Introduction

With relation too the observation in recent times of confirmed cases of permanent damage to glazed units caused by the activity of chemical compounds on the edges of the glass we would like to draw your attention to the problem. We realize that some of you are aware of the problem but however, we want to share our views with everyone. Our experience points to the fact that most often the damage to the glazed unit, which is visible in the form of the sealant leaking into the interior is caused by using the silicone directly on the edges of the glass during the assembly along the wings of a window. Simultaneously, we know that technical specifications do not recommend the application of assembly silicone in direct contact with the sealing of the glazed unit. Despite this fact, we have had the possibility of observing the opposite taking place. This involved the overuse of silicone, which could explain its lower price and this was not curbed by the inscription on the packing which instructed not to use this silicone for assembling glass units.
We came to the conclusion that some of the cases known to us had one common feature and that was the fact that the glass units which were bought from us were later sold on to assembly firms or individual clients whose creativity in this area is to be "admired". This is visible in the pictures which are attacked to this article. We hope that the article presented will explain the essence of the problem and constitute a warning, while simultaneously contain an indicator of appropriate conduct in order to avoid the described regretful situations. While remembering that damage often occurs due to a lack of knowledge, we suggest you to browse the material presented by us.

Adam Wierzbowski
Quality Chairman Plenipotentiary

Effect of chemical compounds on the edges of double glazed glass.

With relation to the increasing amount of chemical agents which are included in semi-finished products with regard to the production of windows, there is a danger of the lack of chemical compatibility in the materials applied. The information presented is mainly geared towards producers of windows and firms which mount the glass panes into the windows, in order to explain the phenomenon and avoid complaints regarding defects along the edges of sealed glass units.

A window with double glazed glass should be treated as one coordinated system from the point of view of construction, as the window frame contains such materials as packing washers, sealants, additional sealing materials, glue, paint etc. which have an effect on the glass edges. The most important criteria in choosing materials of the chemical type refer to the chemical compounds in them and their effect on the sealing of the glass unit.

Bearing in mind the aim of analysing a given component, one should adhere to the following definition:

"Materials are compatible if there is no damaging chemical interaction between them". This definition does not exclude mutual interaction, as long as it is not damaging. The term interaction is connected with physical processes or physio-chemical processes, which can take place between two different materials, leading to changes in their structures, colour, consistence etc. Mutual interaction of chemical compounds is commonly known as migration. The process of migration occurs if at least two different materials are used. At least one of these materials must contain components in its molecular structure that are capable of migrating. However, in the second one there must be conditions which allow the migrating components to be received. More importantly, for a reaction to occur, both materials do not have to be in direct contact with each other, as they can also have varying levels of concentration.

One example of the physio-chemical interaction involving chemical compounds is the so-called movement of plasticizers. If in one material there are plasticizers, which are not evident in the other, the process of migration can take place. This system will work towards balancing the concentration of plasticizers. The speed of change is greater in the case of higher temperatures.

Plasticizers are chemical compounds which are added to plastic materials, silicone sealants or many other materials that have a mechanical influence on the properties. As the name itself indicates, plasticizers show activity that is similar to solvents. The movement of plasticizers is treated as damaging interaction when the materials change their properties. The material which is transmitting the plasticizers becomes harder, breakable and shrinks, while the material which receives the plasticizers becomes soft, flexible and even dissolves.

A typical example of the processes described is the interaction of silicones containing plasticizers or other compounds that have a similar chemical structure to butyl – the primary sealant of double glazing glass. Butyl becomes dissolved, the inside of the glass becomes visible due to leaks and then the glass unit loses its main properties. It is important to note that this reaction always takes place regardless of whether in polyurethane, polysulphide or silicone are used in the repeated process of sealing.

This process may be drawn out in time in various cases.

The solution to this problem is the application of materials which are compatible – meaning that they do not create damaging interaction. Bearing this aim in mind, laboratory tests are carried out which clearly indicate whether the chemical structure of a given substance can allow it to be used in contact with the sealed edge of a glass unit. One of the methods in carrying out such tests is the thermogravimetry method, where the tested sample is put under temperatures ranging from 0-10000C in a specified time span, while its weight with a tolerance of I mg is registered. The loss of the sample mass occurs in temperatures characterized by the evaporation of specific chemical compounds.

The method of producing glazed units in our factories and the choice of sealing methods is at a standard that ensures its long-life durability, which is confirmed by tests in Poland and in such European countries as Germany, Sweden, Denmark and Holland. The primary and secondary sealants always come from the same supplier and the compatibility of these materials is under the constant supervision of the producer. Butyl, which is the primary sealant of double glazing glass, does not contain plasticizers in a chemical sense and if they exist in any materials in the window frame they will be transmitted and from this moment degrading reactions occur regarding the sealing of glazed glass. The time span of degradation with regard to the sealing of the glass unit depends on the surface area of contact with the sealed edge, the concentration of plasticizers and the temperature of the surrounding area. As previously mentioned, a window is a product, which in the case of double glazing glass involves the use of materials that come from different producers.

Conformity from a chemical point of view as regards the components used has an impact on the quality of the window, which is guaranteed by the producer.
The producer of double glazing glass guarantees the quality of its products, but has no influence on the type of materials that window producers or installers use and due to this fact can not answer for their influence on the product. In the case of using inappropriate chemical materials that are not compatible, the afore-mentioned reactions occur.
Due to the lack of norms in the area of requirements with regard to certain chemical components used in the production of windows it is important to adhere to the general rule as follows:
Use only materials tested for compatibility with sealants in double glazing glass. Tests should be carried out by producers of semi-finished producers – the so-called packing washers, silicone or other sealants applied in window frames in accordance with the sealing of the glass edges. The test results oblige the producers to keep the permanent chemical structure in its products and the lack of danger to other products.
This principle is upheld in many European countries and adherence to this rule allows us to avoid costly replacement of glass units and keep the good trademark of our products.

Mirosław Radomski
Vice Chairman

This report has been prepared on the basis of the following materials:
1. "Materialverträglichkeit rund um das Isolierglas" – Bundesverband Flachglas.
2. Materials from producers of sealants.
3. Publications in the magazine entitled "Glaswelt".

Examples of reactions resulting from the application of the so-called mutually incompatible materials.
In the pictures below there are fragments of windows shown with the outer casing strip removed. The pictures shown present the effects of reactions between silicone used to stick packing washers (fixing blocks) to the PVC profiles and the sealing of double glazing glass.

Press-Glas SA
Nowa Wieś, ul. Kopalniana 9
42-262 Poczesna
Poland
+48 (0) 34 327 50 69
+48 (0) 34 327 58 01
poczta@press-glas.com