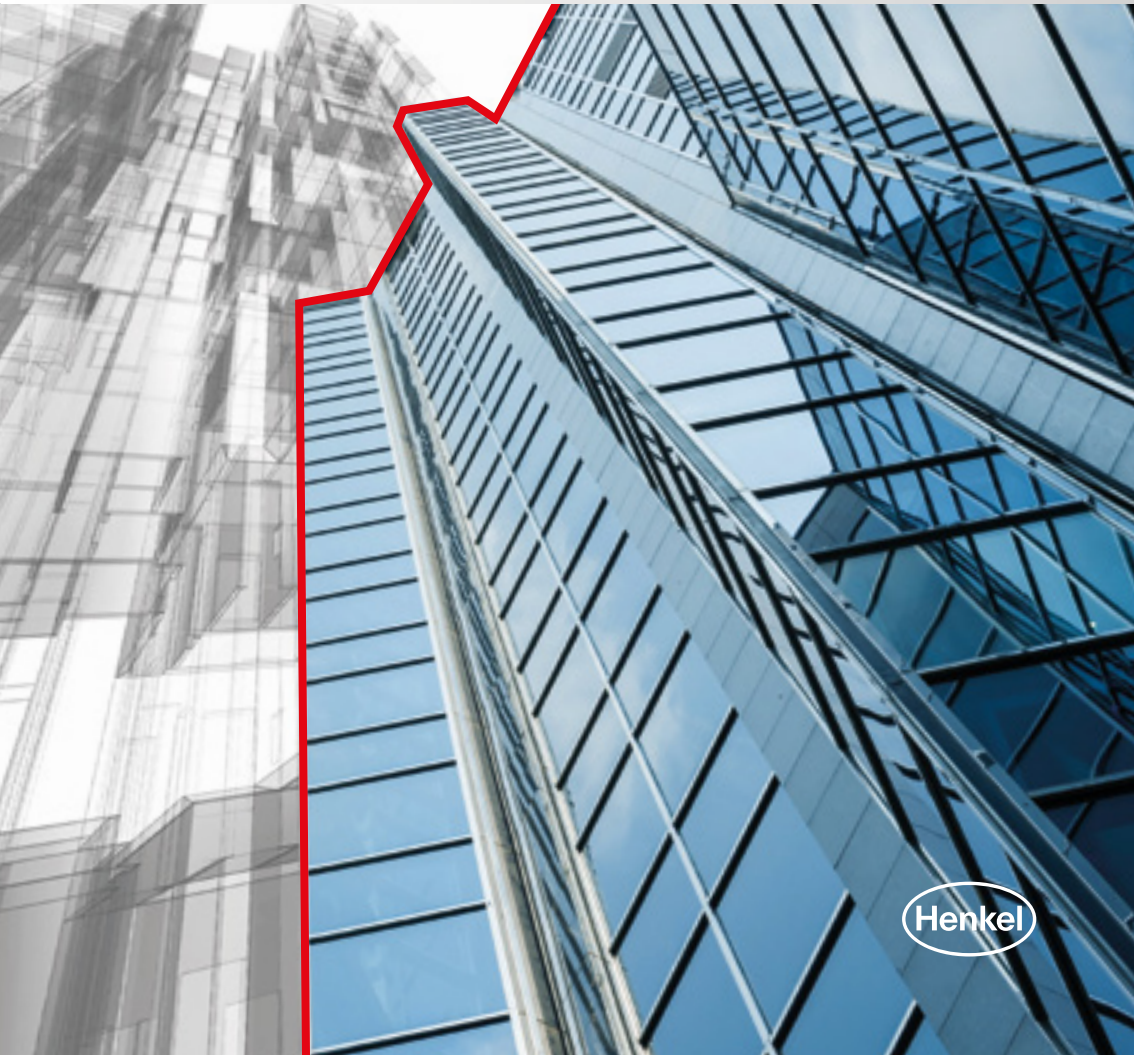
TEROSON®

GUIDE FOR PROFESSIONAL USERS

Sealing Technology for Facades and Windows



Saturn Tower, Wien, Sauritschnig

TEROSON®

Topics

30 years of experience and expertise

About TEROSON

TEROSON history

TEROSON today

The origin of the brand TEROSON dates back to the 19th century. Being founded in 1898, the company manufactured products for the up-and-coming automobile industry. Since then, innovation has been a tradition at TEROSON – for more than 100 years. This also applies to the company's activities in the building technology sector. Since joining the Henkel Group in 1991, the research and development work carried out by TEROSON has received a fresh innovation-promoting boost. The brand has been able to establish itself firmly in the facade and metal construction market.

For 30 years now, TEROSON Bautechnik has been active in the field of special sealing systems and solutions for facades and windows. Today, the company offers a compact and clearly structured portfolio of well-proven classic and innovative products for the reliable and durable sealing of structural joints. The range includes sealing strips, assembly adhesives, assembly foams, precompressed foam tapes, joint sealants, extruded butyl sealing products and other system components.

Especially in extreme climates and in difficult construction conditions, the premium quality of Henkel TEROSON products has a proven track record of long-term success.

On site, the systems can be applied even at temperatures of -5 °C. In addition, there are no restrictions for use at high temperatures (up to 80 °C). Downtimes at the construction site can thus be substantially reduced.

Henkel TEROSON was also the first manufacturer to have its window and facade products certified regarding their emission of harmful volatile organic compounds (VOCs). Products that have been awarded the GEV label EMICODE® EC1 PLUS feature very low emissions and offer the highest possible protection against indoor air pollution. As a result, these TEROSON products make a significant contribution to a higher quality of life and healthy living. The EMICODE® label has become a useful orientation aid and decision-making tool for consumers, product users and building clients.

But Henkel is also taking a new and different approach in the area of technology development – especially in the field of sealing and bonding solutions for facade and window installation. For example, Henkel replaced almost all its acrylate and bitumen adhesives with PSA coatings based on patented hotmelt technology, thereby achieving unique application advantages. But don't just take our word for it: put us to the test!

When it comes to fire protection, the facade is of particular importance. The focus is usually on the fire-retardant properties of the facade materials and insulation used, but sealing is also an important element that should not be neglected.
TEROSON Bautechnik continues to build on its fire protection expertise in weatherproofing and is the first supplier in the market to develop an elastic, vapor-permeable facade sealing strip that features excellent fire-retardant properties. TEROSON FO 2 FR offers protection against all four elements - water, air, fire and earth.

The organization – TEROSON WINTeQ Europe

TEROSON – Your partner for Europe-wide projects

Under the roof of TEROSON WINTeQ Europe, Henkel offers sealing and bonding solutions to facade builders and window installers – across borders, state of the art and of premium quality. TEROSON's team of technical advisors provides active support beyond national boundaries, based on many years of practical experience. TEROSON's range of systems and services is in a class of its own and therefore attractive for all window-making and metal-working companies – no matter whether they operate on a regional, national or international scale.

A quality window must go hand in hand with quality installation – only then can the desired result be produced in the building envelope. Especially in the construction of curtain walls, no project is like the other. The demands on facade geometry, function and appearance often push planners, engineers and contracting companies to their limits. We enable our partners to translate unique architectural design into reality by providing expert waterproofing advice.

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Central Library in Seattle, Seele GmbH & Co

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Headquarters of 50Hertz, Berlin, Sommer

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South Bank, London, GIG FASSADEN

Crucial for a well-functioning building envelope. On time, on schedule, on budget – right from the start.

Building projects of our customers – at home and abroad

The expert with comprehensive advisory service & product knowhow in the field of sealing & bonding solutions for facade and window installation

We are TEROSON – a brand of Henkel Adhesive Technologies. We know that modern facade constructions are becoming increasingly individual and complex, and that the demands on you are growing all the time. We therefore offer the comprehensive solutions you need to safely master every bonding and sealing job on any type of facade. Our well-matched, innovative product systems are supplemented by expert advice and service packages. You can always count on us – not only as an expert with 30 years of experience, but also as a true partner at your side.

TEROSON. The perfect partner for YOUR success.

1. Outstanding product quality
2. User-friendly application
3. Sound advice
4. Excellent service
5. Technical support
6. Your partner all across Europe

TEROSON. No room for compromise.

Product innovations by TEROSON

- **TEROSON SD 150 M+S**
  The first full-surface self-adhesive sealing strip for facades
- **TEROSON WT 112 DB**
  Revolutionary antidrumming compound with the highest fire protection rating (of its time) – very low consumption
- **TEROSON SE 2000 MF**
  Highly reactive bonding and sealing wizard for virtually all applications in metal construction
- **TEROSON FO SD3**
  The first diffusion-capable facade sealing strip featuring an s_d value of less than 5 m
- **TEROSON SE 139**
  The first highly elastic acrylic joint sealant for structural and connection joints (outdoors)
- **TEROSON EF 537**
  The first high-precision window foam featuring minimal post-expansion of just 20 %
- **TEROSON FO FOIL-TACK**
  Full-surface, self-adhesive and repositionable sealing strip – no need for a primer, usable down to -5 °C
- **TEROSON FO 2 FR**
  The first flame-retardant, vapor-permeable special sealing strip for external facade connections

The global corporation behind TEROSON: Henkel

Henkel operates in 120 countries and is the world market leader in adhesives, sealants and surface technologies for consumers, craftsmen and industrial applications. Thanks to its substantial investments in research and development, the company is driving the continuous improvement of products and solutions for the benefit of its customers.

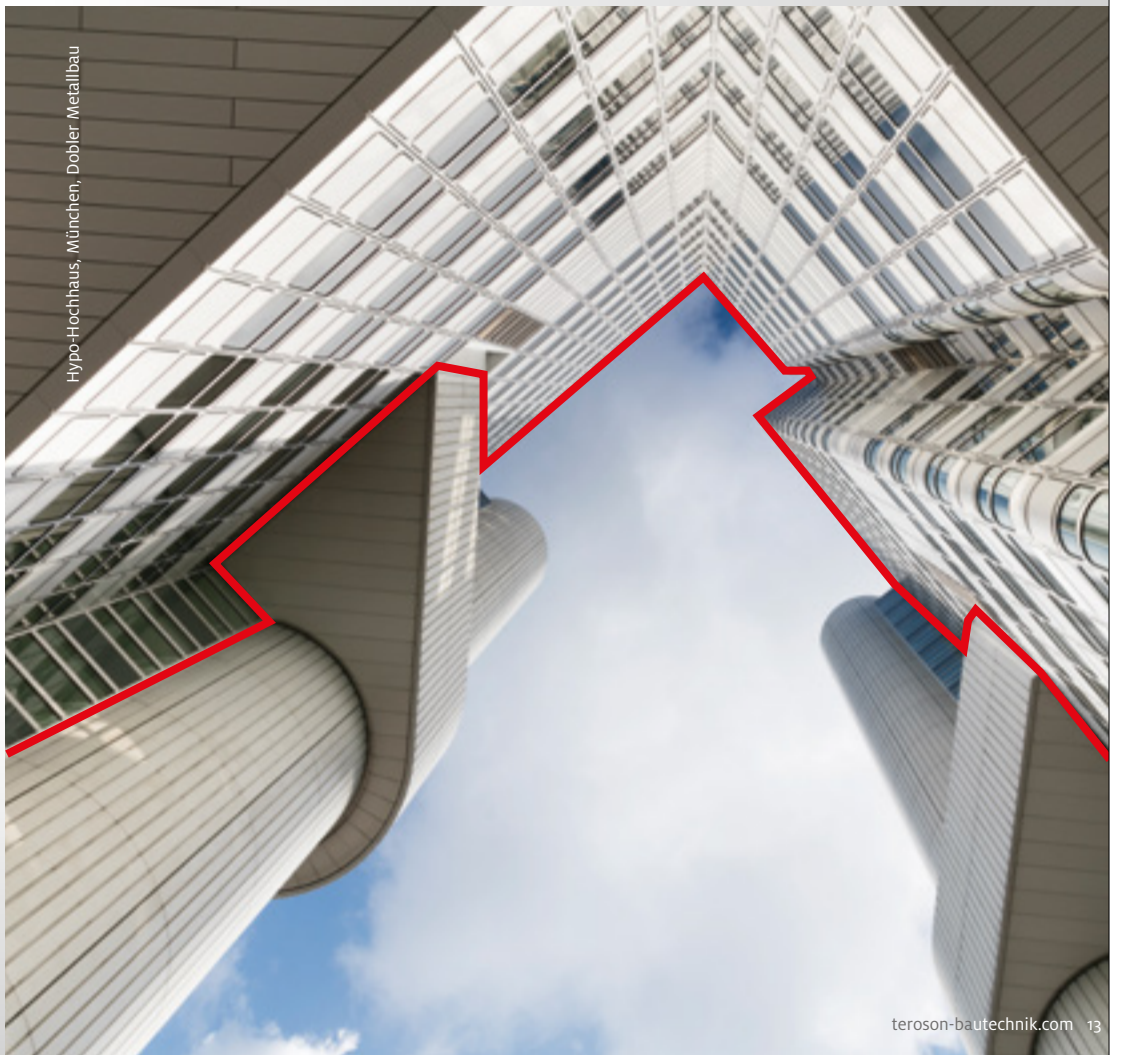
Quality from Henkel – to guarantee your professional success

Among the building technology brands of the global Henkel Group, TEROSON is the expert in sealing and bonding solutions for facades and windows. Henkel has also established a strong ETICS business under the brand name Ceresit. Together, the two brands form the business unit “Facade Solutions” within Henkel Adhesive Technologies Construction.
Thanks to their integration into the Henkel Group, the experts of TEROSON can tap into all areas of expertise, application requirements and technologies within the Group.
TEROSON combines the best technologies in the field of facade and window sealing. We can therefore fully meet the most demanding application requirements and provide our customers with maximum benefit.

