and after the fire carry great importance.

The contact of water with metals such as steel, causes corrosion on the structures in time and this results with visual troubles as well as problems concerning bearing capacity. Moreover, the damage to be given by the water leaking from the roof or facades to the fittings, furniture, etc. materials within the building will cause serious tangible losses. The possible water leaks can be avoided by means of the double lamp-bushed system applied on the wall panels. In order to provide water insulation, the roof panels are determined according to the inclination of the roofs. By means of the capped roof panels, the required water insulation can be provided even in the roof coating with an inclination of 5%. In the roofs that are constructed with an inclination under 5%, the membrane panels are used and higher water insulation is obtained. On the other hand, water vapor affects the structure due to condensation and causes chemical deformations and worse comfort conditions. Water vapor hazard does not play an important role at sandwich panels. The reason of this is that the insulated metal surfaces are placed on the structures as a strong vapor stabilizer.



The polyurethane-filled sandwich panels have the adequate sound absorption characteristic in the normal industrial buildings according to the requirement of the building; however, they are not sufficient for the regions or offices that are very sensitive to sound and therefore additional solutions such as vibration absorbers may be required.

Environment-friendly systems are fully used in the production of the sandwich panel filling material polyurethane and the production is done without causing any harm on the environment. n-Pentane, which is used as inflator gas for polyurethane, has no affect on the environment. Also the polyurethane can be brought into dust form again and re-used as thermal insulation material. The sandwich panels to be applied on the roofs and walls, which are called as the shell of the structures, particularly provide the protection of the structure from external factors, thus enables it long life, energy saving and more comfortable living conditions.

Assan Panel reserves the right to make changes in this file that has been issued for informative purposes.

Reference: 1. Assan Panel Studies 2. TSE EN 14509 /08.01.2009 3. Lightweight Sandwich Construction, J.M. Davies 4. Sandwich Panel Construction, Rolf Koschade 5. Practical Guide to EN 14509, Klaus Berner 6. Durability Assessment of Sandwich Panel Construction, Dr. Lars Pfeiffer 7. TSE EN 13501-1 / December 2003 8. Ode Technical Publications - 1999 9. TSE 825 / April 1999