View Paper on Fire Safety in Buildings

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Fire is one of mankind's greatest discoveries but can also be a great source of danger in accidents. On average 8 in 1,000,000 people are killed every year in Europe and more are hospitalised due to fire. This risk has fortunately been addressed by governments which have continuously adjusted fire safety strategies. As a positive result, in the past 30 years the amount of fire deaths dropped by 65% in Europe.

Buildings notably represent an important part of the places where fire has fatal consequences. Therefore, numerous national and regional fire safety regulations have been put in place targeting buildings specifically.

Plastics are used in a wide and growing range of building and construction applications, from durable pipes and window frames to state of the art insulation solutions. As a result, fire safety has always been and continues to be a major objective for the plastics industry and an integral part of product design and manufacturing. Over the years, our industry has increased efforts to develop plastic materials, products and construction solutions with lower ignitability and limited impact on fire spread that have contributed to the ongoing reduction of fatalities, injuries and property damage due to fire.

1. Are European citizens put at risk?

When fires originate in buildings, the building contents (papers, furniture, appliances, clothes, etc) are typically burning first. A look around our homes shows that this fire load can be significant, but controlling every single item contributing to the fire load is difficult with a regulatory approach.

Regulations however can address fire safety of the building itself. A number of different measures are in place for ensuring fire safety of people, depending on the building's use. One of the tools for design of safe buildings is testing and classification of construction products regarding their fire performance. This has already been done on a national basis for many years, but an increasing number of construction products have today been described in harmonized product standards at European Union (EU) level under the **2011 Construction Products Regulation (CPR)**. This requires building and construction products to be tested and classified for their fire performance according to a **harmonised classification system for reaction to fire**. Based on these qualifications and considering specific and local situations, EU Member States can include different requirements for fire performance of these products into their national legislation.

One could imagine that full harmonisation of requirements should be put in place in order to make sure citizens are protected against fire. For instance, the EU has a comprehensive action programme on road safety based on Article 91 of the Treaty on the Functioning of the EU which could be used as an example for European action on fire safety. However, for

building regulations, the European Union needs to leave room for local needs. Member States are and should therefore remain free to design their fire safety regulations by taking into account the local specificities in terms of building design solutions, materials, user patterns and climate. The EU should therefore continue to **respect the subsidiarity principle** in order to have effective fire safety strategies in every corner of the continent. What has been done on road safety cannot be reproduced to all areas and a clear subsidiarity assessment has to be carried out before any EU action.

2. Are fire tests and regulations fit for modern buildings?

- There are effective harmonised standards for test methods

National governments can set their own requirements but there are rules on how those should be laid down. Notably, reference must be made to available European harmonised test methods. It is exactly this system for testing and classification of reaction to fire and resistance to fire that has been developed for CE marking of construction products. These harmonised standards are proposed for revision every five years in order to take into account the latest innovation in building design but have been kept more or less unchanged, which proves that test laboratories and **regulators consider the framework to be effective.**

The reaction to fire tests that have been developed for CE marking are small and medium-scale. However the European classification criteria have been linked to the performance of a large variety of construction products tested as surface products in the large-scale room corner test. All tests, regardless of their size, have to consider the fire scenario in which the construction product is burning. A benefit of small-scale tests is to allow many SMEs to test and market their products while respecting fire safety standards. There are also large-scale tests developed in Europe in which complete construction parts or building elements are tested according to the harmonised standards (e.g. EN 1363-1). When harmonised test methods are not yet available, **national provisions continue to ensure the safety of citizens.**

- Insulated façades and fire safety

One of the many solutions for thermal insulation of buildings is external thermal insulation composite systems (ETICS), which, when it includes plastics, offer a cost and performance effective way to insulate façades. For this specific application, regulators in a number of countries consider that an additional large scale test is necessary to assess fire safety of the complete construction. The European Commission is currently preparing a decision on how and where a harmonised test method has to be developed under the Construction Products Regulation. The plastics industry supports the harmonisation of large-scale fire tests for insulated façades and calls for standardisation bodies to be mandated to finalise and validate the method developed by the European Organisation for Technical Assessment, which incorporates the most common used test methods in Member States.

- Sandwich panels and fire safety

Sandwich panels on the other hands are commonly used in commercial and industrial buildings and harmonised testing requirements for such products have been made more severe in 2014. This shows that fire test requirements may be tightened through product standards in order to protect citizens against fire.

- Incorporating smoke toxicity of construction products into regulation?