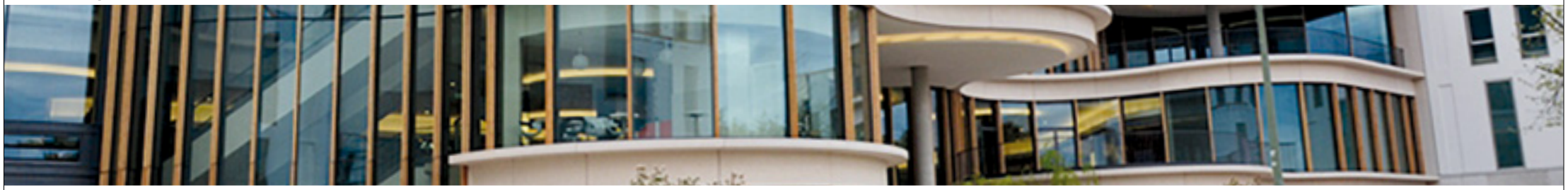
- **Structural waterproofing**
  High expertise and a comprehensive product range mainly under the brand name Polybit
- **Coatings**
  High expertise and a comprehensive product range mainly under the brand name Fester
- **PSA**
  High expertise and superior technologies mainly under the brand name Technomelt

TEROSON®

Building physics



Hypo-Hochhaus, München, Dobler Metallbau



The structural-physical necessities of facade and window installation

In order to ensure optimum performance of the building envelope, windows do not only need to be manufactured to a high quality standard but also expertly installed. In the end, only a 100 % tight building envelope is a well-functioning building envelope. It does not make sense to invest in high-quality windows, insulation and cladding and not make sure that the gaps and joints on facades and windows are properly sealed with quality materials. Failure to do so will result in trouble, eventually causing substantial structural damage.

The professional execution of facade and window installation requires meticulous and expert planning, selecting the right sealing products such as sealing strips, adhesives and sealants, and, of course, expert workmanship according to the current state of the art. If, during the installation of facades and windows, the necessary sealing measures are not given the right attention, the consequences will quickly show. The most common mistakes concerning the vertical surfaces of the building envelope are partly made during the planning stage but mostly on the construction site, leading to visible defects like mold growth, water stains and material softening.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Driven by the demands for energy efficiency, living comfort and sustainability stipulated by the German Energy Saving Ordinance (EnEV) in its currently valid version of 2016, window technology has taken a huge step forward in the last few years. This not only applies to the industrial manufacture of windows, but also to the technology of window installation. In any case, it is always advisable to hire a project manager or energy consultant who accompanies the project management – from the planning phase to the final inspection.
Special attention must be paid to observe the statutory provisions and the requirements laid down in the technical guidelines. For an overview and extracts from the most important regulations refer to pages 239 to 253.

There are 6 main factors to consider:

1. Physically correct positioning of the window in the building structure
2. Proper fastening of the window in the building structure
3. Air- and watertight sealing of the connection joints
4. Reliable protection against moisture (vapor diffusion gradient)
5. Sound and heat insulation of the connection joints (between components and building shell)
6. Prevention of thermal bridges

6

General principles and requirements of facade and window installation

In general, it is always advisable to call in a project manager or energy consultant to oversee the project from the planning stage to the final building inspection.

The following requirements for professional window installation must be observed by all means:

a. The windows in the facade need to be installed in such a way that the building structure is permanently protected from weather-related damage (weather protection).
b. Energy consumption must be reduced as much as possible in compliance with EnEV 2016 (thermal insulation).
c. The indoor climate must be as pleasant and healthy as possible for future residents and also provide the necessary quiet.
d. The installation must provide safe in the event of fire (fire protection).

Building material table

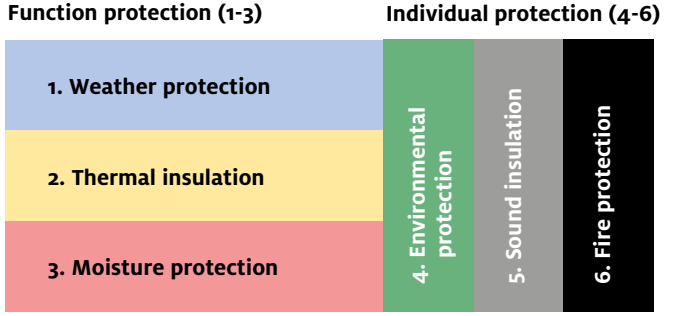
Building material	Average thickness	μ	s_d value
Vertically perforated bricks	360 mm	5–10	3.6 m
Sand-lime bricks	240 mm	17	4.1 m
In-situ concrete	240 mm	70–150	36.0 m
Exterior plaster	15 mm	10	0.2 m
Interior plaster	15 mm	10	0.2 m
Insulation	120 mm	15	1.8 m

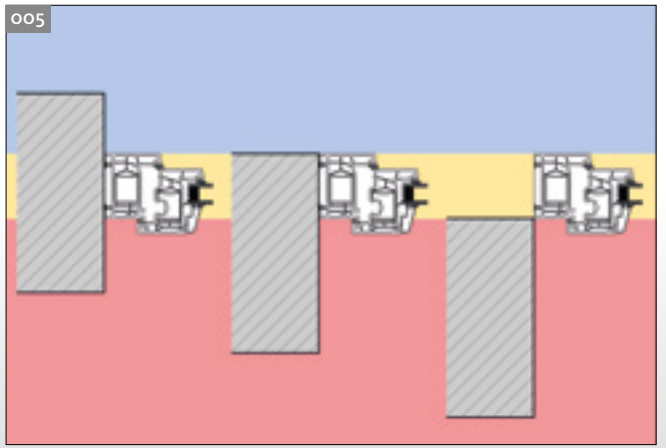
The following standards and technical regulations must be observed when installing window and facade elements:

1. Weather protection (EnEG, GEG)
2. Thermal insulation against heat and cold (EnEV, GEG)
3. Moisture protection (condensate, driving rain, DIN 4108, VOB/C DIN 18360)
4. Environmental protection (LEED, BREEAM, DGNB)
5. Sound insulation (DIN 4109)
6. Fire protection (DIN 13501)

Functions

Installation of the vertical building envelope





1. Weather protection

The product standard divides facades and windows into different classes with regard to driving rain resistance, airtightness and resistance to wind load.

Properties and classification of windows and exterior doors acc. to product standard

Property	Value / unit	Classification									
Driving rain resistance	Unprotected (A)	1A	2A	3A	4A	5A	6A	7A	8A	9A	Exxx
	Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)	(450)	(600)	(> 600)
	Protected (B)	1B	2B	3B	4B	5B	6B	7B			
	Test pressure (Pa)	(0)	(50)	(100)	(150)	(200)	(250)	(300)			
Air permeability	Maximum test pressure (Pa)	1 (150)			2 (300)		3 (600)			4 (600)	
	Reference air permeability at 100 Pa*	(50) or (12.50)			(27) or (6.75)		(9) or (2.25)			(3) or (0.75)	
Resistance to wind load	Frame deflection	A (≤ 1/150)			B (≤ 1/200)			C (≤ 1/300)			
	Test pressure P1 (Pa)	1 (400)	2 (800)		3 (1200)	4 (1600)		5 (2000)	Exxx (> 2000)		

* ($m^3/(h \cdot m^2)$) or ($m^3/(h \cdot m)$)

Watertightness (DIN EN 12208)

Watertightness is the protection that the window offers the inside of the building against water ingress for a given wind load, quantity and duration of rain.

Airtightness

Permanent airtightness refers to the design of the heat-transmitting surface areas, including structural and connection joints. It is clearly required by GEG, EnEV and DIN 4108-2. These regulations also specify that neither construction joints in building components nor component and wall connection joints contribute to the minimum air exchange rate and must be designed to be airtight. The obligation to provide evidence is clearly regulated. Airtightness is usually determined by means of a differential pressure test (blower door test).

2. Thermal insulation

The primary task of thermal insulation is to reduce heat loss from the building during the heating period and thus minimize the energy consumption of buildings significantly. It also helps ensure a sufficiently high surface temperature on the internal surfaces of the building components during the heating period. In a normal room climate, surface condensation can thus be prevented.

3. Moisture protection

Protection against moisture provides for the comfort and well-being of the inhabitants and protects the building structure against damage. While weather protection prevents driving rain from entering the inside of the building through external building components, moisture protection must ensure that condensation caused by the use of the building forms on the interior surfaces or inside a building component. Consequently, when sealing a component, the vapor-tight or vapor-retarding materials must always be installed on the warm side and the vapor-open or -permeable materials on the cold side of the building.

Principle: Tighter on the inside than on the outside.

4. Environmental Protection

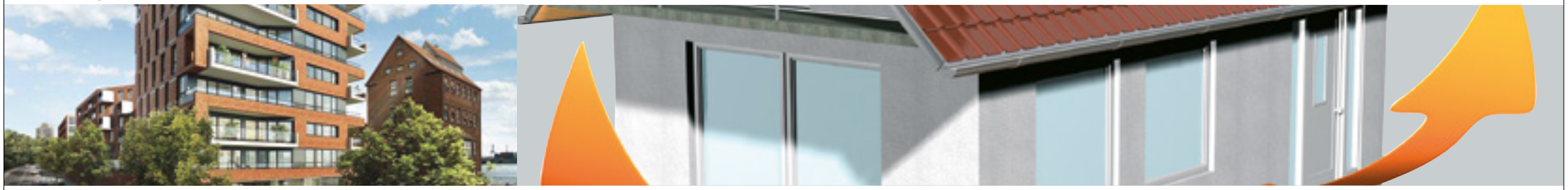
Under environmental protection we summarize the topics of sustainability and sustainable building. The indoor air emissions (VOC) as well as the worrying lists of ingredients (SVHC) are of great importance. These requirements are constantly becoming more stringent and are increasingly leading to innovation and transformation. With good reason.

5. Sound insulation

Sound insulation of the connection joints between components and building shell is basically ensured by the thermal insulation of the building. But also the sealing products contribute to sound reduction. They often determine whether a higher sound insulation class can be achieved. For more details, please refer to the chapter on “Sound Insulation” (p. 39-46).

6. Fire protection

Fire protection with regard to facade design is a complex topic that has been hotly debated for many years and whose EU-wide harmonization is only slowly progressing. Building materials are classified in accordance with DIN EN 13501. For more details, please refer to the chapter on “Fire Protection” (p. 47-51).



So much energy is lost:
The largest loss of energy from the building envelope is through windows, doors and walls. By replacing old windows and doors and expertly sealing the connections between the components and the building structure, a major part of the energy loss can be prevented in the long term.

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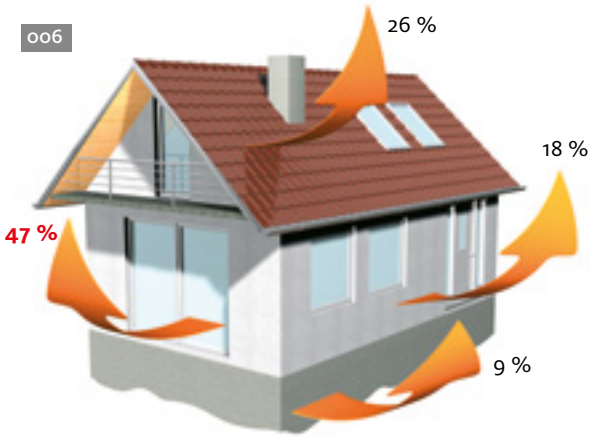

Please note: Buildings account for nearly 40% of annual global greenhouse gas emissions.

Condensation

EXPERT ADVICE

■ Basic rule:
The crucial issue in facade and window installation is a “distinct” vapor diffusion gradient from the inside to the outside. In other words: a diffusion gradient of at least 1 : 5. This is the only way to ensure an expert and structurally correct building envelope connection in the long term.

