

VDE Certification of LANXESS Plastics

The domestic appliances standard

The extended domestic appliances standard, IEC/EN 60335-1, covers dangers of an electrical, mechanical and thermal nature, as well as the fire and radiation hazards associated with electric appliances for domestic and similar use. It deals with the dangers that can arise despite correct use of the appliances in accordance with the instructions.

Plastics that are employed in domestic appliances or for similar purposes as specified in the standard are required to pass a fire resistance test. The precise values that have to be attained are a function of the current strength and of whether the appliance is operated in supervised or unsupervised mode. What is tested is the fire resistance of the insulating material, employing glow wire tests to IEC/EN 60695 (Figure 1). A distinction is drawn here between the GWFI test (glow wire flammability index, IEC/EN 60695-2-12), the GWIT test (glow wire ignition temperature, IEC/EN 60695-2-13) and the GWT test (glow wire temperature, IEC/EN 60695-2-11). The GWFI test and the GWIT test are conducted on test sheets. The results then take the form of material properties that can be requested by the appliance manufacturers in question for specific materials. The GWT test, by contrast, is conducted on the finished part. In addition to material properties, this test also includes criteria such as the finished part geometry, the use of additional masterbatches or processing aids, and the processing history. The GWT test is thus not a material property and cannot be requested as such by the material suppliers.

Selection and order of the tests

The test conducted to establish the fire resistance of plastics as per IEC/EN 60335-1 is shown in Figure 2.

When insulating materials are used in unsupervised appliances with a current strength in excess of 0.2 amps during normal operation, it is essential to use plastics that have a GWFI value of at least 850 °C, and the test specimen must not be thicker than the corresponding finished part. The material must additionally have a GWIT value of at least 775 °C, and again the test specimen must not be thicker than the corresponding finished part. If these values are not attained, it is possible to establish the GWT value on the finished part instead.

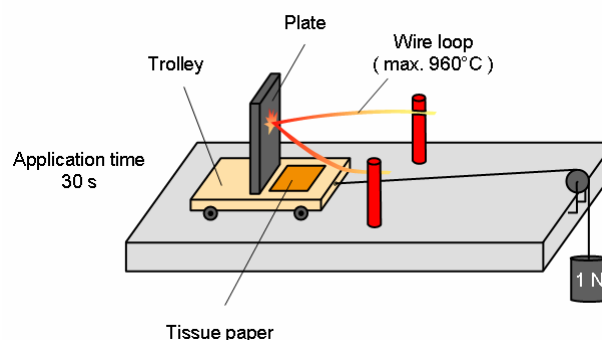
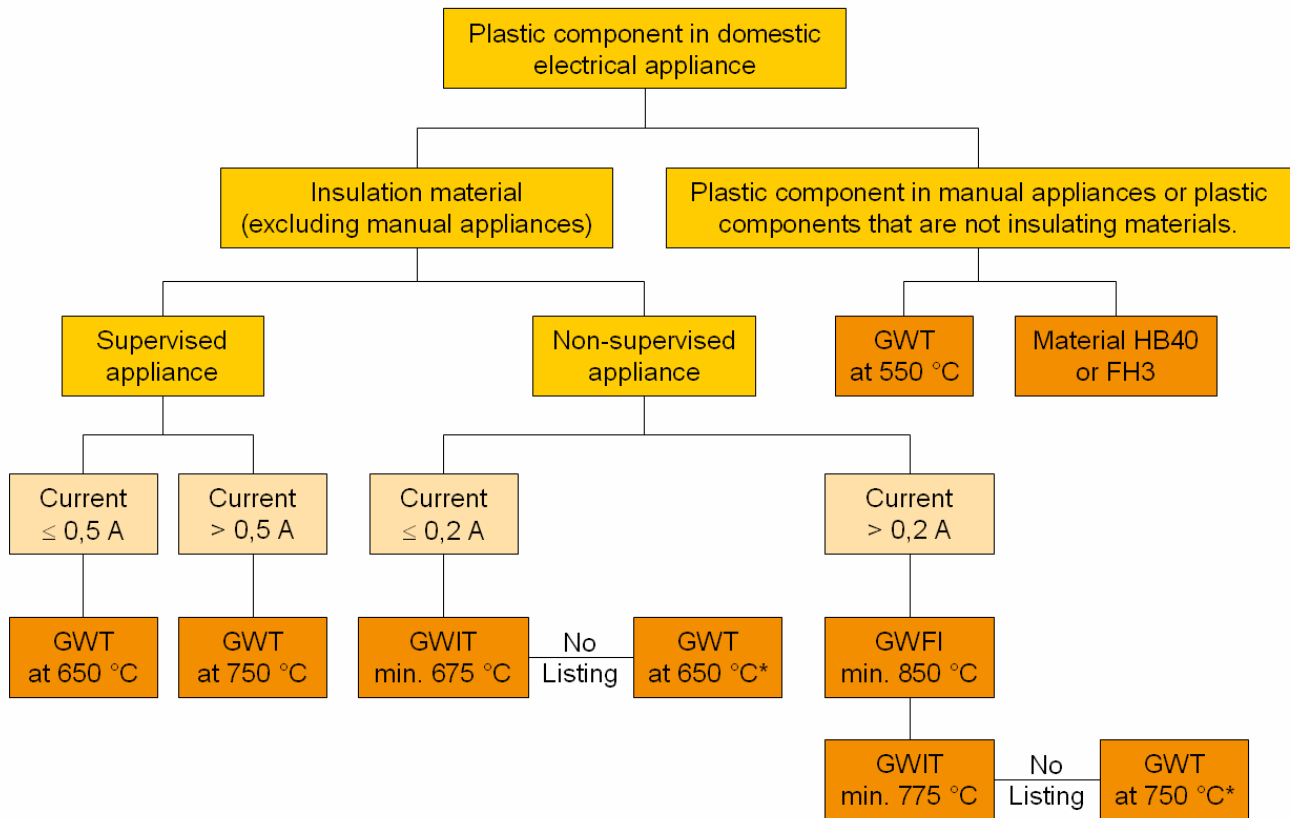


