

## DETERMINATION OF TENSILE-IMPACT STRENGTH OF PLASTIC FLUE LINERS OF CHIMNEYS AFTER THE EXPOSURE WITH LABORATORY LIGHT SOURCES

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### Abstract

Some boilers of central heating systems have an exhaust temperature lower than 100 °C (Brennwertgeräte). In these cases a plastic flue liner can be used for the chimney. At the roof the plastic flue liner is outside the containment and therefore is exposed to natural weathering.

According to the standard EN 14 471 (Chimneys- System chimneys with plastic flue Liners – Requirements and test methods, 2005 11 01) plastic flue liners have to be exposed with an intensity of 30 W/m<sup>2</sup> for a time of 1330 hours, which means a total exposure of 0,144 GJ/m<sup>2</sup>. This has to be done in the wave length range of 300 to 400 nm. In comparison to the EN 12 608 (Unplasticized polyvinylchloride (PVC-U) profiles for fabrication of windows and doors – Classification, requirements and test methods, 2003-09-01) this is a very low radiant exposure. To reach a one year equivalent in a medium climate one has to exposure window frame profiles with 1.6 GJ/m<sup>2</sup> within the wavelength range from 300 to 800 nm. According EN ISO 4892-2 (Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc Lamps, 2006-06-01) a total irradiance of 60 ± 2 W/m<sup>2</sup> in the wave length range from 300 to 400 nm was used.

It was the reason to exposure plastics flue liners of chimneys with laboratory light sources with an irradiance of 60 W/m<sup>2</sup> up to a radiant exposure of 0,864 GJ/m<sup>2</sup> in the wave length range from 300 to 400 nm. To test the mechanical behaviour of the flue liners it was decided to test the tensile-impact strength according EN ISO 8256 (Plastics –Determination of tensile-impact strength, 07 2004).

Finally we tested 22 plastic flue liners with radiant flux density of 0.1 GJ/m<sup>2</sup>, 0.22 GJ/m<sup>2</sup>, 0.43 GJ/m<sup>2</sup> and 0.864 GJ/m<sup>2</sup> in the wave length range from 300 to 400 nm. The tests of the tensile-impact strength was done before exposure and then after the artificial weathering with the mentioned flux densities.

The tested 22 plastic flue liners show no general behaviour. Some materials are improved through the artificial weathering; other materials are improved after the lightening with 0.1 GJ/m<sup>2</sup> which could be a kind of temper effect on the material. In some cases the tensile-impact strength are decreased very strong.

The detailed results are shown in the paper respectively in the presentation.