In accordance with the laws of building physics, water vapor always seeks equilibrium. High humidity will therefore always move to an area with lower humidity until a vapor pressure equilibrium is established. In our latitudes (Western Europe), this usually means a diffusion flow from the inside to the outside. In the cold season, it is unavoidable that water vapor precipitates as condensation – normally when the saturation limit is exceeded at around +10 °C. If the principle of “Tighter on the inside than on the outside” has been observed, less water vapor will penetrate from inside the building into the wall construction than can diffuse out through the external walls in summer. In this context, the connection joints between window/facade elements and the building structure are much more critical.

Since the thickness of the sealant applied in the connecting joint is much lower than the wall material thickness, the isotherms, i.e. the lines of identical temperature within the structure, are much closer to each other in the area of connecting joints. For this reason, special care must be taken to ensure that the inner sealing of the connection joint has a significantly higher diffusion resistance factor than the outer sealing – in other words: Tighter on the inside than on the outside. The terms “inside” and “outside” need to be understood in terms of building physics, not in terms of building geometry. Inside therefore means the area with a temperature of > +10 °C, whereas outside means the area of < +10 °C. In the case of punched windows, inside mostly means the same in terms of building physics and building geometry. With curtain walls, however, this is often not the case.

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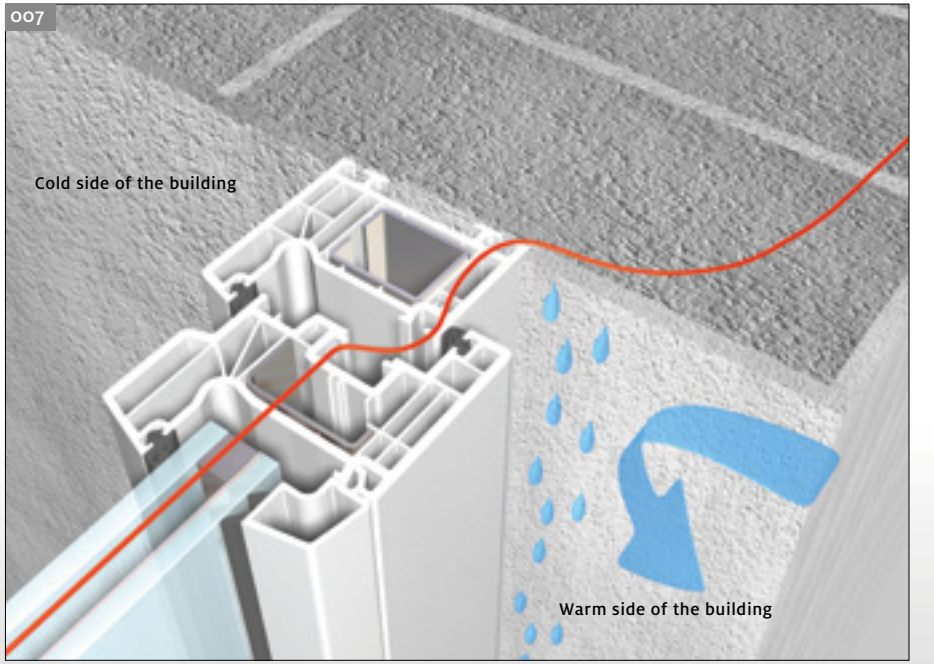


Isotherms or heat flow in building components

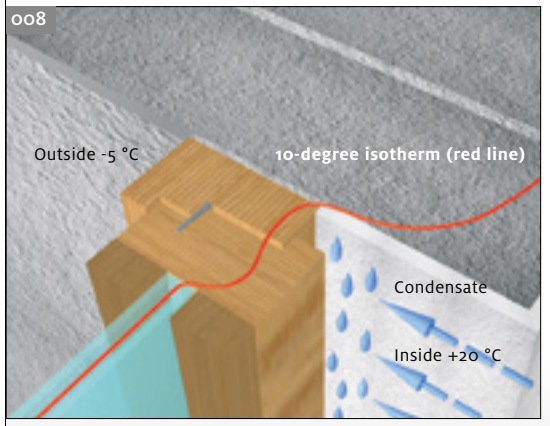
The calculation of isotherms running inside building components, especially in the area of window connections, has become more and more important – not least because of the increasing amount of structural damage reported over the last years. Proper calculation of the isotherms is a prerequisite for the expert installation of windows and reliable sealing of joints. The calculation can be done with the help of detailed drawings.

The illustration shows that the position of building components in relation to each other and of the joints connecting them is of vital importance for the heat flow. Isotherms are lines or surfaces of constant temperature inside building components. The calculation is based on the standard climatic conditions laid down in DIN 4108 (indoor temperature +20 °C, 50 % relative humidity on the component surface, outdoor temperature -5 °C).

The 10-degree isotherm (also called the “red line”) is of particular importance here: it delineates the area where condensate may form. Condensation occurs when warm, moist indoor air moves to the outside and comes into contact with surfaces of lower temperature. If the red line reaches the surface of built-in components or is interrupted, there is a high risk of condensation and subsequent moisture penetration.

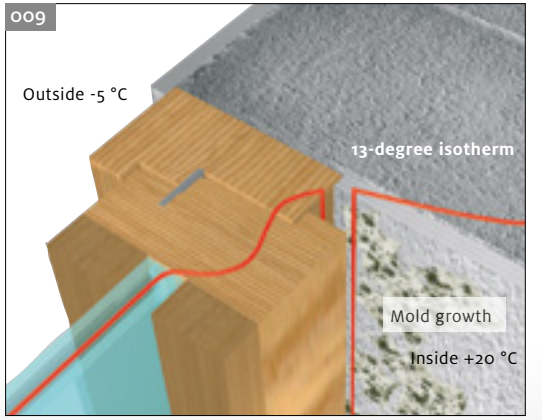
When comparing an externally installed window (009) and a centrally installed window (008) with an otherwise identical wall construction, the externally installed window clearly performs worse. The situation would be different, however, with thermally insulated exterior walls. Here, it is correct from a structural-physical point of view to install the window in the area of the insulation layer.

008



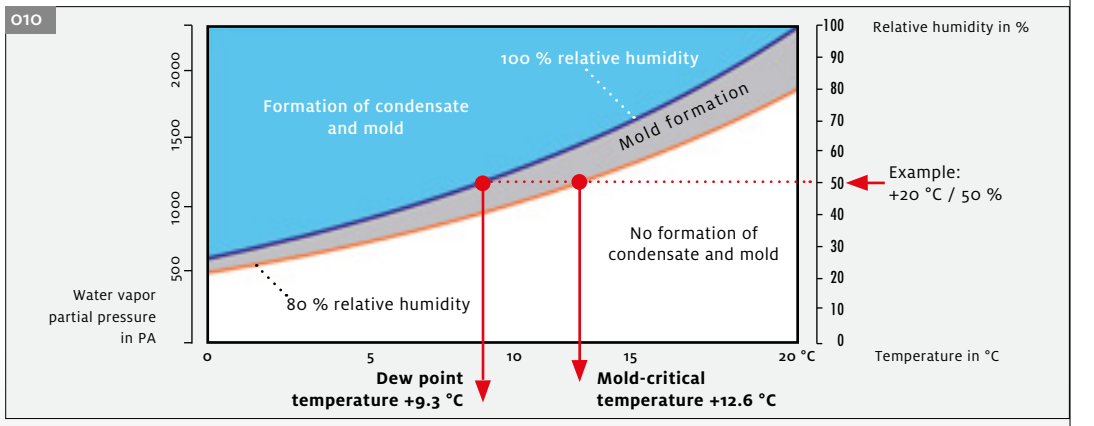
Isothermal line: centrally installed window
Unfavorable run of the isotherm, formation of condensate on the surface

009



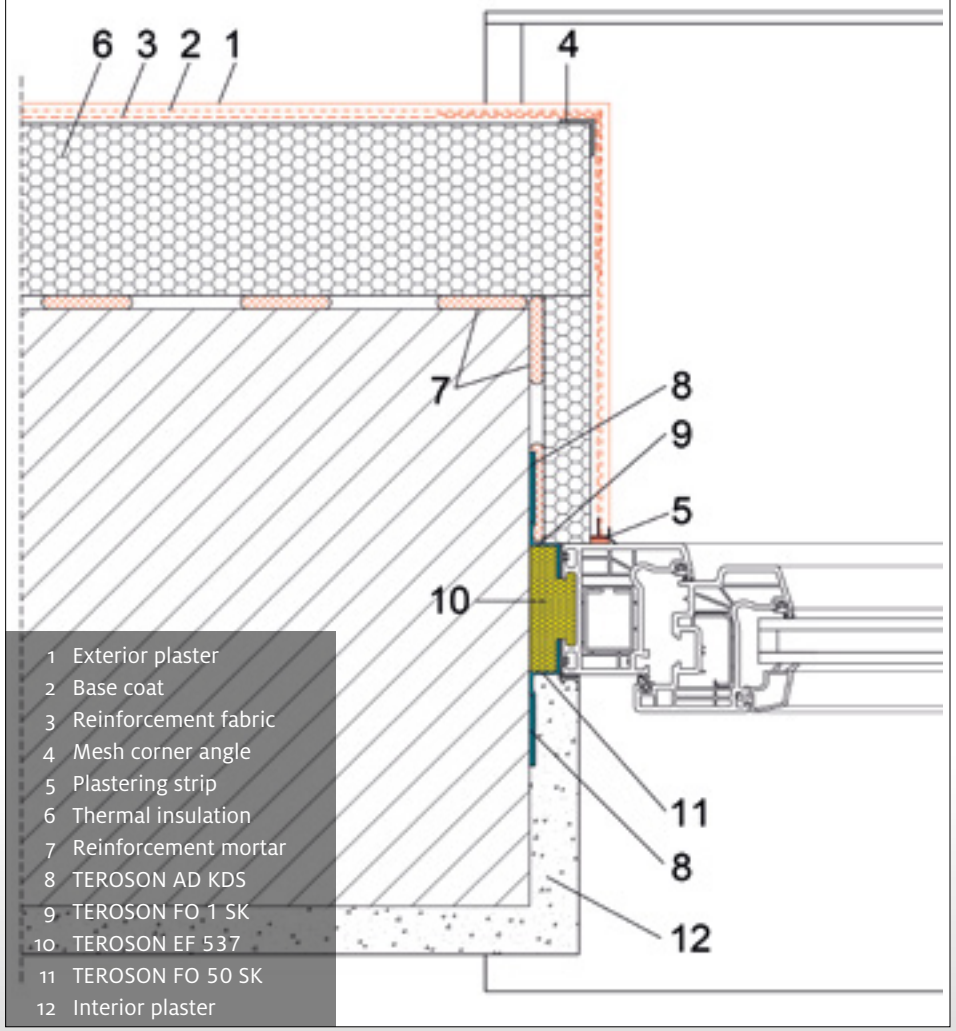
Isothermal line: externally installed window
Also unfavorable run of the isotherm. 13-degree isotherm is interrupted on the surface. Inevitable consequence: mold formation.

010



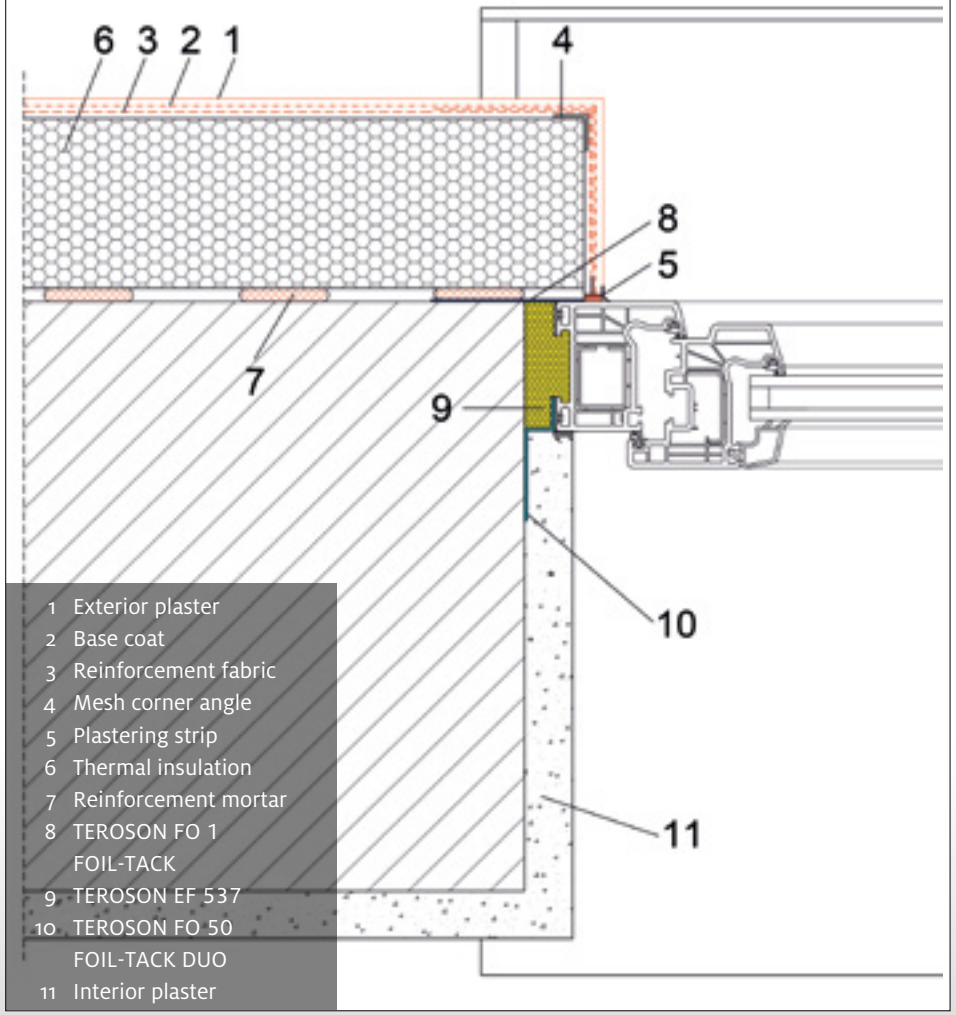
Source: “Wärmebrückenkatalog für den Fenstertausch im Gebäudebestand”, iBAT Hannover