Figure 1 Test setup for the glow wire test



*If no GWT: needle flame test on the surrounding parts, or surrounding parts at least V-1

Figure 2 Testing the fire resistance of plastics

Material certification by the VDE

The GWFI and GWIT values have so far been specified as material properties on the data sheet or on the UL (Underwriters Laboratories) Yellow Card. Since 2007, it has now been possible to have suitable materials registered with the VDE as electrical insulating materials. The following conditions must be fulfilled for this:

- The producer of the material must be registered with the VDE and be regularly audited (Figure 3).
- Suitable materials must be tested and certified by the VDE.
- The certified materials must be regularly audited.

When certified materials are used, it is now possible to obtain the VDE certificate without the finished

parts needing to be checked. This has many advantages for the customer:

- Planning certainty

By using certified plastics, it is possible to achieve conformity with the standard and the associated VDE seal at an early stage of planning. This absolves the processor from the need to carry out any post-molding treatment or select a new material.

- Reduced outlay on testing

The use of certified plastics eliminates the need for separate tests on different series of products made of one and the same material. The onus of testing is shifted from the plastics processor to the plastics supplier. The processor saves on testing costs and frees up testing capacity for other tests.



- **Reduced time-to-market**

The use of certified plastics eliminates the need for testing the finished part. This means that no time is taken up by testing, which can otherwise only be performed during the final stage of development. The elimination of finished-part testing allows processors to bring their products onto the market more rapidly.

- **Global products**

In addition to the UL Yellow Card, the LANXESS products are also listed by the VDE. The material selection specifications of the two most important organizations worldwide are thus fulfilled.

- **Safety**

The VDE regularly audits the certified products, thus guaranteeing that the material properties are constantly monitored.