Fire effluents, including smoke and soot, are always toxic, irrespectively of the products involved in the fire. The hazard from toxicity of combustion gases results in any fire from a few components, amongst which carbon monoxide is always present and predominates in most cases. That's why the best way to reduce the risks induced by toxicity of smoke gases is to prevent fire and, if ignition occurs, to detect the fire as soon as possible and to limit the spread of smoke. In the particular case of fire-fighters, who may suffer chronic toxicity effects of the fire effluents, it is key that they are adequately protected during and after the fire by personal protection equipment (breathing apparatus, skin protection, etc) and to give special attention to hygienic measures such as cleaning of the equipment and clothing.

Building fires in particular and therefore the evaluation of the toxic hazards from such fires (risk assessment) are very complex. The risk for occupants of the building to be affected by toxic fumes depends on several factors such as the amount of available combustible material, fire detection, the ease of evacuation, active and passive fire suppression, etc. In addition, generation of toxic combustion products is not only a material property: the smoke produced by burning products and the resulting hazard are strongly dependent on the **fire scenario** (e.g. room size, temperature, ventilation), and on exposure time.

This complexity makes it irrelevant to **evaluate the smoke toxicity of a single product**, in particular a construction product, which generally burns in a later stage of a fire. It has also led international standardisation committees addressing fire safety and building and construction to conclude until now that it is not possible to find a laboratory scale standardised way of assessing the contribution of a defined construction product to the emission of toxic gases and their effects in a real fire.

Considering the above, the way the CPR addresses the impact of smoke through both its generation and its opacity is perfectly adequate. There is no need to add smoke toxicity as an additional parameter for assessment of the reaction to fire of construction products. It would be a disproportionate provision inducing unnecessary burdens and will not necessarily help in saving more lives.

3. Is the problem growing worse every day as we change the fabric of buildings?

- The number of fire victims is diminishing

Each fire victim is one too many, and we need to understand the reasons behind the casualties. Although fire statistics are somewhat patchy, all available data show that the **number of fire victims is steadily diminishing in the European Union**. In spite of increasing population and a largely increased building stock using modern materials, the number of fire victims diminished by 43% in France from 1982 to 2008 and by 56% in the UK from 1982 to 2013 to give only two examples. Reliable fire statistics are needed to really assess casualties due to fire and address the issue at the most relevant level and with the best available tools.

- Can we protect our buildings?

One could think that an easy step would be to build and insulate buildings with non-combustible materials, but experience has shown that the type and quantity of materials involved are only a few of the various parameters influencing the development and

consequences of a fire. For instance, while the use of plastics in buildings has more than doubled in the last 30 years in Western Europe, fire fatalities have significantly decreased by around 65%. A specific example comes from Germany where plastic insulation has the largest market share and where the amount of fire casualties is less than half as high as Denmark where traditionally non-combustible mineral materials are used for insulation. **Further increasing requirements for fire safety of buildings without analysing the reasons for a specific situation would not be sensible.**

The content of a building seems to be a much more decisive factor. Casualties due to fire usually occur when the content of a building is set on fire and the inhabitants are not alerted or cannot escape. Moreover, habits and behaviour play an important role when confronted with a fire. It is precisely at this point where fire safety measures and public education have to be improved, for example through use of mandatory fire detectors and sprinklers or introduction of shorter escape routes together with prevention and raising of awareness. Some countries, such as France and Belgium, have decided to address the issue by making smoke detectors compulsory in individual private houses and dwellings.

Conclusions: Taking action at the right level, to prevent fire and save lives.

Even though fire casualties are decreasing, there is always room for improvement, but it needs to be improved at the level which will bring the best results. The EU regulates construction products and Member States set building regulations depending on their national specificities, with a reference to European harmonised fire tests, including for plastic materials.

Actions need to be taken at the right level but also at the right moment. As the building content and human behaviour seem to be decisive factors in a fire, prevention of fire and public education need to be strengthened.

Key messages

1. **Respect the subsidiarity principle**
   The EU regulates construction products through the Construction Products Regulation; Members states are more efficient in setting standards for buildings in accordance with their local specificities.

2. **Acknowledge existing testing methods**
   Construction products, including plastics are tested for their reaction or resistance to fire. Those standards are regularly reviewed and all products that are on the market have been declared as safe.

3. **Develop common fire statistics**
   Fire casualties and sources can only be understood with common reliable data. Further increasing requirements for fire safety of buildings without analysing the reasons for a specific situation would not be sensible.

4. **Improve fire prevention and public education**
   The human factor still plays a big role: prevention and public education are essential to avoid fire fatalities and injuries.