011



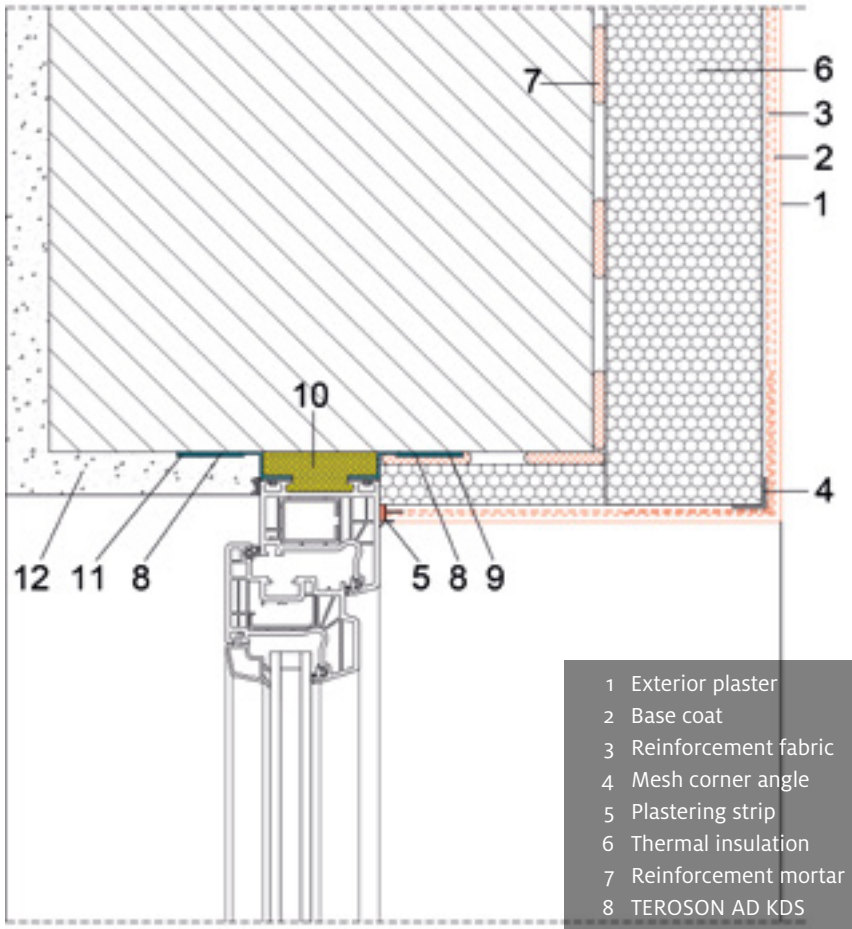
1 Exterior plaster
2 Base coat
3 Reinforcement fabric
4 Mesh corner angle
5 Plastering strip
6 Thermal insulation
7 Reinforcement mortar
8 TEROSON AD KDS
9 TEROSON FO 1 SK
10 TEROSON EF 537
11 TEROSON FO 50 SK
12 Interior plaster

012



1 Exterior plaster
2 Base coat
3 Reinforcement fabric
4 Mesh corner angle
5 Plastering strip
6 Thermal insulation
7 Reinforcement mortar
8 TEROSON FO 1 FOIL-TACK
9 TEROSON EF 537
10 TEROSON FO 50 FOIL-TACK DUO
11 Interior plaster

013



1 Exterior plaster
2 Base coat
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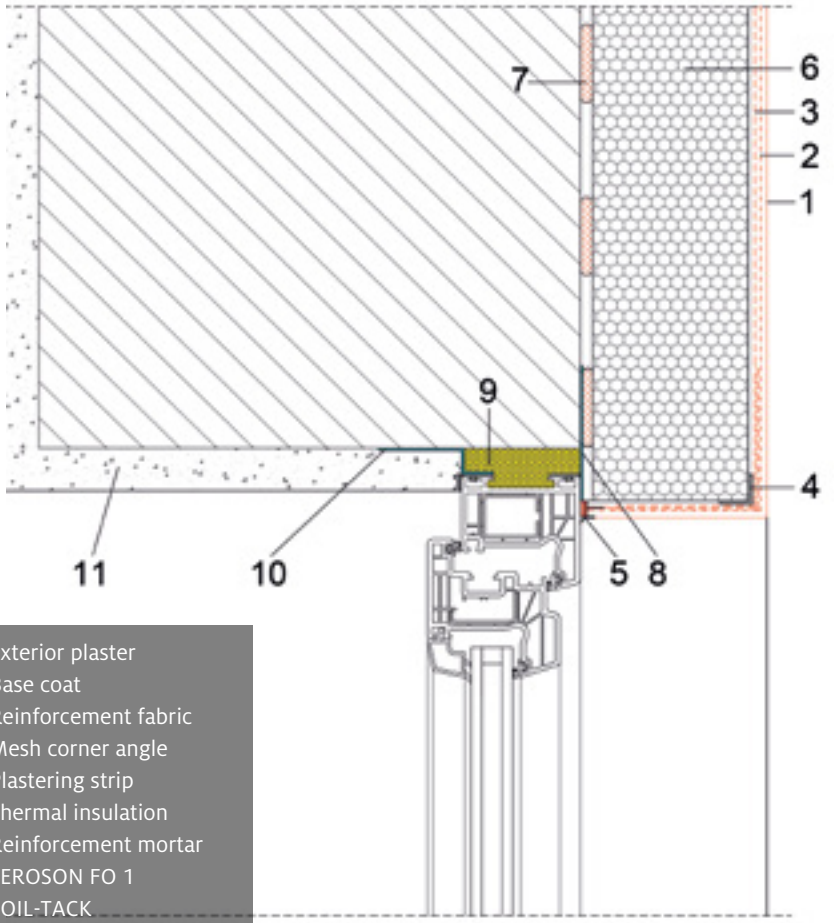
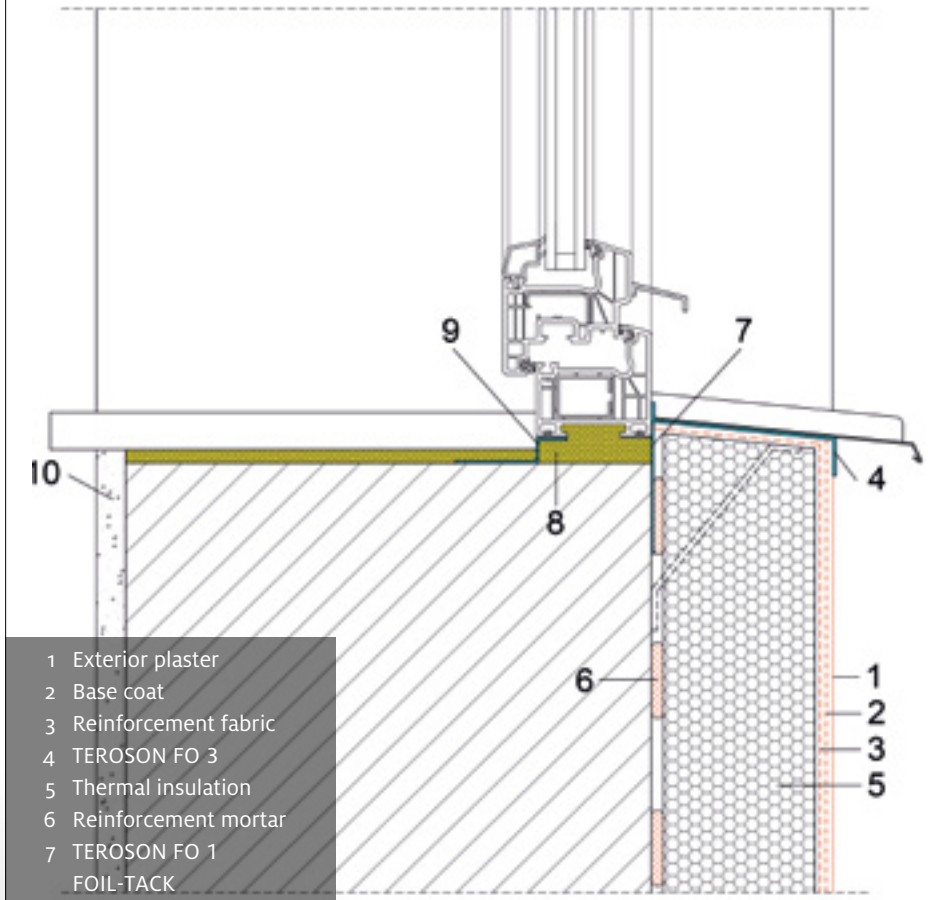
5 Plastering strip
6 Thermal insulation
7 Reinforcement mortar
8 TEROSON AD KDS
9 TEROSON FO 1 SK
10 TEROSON EF 537
11 TEROSON FO 50 SK
12 Interior plaster

014



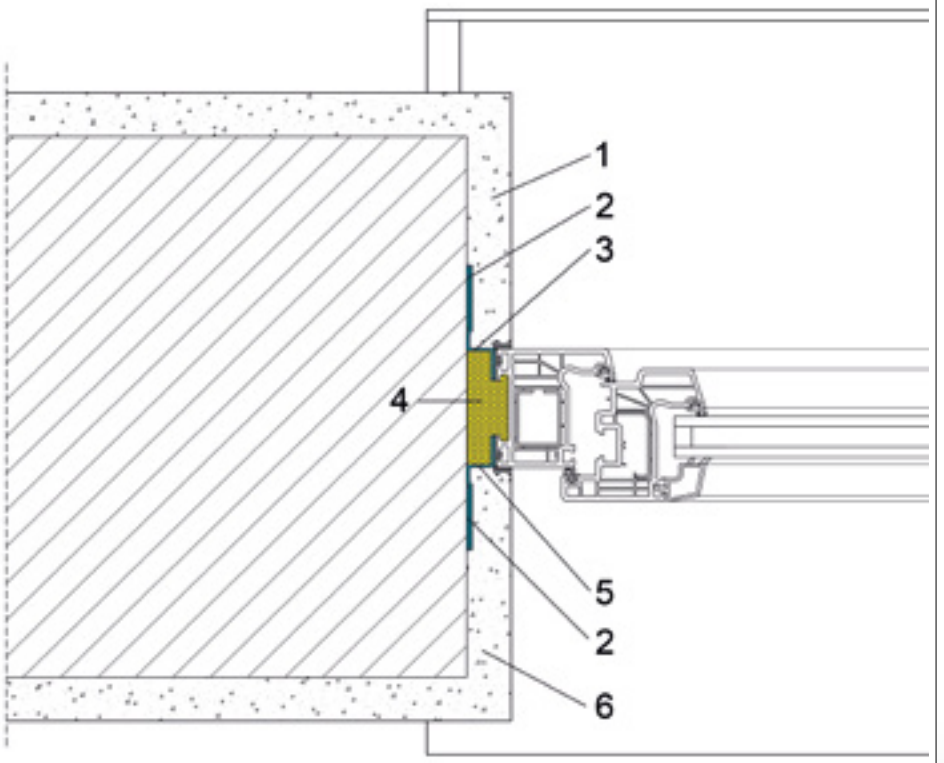
1 Exterior plaster
2 Base coat
3 Reinforcement fabric
4 Mesh corner angle
5 Plastering strip
6 Thermal insulation
7 Reinforcement mortar
8 TEROSON FO 1 FOIL-TACK
9 TEROSON EF 537
10 TEROSON FO 50 FOIL-TACK DUO
11 Interior plaster