VDE Prüf- und Zertifizierungsinstitut

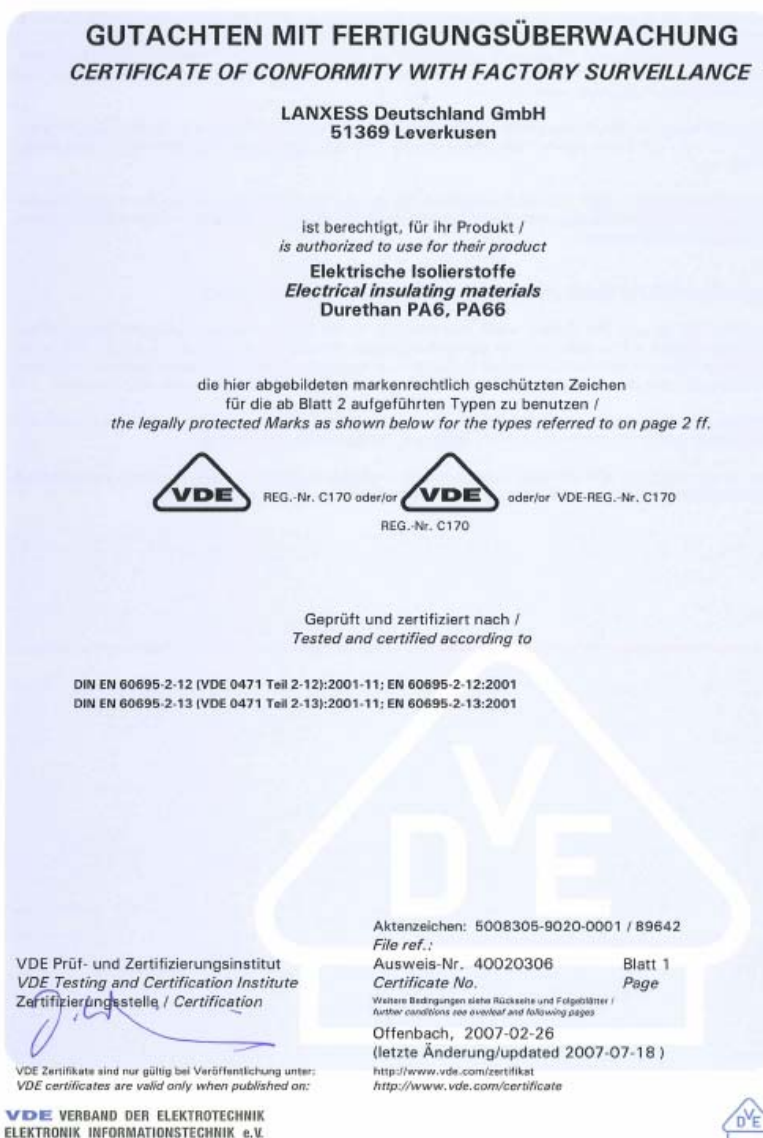


Figure 3 VDE certificate



Colors and specified wall thicknesses

The GWFI test and the GWIT test can be performed using different colors and wall thicknesses. If the glow wire tests are passed in natural, black, white and one other color shade, then an "All Colors" listing is obtained. This allows the material in question to be used in all colors without a GWT test having to be performed.

The wall thickness specifications in IEC/EN 60335-1 stipulate that the test must be performed on sheets with the preferred values of 0.75 (\pm 0.1) mm,

1.5 (\pm 0.1) mm and 3.0 (\pm 0.2) mm. In the case of finished parts with a wall thickness that does not correspond to the preferred values, the nearest wall thickness should be taken as the basis for the assessment, but this must not be thicker than the actual wall thickness of the part. This results in the correlations between test specimens and finished parts as set out in Table 1.

Test specimen listed for:	Permitted wall thicknesses in the finished part
0.75 mm	0.00 to < 1.5 mm
0.75 mm and 1.5 mm	0.00 to < 3.0 mm
0.75 mm; 1.5 mm and 3.0 mm	any wall thickness
1.5 mm and 3.0 mm	any wall thickness \geq 1.5 mm

Table 1 Correlation between the test specimen and the finished part

It is basically also possible to list wall thicknesses outside the preferred values. These then cover a wall thickness in the finished part that is equivalent to the wall thickness of the test specimen, plus or minus 0.1 mm. A test specimen with a wall thickness of 0.4 mm thus covers a range of 0.3 mm to 0.5 mm in the finished part.

LANXESS materials with a VDE certificate

LANXESS Deutschland GmbH is registered with the VDE (Figure 3) and supports its customers by obtaining a VDE certificate for its flame retardant polyamides (Durethan[®]) and polyesters (Pocan[®]). The current status of the certified materials can be directly downloaded, together with the corresponding certificate, under "Certificates" on the technical homepage of the Semi-Crystalline Products Business Unit at www.durethan.com or www.pocan.com.

This information and our technical advice - whether verbal, in writing or by way of trials - are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to verify the information currently provided - especially that contained in our safety data and technical information sheets - and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

Trial Products (grade designations beginning with the codes DP, TP, KL or KU)

This is a Sales Product at the developmental stage (a Trial Product). For this reason, no assurances can be given as to type conformity, processability, long-term performance characteristics or other production or application parameters. No definitive statements can be made regarding the behavior of the product during processing or use. The purchaser/user uses the product entirely at his own risk. The marketing and continued supply of this material are not assured and may be discontinued at any time.