015



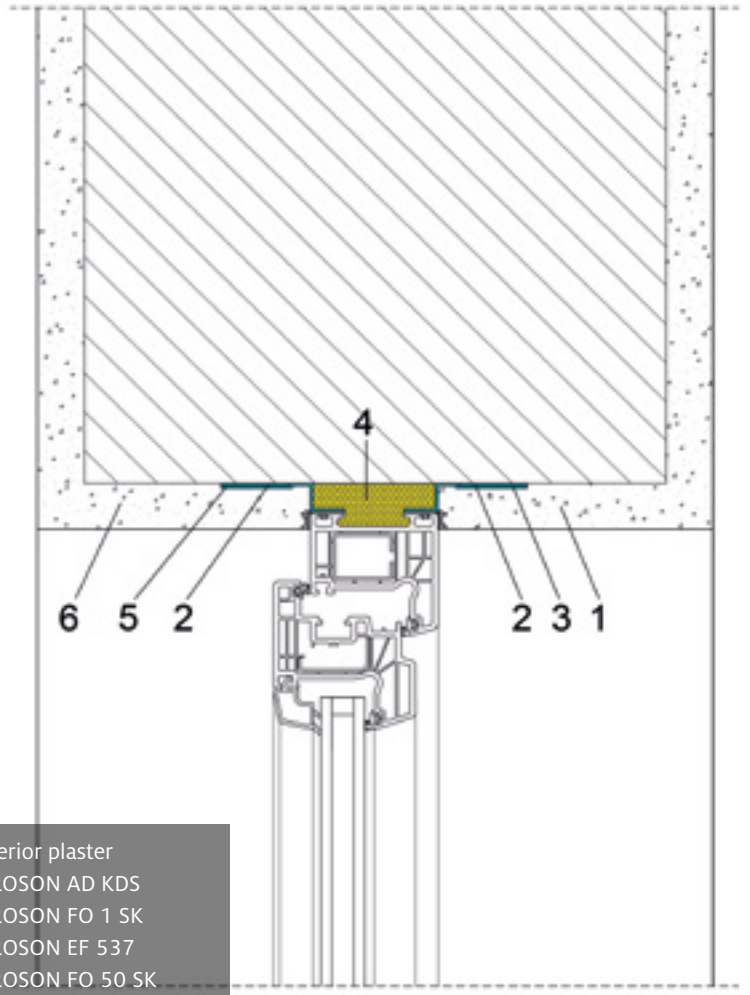
1 Exterior plaster
2 Base coat
3 Reinforcement fabric
4 TEROSON FO 3
5 Thermal insulation
6 Reinforcement mortar
7 TEROSON FO 1 FOIL-TACK
8 TEROSON EF 537
9 TEROSON FO 50 FOIL-TACK DUO
10 Interior plaster

016



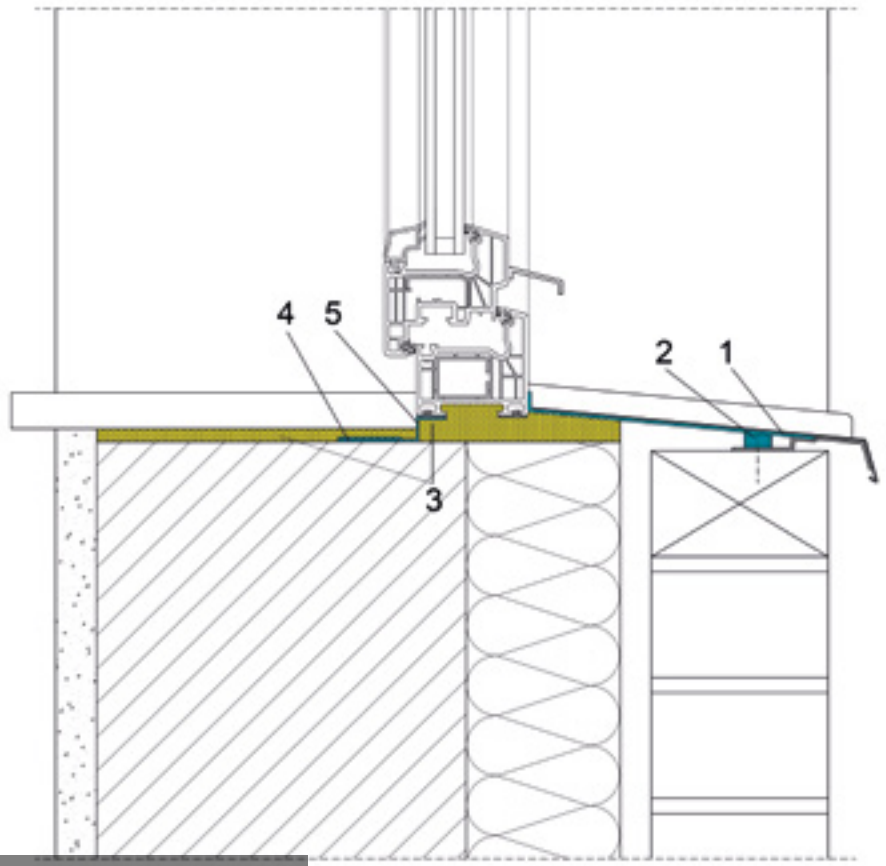
1 Exterior plaster
2 TEROSON AD KDS
3 TEROSON FO 1 SK
4 TEROSON EF 537
5 TEROSON FO 50 SK
6 Interior plaster

017



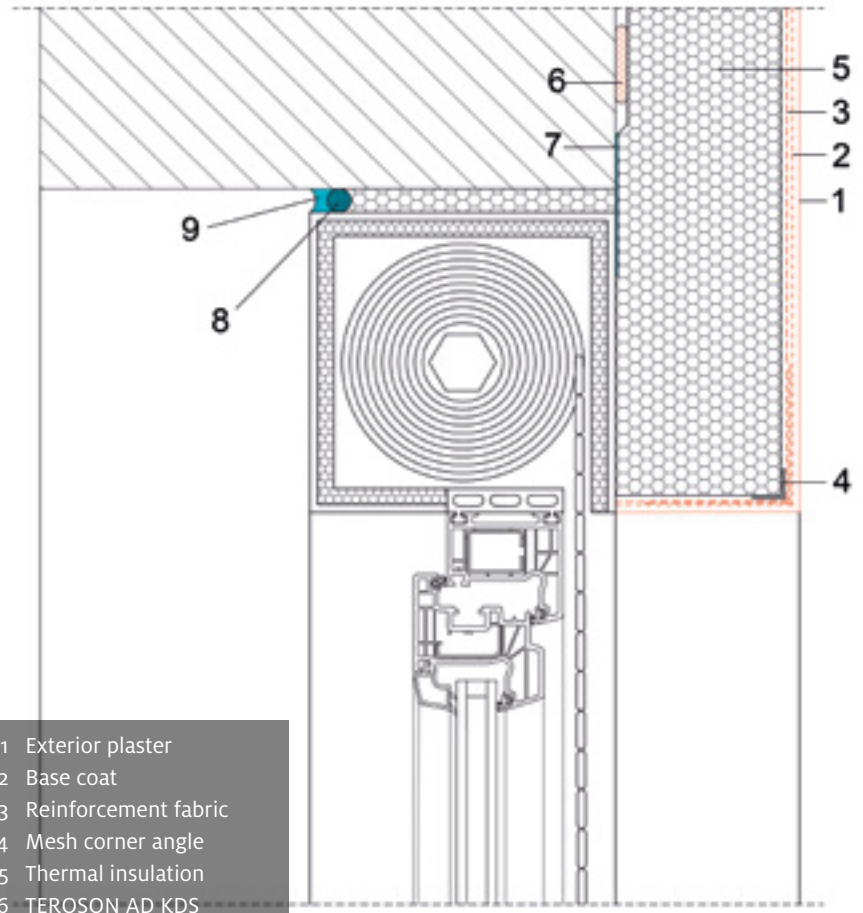
1 Exterior plaster
2 TEROSON AD KDS
3 TEROSON FO 1 SK
4 TEROSON EF 537
5 TEROSON FO 50 SK
6 Interior plaster

018



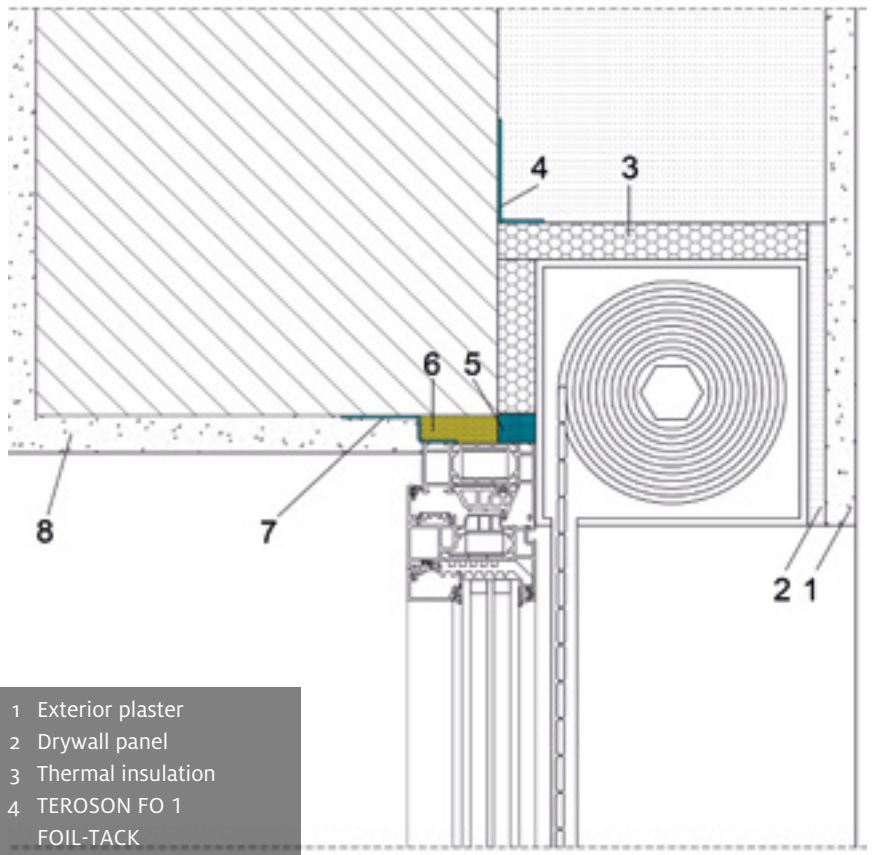
1 TEROSON FO 3
2 TEROSON PT ecoMAX 600
3 TEROSON EF 537
4 TEROSON AD KDS
5 TEROSON FO 50 SK

019



1 Exterior plaster
2 Base coat
3 Reinforcement fabric
4 Mesh corner angle
5 Thermal insulation
6 TEROSON AD KDS
7 TEROSON FO 1
8 Backfill material
9 TEROSON SE 139

020



1 Exterior plaster
2 Drywall panel
3 Thermal insulation
4 TEROSON FO 1
FOIL-TACK
5 TEROSON PT ecoMAX 600
6 TEROSON EF 537
7 TEROSON FO 50
FOIL-TACK DUO
8 Interior plaster

TEROSON®

Enviromental protection

Sustainability at TEROSON

As a manufacturer of building products, TEROSON has, of course, prepared the necessary documents like product and manufacturer's declarations which the product user can submit to the responsible auditor. Since there exist different certification systems for sustainable buildings in Europe (e.g. DGNB and LEED), TEROSON also provides the required documentation for these systems.

If a building is to be certified as sustainable, it needs to fulfill several requirements. However, the various certification systems differ significantly in the requirements that have to be met by the building products.

BREEAM – Building Research Establishment Environmental Assessment Method developed by BRE Global Ltd.
BREEAM is a voluntary sustainability rating system that has been established in the British market since 1990 and in the international market since 1998. The focus is on the environmental impact of buildings, which are assessed in compliance with the British Standard. Based on nine assessment categories, buildings are rated and certified on a scale of Pass, Good, Very Good, Excellent and Outstanding.

LEED – Leadership in Energy and Environmental Design – U.S. Green Building Council
LEED is a voluntary environmental certification system which has been established in the USA and the international market since 1998. The focus here is on energy use, which is evaluated on the basis of the ASHRAE Standards. Buildings can score points to a maximum of 100 across nine categories and can qualify for four levels of certification: Certified, Silver, Gold and Platinum.

DGNB – Deutsche Gesellschaft für Nachhaltiges Bauen e. V. (DGNB GmbH) – German Sustainable Building Council
DGNB is a voluntary certification scheme that was first introduced to the market in 2009. It has been continuously developed since then and is now also internationally recognized as the Global Benchmark for Sustainability. The system is based on the three sustainability areas of ecology, economy and sociocultural issues, which are weighted equally in the evaluation. A DGNB certificate in platinum, gold, silver or bronze can be obtained.

BNB – Bewertungssystem Nachhaltiges Bauen (German Federal Ministry of the Interior, Building and Community) – German Sustainable Building Council
The German Assessment System for Sustainable Building was developed and introduced in 2011 by the Federal Institute for Research on Building, Urban Affairs and Spatial Development in cooperation with the DGNB. It is binding for federal construction projects and is also based on the three classic dimensions of sustainability (ecology, economy and socio-cultural aspects). Fulfillment of the five criteria groups is rated and used to assign the gold, silver or bronze quality standard.

Over the last years, the criteria specified in these assessment systems have been constantly revised. In most cases, the requirements for the building products have become more stringent, comparable to the stricter requirements of the EnEV. For this reason, TEROSON regularly adapts the product and manufacturer's declarations to the current requirements laid down in the different certification systems.

The requirements to be met by sustainable building products must be specified in the bill of quantities which is part of the tender, indicating the selected system and including a catalogue of requirements for the different trades involved. The contracting parties are expected to take these special requirements into account.

Most often, buildings certified as sustainable are large, publicly owned buildings (federal administration buildings, museums, airports etc.) or are put out to tender by companies that have a special interest in sustainable buildings. After being awarded the contract, the contractor should request the required documents from the product manufacturers.

In 2015, the Paris Climate Agreement was signed and came into force in 2016. Naturally, also Henkel supports the obligations arising under this agreement and is therefore pursuing the goal of becoming a climate-positive company by 2040.

TEROSON®

Sound protection

The basics of sound insulation and noise control

Space in cities is becoming increasingly scarce and expensive. More and more areas are being built on, storeys are added to existing buildings and houses are optimized also with respect to sound insulation. Classic examples are residential buildings next to motorways or office buildings in the vicinity of airports. The topic of “noise control” is rightly gaining very much in importance, as a current study conducted by the European Environment Agency impressively demonstrates. It is a well-known fact that noise pollution makes people ill. Sadly, this statement is not an exaggeration. Many people feel severely disturbed by noise. The Employers‘ Liability Insurance Associations report a rapidly increasing number of people suffering from noise-induced diseases. Aircraft noise with a continuous noise level of 40 dB is already sufficient to significantly increase the risk of cardiovascular diseases.
It is therefore of vital importance to combat noise effectively at its source. However, deficiencies in sound insulation are difficult to detect, even for experts, and can only be proven by extensive measurements and expensive experts‘ reports.

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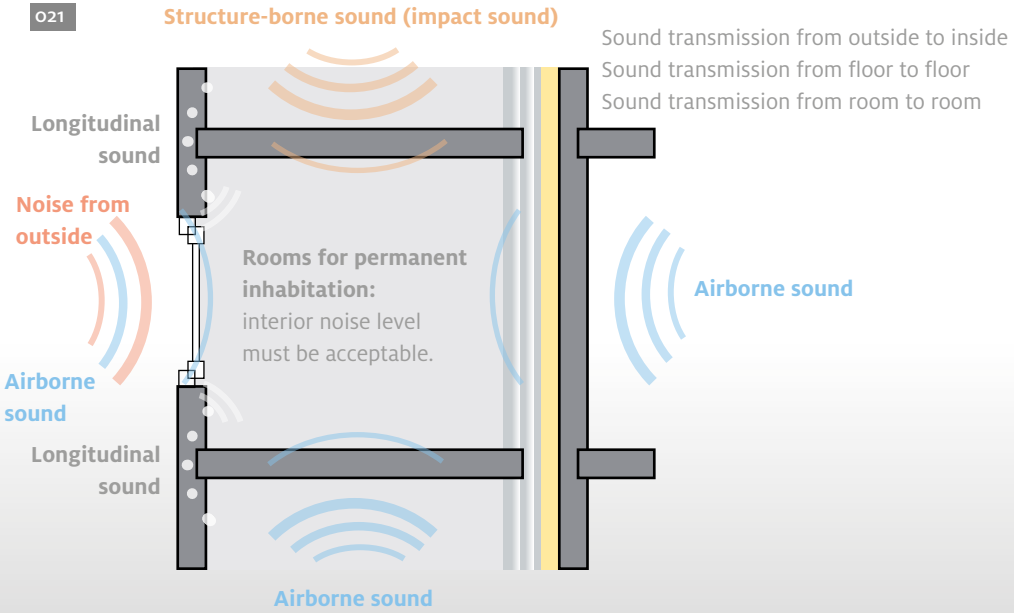

Basically, there are two types of sound:

1. Structure-borne sound

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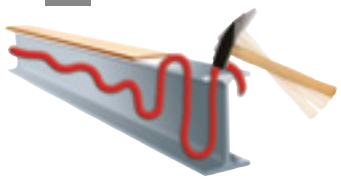


Structure-borne sound covers different noise sources and is, for instance, caused by impacts, earthquakes and the transmission of vibrations in buildings (footfall sound, ventilation systems, rain drumming on the windowsill, vehicles, machines etc.).

Structure-borne sound propagates in the form of bending waves. These cause vibrations of the surrounding air, thus producing sound that is audible to the human ear. The waves can also be transmitted through connected materials, e.g. screed, concrete or steel structures, both inside the building or, in the worst case, between neighboring buildings. A significant reduction of structure-borne sound is achieved, for instance, by separating the materials from each other. Example: a floating screed without direct connection to the masonry.

2. Airborne sound

023

By contrast, **airborne sound** propagates through the air in the form of spherical waves. These travel at a speed of 331 m/s.
With increasing distance from the sound source, the intensity will decrease. In everyday language, airborne sound is usually referred to as “noise” as in street noise, aircraft noise or construction site noise. Good noise reduction can be achieved by using particularly dense materials, such as concrete or glass, as these feature high resistance to noise (airborne sound).

The R_w value (the weighted sound reduction index) is the characteristic value for window and facade construction. The required R_w value only considers the airborne sound transmitted through the building components, facade, windows and doors. Sound transmission via secondary paths is not taken into account.

Jointly with Henkel, Fraunhofer Institute for Building Physics (IBP) investigated these effects in detail between 2017 and 2020.

TEROSON Bautechnik also offers special products for noise control. TEROSON BT 2002 is a self-adhesive insulation board that is bonded on top of metal sheets to absorb structure-borne sound. The insulation boards consist of bitumen-impregnated wool felt. Some of the boards are equipped on their upper side with a special sound-damping layer embossed with a diamond pattern to enhance the sound-absorbing capacity. They are used for the efficient and weight-saving antidrumming of thin-walled sheet metal and provide an additional reinforcement effect. Typical applications include facade elements, windowsills, garage doors, but also ventilation or airconditioning systems and elevator cabins. The sound-damping felt boards are even used in mechanical engineering.

In the case of window connection joints, it is important to achieve not only thermal insulation (on the various insulation levels) but also the required sound insulation. The sound reduction index (SRI) of sound-insulating windows is measured in decibels. As a rule of thumb, it is said that a ten-decibel reduction of noise is perceived by humans as a halving of noise.

The soundproofing properties of windows mainly depend on the following factors:

- Structure and thickness of the glazing
  - A larger distance between the individual panes increases the soundproofing effect of sound insulation windows.
  - If insulating glass consists of panes of different thickness, this may also increase the sound insulation.
  - The gas filled into the space between the panes of insulating glass does not influence the level of sound insulation.
- Acoustic quality of window frames and casements (cross-section and structure of window elements): important is the overall construction of glass, seals and frame.
- Very tight joints between casement and frame and between frame and masonry

The soundproofing of connection joints has become increasingly important in recent years. The latest generation of window elements has been considerably improved with respect to sound-insulating properties, e.g. by using multi-chamber systems and foam-filled or otherwise insulated profiles. Modern windows are equipped with special sound-insulating glass and have double or triple glazing.

Airtightness is a crucial factor for sound insulation resp. sound transmission, and thus also for the tightness of connection joints. The use of insulating materials such as sealing strips increases the sound insulation of joints. The absorbing properties of these materials make sure that connection joints are also acoustically insulated.

VDI standard 2719 differs between six sound insulation classes (SSK 1-6) for windows:

Sound insulation class	Traffic density	Distance of the house	Sound reduction index of the window
1	Residential street 10–15 cars per hour	> 35 meters	25–29 dB
2	Residential street 10–15 cars per hour	25-35 meters	30–34 dB
3	Residential street 50–200 cars per hour	25-35 meters	35–39 dB
4	Main street 1000–3000 cars per hour	100-300 meters	40–44 dB
5	Main street 1000–3000 cars per hour	30-100 meters	45–49 dB
6	Expressway 3000–5000 cars per hour	< 100 meters	≥ 50 dB

EXPERT TIP:

- Noise differences of approx. 10 dB are perceived by the human ear as either half or double the volume and are therefore of essential importance.
- Sound insulation of the connection joint is particularly important from sound insulation class 3 upward and thus relevant for planning. Airtightness is a key factor for achieving effective sound insulation of the joint and thus for the required sound insulation class.

Sound insulation and noise control

Requirements

The requirements to sound insulation apply to the entire exterior component after its installation. Besides the window, this also applies to auxiliary equipment such as roller shutter boxes and window fans as well as to the exterior wall including connections.

For the sound insulation of connection joints, the requirements are laid down in the following standards and guidelines:

- DIN 4109, parts 1, 2 and 35: “Sound insulation in buildings”
- DIN 18005-1 “Noise abatement in town planning”
- VDI Guideline 2719 “Sound insulation of windows and their auxiliary equipment”
- DIN EN 12354, parts 1 and 3: “Building acoustics”

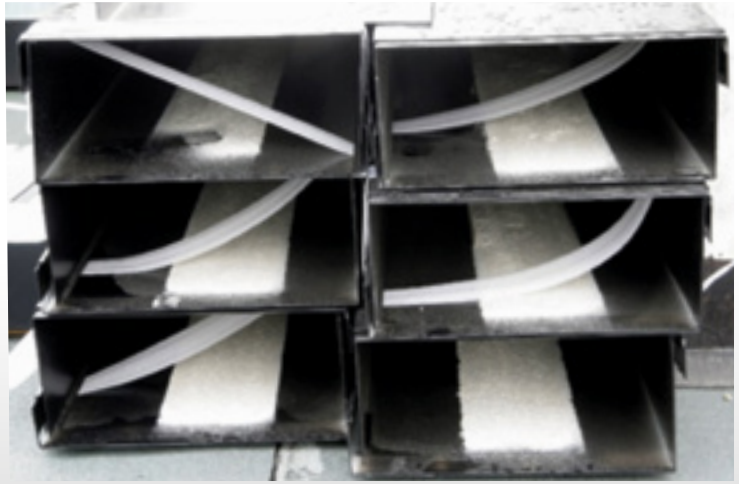
DIN 4109 lays down the requirements for sound insulation, in particular the protection of residents in rooms designed for permanent inhabitation (living rooms, sleeping rooms, offices etc.) against:

- noise from other rooms
- noise generated by technical installations inside the building (e.g. heating, water supply, airconditioning, lifts)
- external noise (traffic noise, commercial and industrial noise)

For new-builds, the requirements under DIN 4109 are mandatory. The standard lays down the minimum requirements, but in practical construction work higher requirements are usually fulfilled.

TEROSON WT 112 DB is a trowelable and sprayable antidrumming compounds based on aqueous synthetic resin dispersions with flame-retardant additives. TEROSON WT 112 DB meets the highest fire protection requirements and is “non-combustible” (class A2-s1, d0) in compliance with DIN EN 13501.

The coating is used for sound deadening and absorption of structure-borne sound caused by thin-walled sheet metal structures such as facade elements, sheet metal structures in vehicle, wagon and apparatus construction and in shipbuilding. It can be used on ventilation ducts, elevators and garbage chutes, but also in container construction.



TEROSON®

Fire protection

Fire protection

Fire protection with regard to facade design is a complex topic that has been hotly debated for many years and whose EU-wide harmonization is only slowly progressing.

Buildings
- over 18 m building height (> 5 floors) and/or
- with small clearances (1 m) and/or
- with evacuation problems often require a higher level of fire protection.

Fire protection is active consumer protection and a vital necessity in densely populated areas and high-rise buildings. Fire protection includes fire prevention, fire containment and firefighting.

The goal of **fire prevention** is to take precautions against potentially harmful fires. Certain areas are regulated by law – in particular the fire resistance classes of building components and the building material classes.

Fire containment includes measures like the design of fire compartments to limit the spread of fires, sprinkler systems, smoke flaps etc.

Firefighting: In particular, the time between the outbreak of a fire and effective counter-measures is of vital importance. Every minute counts. Facades or roofs covered with roofing membranes or sealing strips are no obstacle for the fire brigade.

TEROSON fire protection products

When planning the fire protection of buildings by means of suitable building materials, the aspect of "fire prevention" is of key importance.

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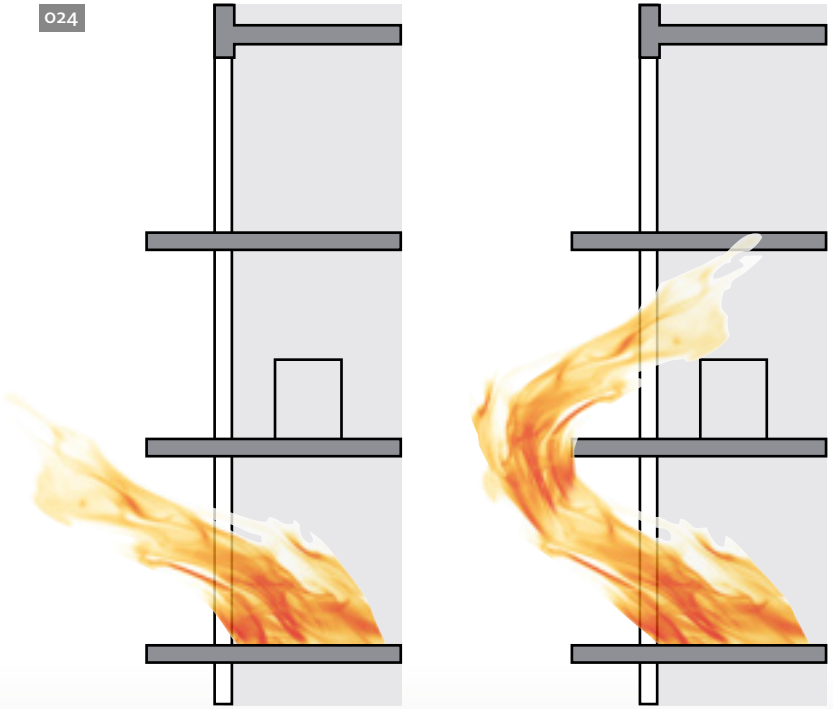
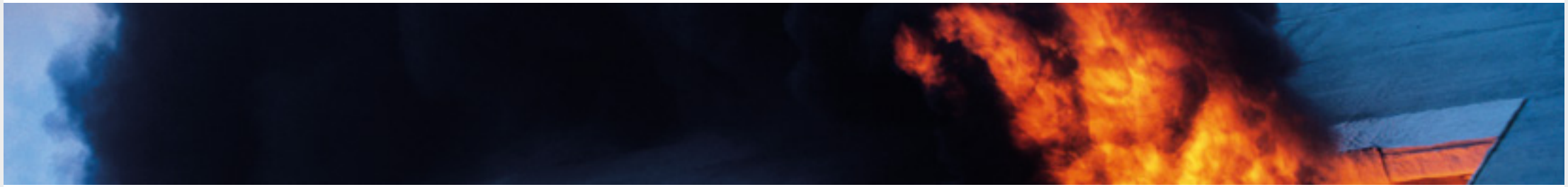


Assumed and actual shape of the flames



Standards and regulations

Formerly, DIN 4102 regulated and classified the fire behavior of building materials in Germany. Building materials to be used in building construction have to meet at least the requirements of building material class B2 (“normally flammable”). Meanwhile, DIN 4102 has been extended in Germany and other EU countries to include EN 13501. This standard classifies all building materials into seven Euro classes with corresponding fire side-effects. Here, too, the building materials used must be at least “normally flammable” and thus meet the requirements of Euro class E.

The classification of building materials according to DIN EN 13501 is as follows:

1. Fire resistance, classes A1-F
2. Smoke development, classes s1-s3
3. Formation of droplets, classes d0-d2

Conversion table DIN 4102-1 versus EN 13501-1

Building authority designation	Class acc. to DIN 4102-1	European class acc. to EN 13501-1	Smoke development			No burning droplets
			No	Limited	Unlimited	
Non-combustible	A1	A1	✓			✓
	A2	A2 s1, d0	✓			✓
Flame-retardant	B1	A2 s2, d1/2		✓		
		A2 s3, d1/2			✓	
		B/C s1, d0	✓			✓
		B/C s2, d0		✓		✓
		B/C s3, d0			✓	✓
		B/C s1, d1/2	✓			
		B/C s2, d1/2		✓		
		B/C s3, d1/2			✓	
Normally flammable	B2	D s1, d0	✓			✓
		D s2, d0		✓		✓
		D s3, d0			✓	✓
		E d2				
Easily flammable	B3	F				

The ratings A1, A2, B, C, D, E, F stand for the fire resistance class, s1, s2, s3 mean the level of smoke development whereas d0, d1, d2 refer to the formation of burning droplets. These criteria can be combined for classes A2, B, C, D in order to allow more precise statements. Particularly in the case of combustible building materials, it is important to know the extent to which smoke development and flaming droplets/particles cause additional hazards.

This is absolutely necessary to delay the spread of fire (flashover) and gain more time for the rescue of persons.

Further standards and regulations – Example: Great Britain

Despite the European harmonization, each country is committed to this topic with different interests and varying degrees of intensity. In England, for example, the Building Regulations 2010, section “Fire safety”, additionally stipulate under Regulation 7 (as a kind of “warning shot”) that all building materials used on external walls must meet the requirements of Euro class A2-s1, d0 or class A1.

Exempted from the regulation are, among others, waterproofing membranes and sealing strips which are regulated by “Approved Document B 2019”, par. 12.16. In this paragraph, a minimum classification of B-s3, d0 (high smoke production, no burning droplets) is required for strips and membranes above ground level. Of course, the structurally required properties of strips and membranes must remain unchanged so that sometimes paradoxical conditions result. In the end, planners and facade builders often have to use a process of elimination.

The main points of criticism are:

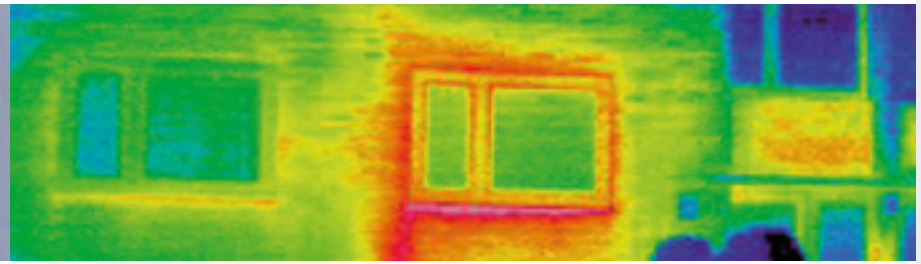
- inadequate vapor diffusion gradient of the solutions offered
- poor workability of the materials
- insufficient durability of the materials
- insufficient flexibility and water resistance of the materials
- lack of long-lasting functionality

Nevertheless, it should be noted that safety is everyone‘s responsibility!

TEROSON®

Weather protection

System-based weather protection



The basics of sealing

Due to the stricter requirements of the German Energy Saving Ordinance (EnEV) in recent years, connection joints and their proper sealing have become increasingly important. They separate the individual building components either from each other or from the building structure. The joints must be expertly sealed, while taking the structural-physical necessities into account. They must also meet the requirements of the “RAL Guideline on the planning and installation of windows and front doors in new-builds and refurbishment projects”.

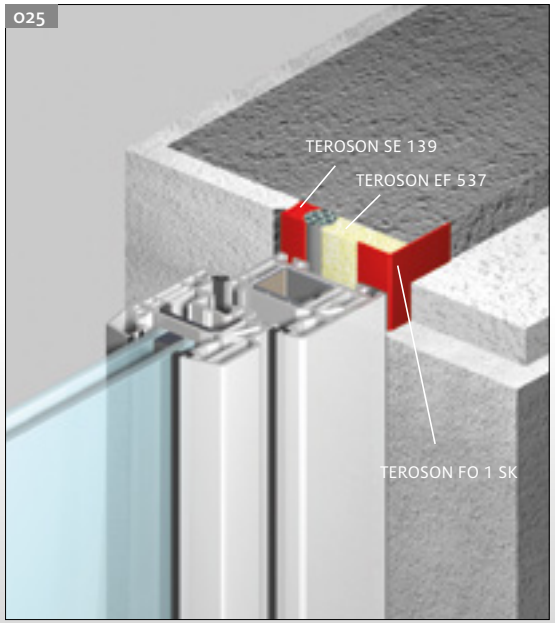
Because of the high importance of this critical zone, its proper sealing must be planned well in advance. The materials used for the different tasks and functions must be compatible and match each other under building physical aspects. It is recommendable to install a vapor-tight membrane on the inside of the building to prevent the penetration of moisture through the joint and thus into the insulation material. Especially low-energy or zero-energy houses require the installation of window systems that meet the highest demands with respect to thermal and acoustic insulation. In addition, they need to comply with the more stringent requirements for burglary protection.

Modern window elements are able to generate high energy savings thanks to effective heat and sound insulation. But also the connection joints must be able to fulfill today‘s thermal and acoustic insulation requirements.

EXPERT TIP:
Connection joints must be able to
- accommodate structural movement
- slow down the heat flow in the area of the joint
- retard (or even prevent) vapor diffusion from the inside
- prevent the ingress of moisture from the outside.

These days, the products used for sealing connection joints not only need to fulfill purely functional requirements. Apart from sealing the building envelope, they are also expected to meet the demands of sustainable construction, especially for new-builds.

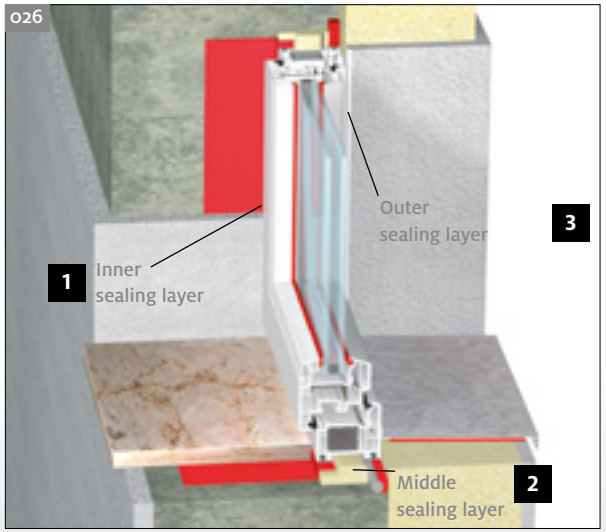
Windows and front doors are building elements that have to meet the most diverse requirements. In addition to their main function, i.e. opening and closing to allow or deny access, these elements are also expected to fulfill special tasks such as:
- Thermal insulation
- Sound insulation / noise control
- Weather protection: sealing against wind, air, driving rain, hail, snow, moisture etc.
- Burglary protection
- Ventilation
- Barrier-free access to the building
- Fire protection



Basically, sealing of a building element is performed on 3 different levels (see figure 026). The **outer sealing layer** must be resistant to driving rain while allowing vapor to diffuse.

The **middle sealing layer** provides thermal and acoustic insulation of the connection joint. It must also absorb movements of the structural element caused, for example, by opening or closing the window or by wind loads acting on the element.

The **inner sealing layer** must be airtight and ensure that the building is inside tighter than outside. In addition, a vapor retarder of > 40 m must be installed inside the building when sealing the joints. Naturally, special constructions require special sealing solutions where the sealing system needs to be modified. But these solutions do not represent the standard.



3-level sealing

Product name	Product type	s_d value range	1 Inner sealing layer (warm side of the building component)	2 Insulation layer	3 Outer sealing layer (cold side of the building component)
FO 1 SK	Fleece-laminated window sealing strip	**< 10 m**			✓
FO 1 FOIL-TACK	Fleece-laminated window sealing strip				✓
FO 1 FOIL-TACK DUO	Fleece-laminated window sealing strip				✓
FO 2 FR	Plastic sealing strip for facades				✓
FO 3	Plastic sealing strip for facades				✓
FO 3 SK1	Plastic sealing strip for facades				✓
FO 3 SK2	Plastic sealing strip for facades				✓
PT ecoMAX 600	Precompressed joint sealing tape				✓
SE 108^{xlt}	Neutral silicone sealant				✓
SE 2000 MF	MS polymer-based hybrid sealant				✓
EF 537	Polyurethane foam			✓	
FO 50 SK	Fleece-laminated window sealing strip	**> 40 m**	✓		
FO 50 FOIL-TACK	Fleece-laminated window sealing strip		✓		
FO 50 FOIL-TACK DUO	Fleece-laminated window sealing strip		✓		
FO 150 FOIL-TACK M+S	Plastic sealing strip for facades		✓		
TA ALU	Aluminum-coated sealing / fixing tape		✓		
SE 139	Acrylic sealant		✓		
SE 20	Acrylic sealant		✓		

Product	Group	Typical uses: 1 Inner sealing layer (warm side of the building component)	Typical uses: 2 Insulation layer	Typical uses: 3 Outer sealing layer (cold side of the building component)	Application: Must be covered with a plaster coat	Application: Not plasterable	Type of joint: Maintenance joint	Type of joint: Permanent joint	Joint size: Up to 30 mm	Joint size: Without limitation
FO 1 SK	FO			✓	✓			✓		✓
FO 1 FOIL-TACK	FO			✓	✓			✓		✓
FO 1 FOIL-TACK DUO	FO			✓	✓			✓		✓
FO 50 SK	FO	✓			✓			✓		✓
FO 50 FOIL-TACK	FO	✓			✓			✓		✓
FO 50 FOIL-TACK DUO	FO	✓			✓			✓		✓
FO 2 FR	FO			✓		✓		✓		✓
FO 3	FO			✓		✓		✓		✓
FO 3 SK1	FO			✓		✓		✓		✓
FO 3 SK2	FO			✓		✓		✓		✓
FO 150 FOIL-TACK M+S	FO	✓				✓		✓		✓
FO KSK M+S	FO	✓		✓		✓		✓		✓ only combined with a guide plate
TA ALU	TA	✓				✓		✓		✓
SE 108^{XLT}	SE			✓		✓	✓		✓	
SE 2000 MF	SE	✓		✓		✓	✓		✓	
SE 139	SE	✓		✓		✓	✓		✓	
PT ecoMAX 600	PT			✓			✓		✓	
PT 1000	PT	✓		✓			✓		✓	

TEROSON®

We also work
across borders
to make
your project a success.

TEROSON. No room for compromise.

Henkel

TEROSON®

Window sealing technology

Window sealing

Definition

When planning the installation of punched-window or strip-window facades, proper sealing plays an important role. The sealing measures must be adapted to the building type, the sealing system, aesthetic aspects and the facade design. Especially with low-energy buildings or passive houses, tight sealing of the connection joints around windows and exterior doors is of key importance to prevent the later loss of energy.

Nowadays, these types of buildings are checked for airtightness with the so-called "blower door test" before the actual start of interior construction work. This test determines whether there are still leaks in the building shell that would later lead to high energy losses.

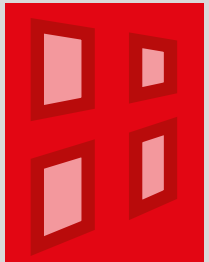
027

Window sealing
TEROSON Bautechnik

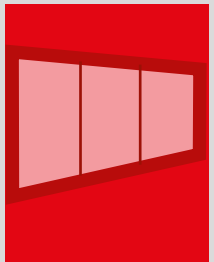
Facade sealing
TEROSON Bautechnik

Solid facades
Solid wall construction
(load-bearing facades)

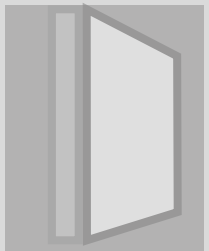
Curtain-wall facades
Light-weight facade constructions (non-load bearing facades)



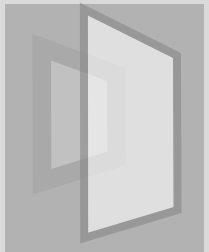
Punched-window facades



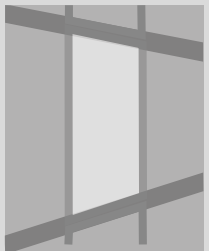
Strip-window facades



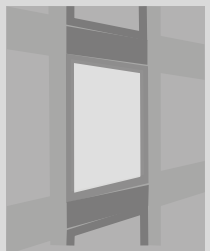
Curtain walls, ventilated facades



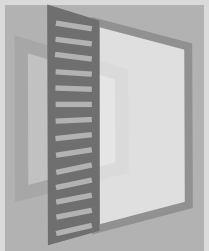
Double-skin facades



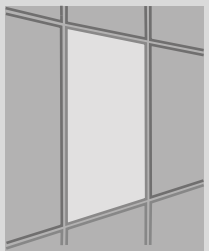
Unitized element facades



Mullion-transom facades



Hybrid facades



Glass facades

Predominant use of **plasterable** sealing strips, adhesives, sealants, foams etc.

Predominant use of sealing strips, adhesives, sealing compounds etc. that can be **faced**

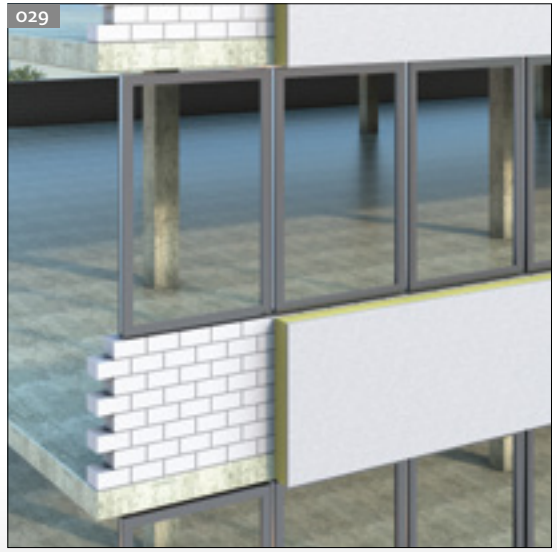
Sealing of punched-window facades

Punched windows are inserted into a hole in the masonry wall. As a rule, the joint widths range from 10-20 mm up to max. 50 mm. In the case of punched-window facades, the individual elements are sealed around their perimeter (connection sealing between window and building shell). Depending on the type of building (old or new, with or without ETICS, clinker or wood facade), the sealing work can be done with sealing strips, precompressed sealing tapes, foams or gun-applied sealants.


028

Sealing of strip-window facades

Strip (also called ribbon) window facades are sealed above and below the window elements. The individual elements are connected with each other, either directly or indirectly. Depending on the profile manufacturer and size of window strip, structural (load-bearing) profiles are required for connecting and stabilizing the individual elements. The profile manufacturer's installation instructions specify exactly how the windows must be joined and sealed. Perimeter sealing is done in the same way as for punched windows.


029

Basic information on sealing strips and membranes

In the area of window sealing, various technologies have established themselves. Meanwhile, sealing strips have become very popular since they offer versatile use and produce safe and reliable results. Sealing strips are also ideal for meeting the building's structural-physical requirements.

Depending on the installation requirements, builders can choose from different materials for sealing strips:

- Textile materials: fleece-backed sealing strips with capillary action to improve the adhesion of subsequently applied plaster coats – mainly for sealing punched windows (solid facades)
- Plastic materials: sealing strips with a smooth surface that can be faced – mainly used for shadow gaps in the curtain wall

In addition to the material, also the diffusion behavior of sealing strips plays a crucial role.

- If the strips are installed on the cold side of the building (i.e. on the outside), they must be permeable to water vapor diffusion.
- If the strips are used on the warm side of the building (inside), they must be vapor-retarding or impermeable to water vapor diffusion.

The planned construction type and installation situation determine the way in which the sealing strip is fixed.

On window frames, the strip can either be clamped, bonded or fixed mechanically. If it is to be bonded, it must be equipped with a self-adhesive film. Especially on masonry or other substrates, the use of a reliable adhesive is key. The strip can either have a single self-adhesive strip, be self-adhesive over its entire surface or be fixed with an adhesive paste.

- On smooth substrates, full-surface self-adhesive sealing strips can be applied very quickly and efficiently.
- On uneven or not properly prepared substrates, it is highly recommended to apply adhesive pastes. This is also the safest method since it is able to compensate for unevenness and other irregularities in daily construction work. After curing, a wet adhesive is also much more resistant to tensile and shear stresses.

However, depending on the condition or structure of a building (e.g. clinker, exposed brickwork on the outside), sealing strips are not always the first choice. When renovating buildings under monument protection, sealing strips are excluded from use for reasons of product performance and cost-effectiveness.

Advantages and disadvantages of sealing strips at a glance:

Advantages:

+ For all solid substrates (combined with a suitable adhesive paste)
+ For accommodating variations in joint size
+ Immediately watertight (self-adhesive strips)
+ No maintenance joint
+ Safe sealing of corners
+ Ideal s_d value (inside or outside the building)
+ Perfectly suited for pre-wall installation
+ Can be prefitted in the workshop

Disadvantages:

– No permanent UV resistance when exposed to direct weathering
– Cannot be used on exposed masonry in renovation projects
– Additional plaster work necessary in case of renovation

Window connection outside

The precondition for expertly sealed windows is a smooth trowel finish in the area of the reveal. Especially in the case of perforated bricks, a smooth trowel finish is indispensable – otherwise the open holes on the brick face cannot be sealed (030). When applying the sealing strips on the window element, make sure to form a loop in every corner before bonding the strip to the window. The loops should always be 1 cm larger than the distance between window element and building shell (031).

EXPERT TIP:

- Apply a smooth trowel finish.
- Form a loop that is 1 cm larger than the distance between building shell and window element.

030

Window opening with smooth trowel finish

031

Window frame with all-around sealing strip incl. loops formed in the corners

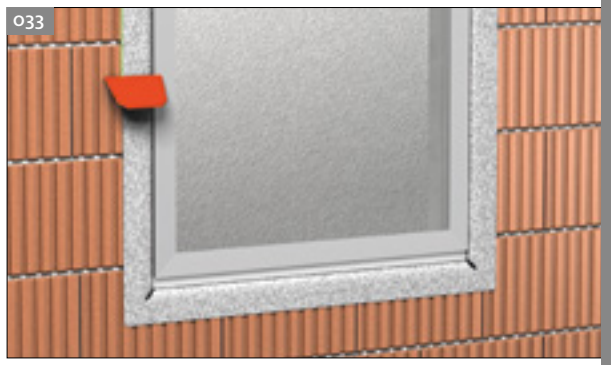
Alternatively, the strip can also be bonded with an overlap in the corners of the window. The area where the beginning and end of the strip overlap should be at least 5 cm. The overlap should not be located in the corner area.

After applying the sealing strip all around the window and pressing it down with a hard rubber roller, insert the window into the opening, align it and secure it with mechanical fasteners (032). Plasterable sealing strips can be fixed to the building shell in different ways. For example, it is possible to use plasterable strips with full-surface adhesion, e.g. TEROSON FO FOIL-TACK. This type of strip is increasingly used, especially on smooth surfaces.

032

Anchor the window frame.

033



Press the strip down with a plastic spreader.

Easy application without primer and full-surface adhesion save time and money when sealing windows and front doors. The window element is mounted on the same level as the insulation layer, i.e. before the wall.

After application of the adhesive, the strip is pressed down to the surface with a plastic spreader (033).



ETIC systems: Elements installed before the building shell

Please note:
In terms of building physics, the application described here takes place on the warm side of the building although the sealing strip is applied on the outside of the building. For this reason, it is necessary to use a vapor-retarding sealing strip.

In facade construction, it is possible to use two types of sealing strips for the connections around facade elements: plasterable strips and those that can be faced. The choice depends on the type of facade and on the architect's planning.

The facade element is installed in front of the building shell and thus integrated into the insulation layer. Before mounting the window frame in the masonry, the sealing strip is applied on the window frame. In the corners, the strip can either be formed into a loop or fixed with a minimum overlap of 5 cm on the frame. After that, the strip (e.g. TEROSON FO 50 SK) must be pressed down to the profile with a hard rubber roller (034).

TEROSON AD SP adhesive paste is suitable for fixing the sealing strip TEROSON FO 50 SK to the building shell. The adhesive can be applied down to temperatures of +5 °C. In the cold season, adhesive paste TEROSON AD KDS can be used down to -5 °C and on damp substrates (036).

Application: The sealing strip must be pressed down to the masonry with a hard rubber roller to produce a firm bond with the substrate (037). Especially when fixing plasterable facade sealing strips with adhesive paste, care must be taken to ensure full-surface adhesion of the strip.

Full-surface bonding means that at least 75 % of the strip must adhere to the building shell (example: 3 cm of a 4 cm wide strip must adhere to the surface). This is necessary to prevent the subsequently applied plaster coat from cracking. After the adhesive has

034

Roll down the sealing strip.

035

Fix the window frame in the insulation layer.

036

Apply the adhesive.

037

Press the strip into the adhesive bed.

038

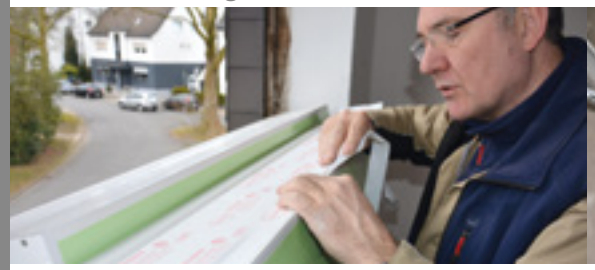
Install the insulation system.

039

Facade after completed ETICS installation.

In the next step, the facade element with the sealing strip applied around its perimeter is inserted into the wall opening, aligned and secured to the masonry with approved anchoring devices (035).

cured, the external thermal insulation composite system (ETICS) can be installed on the building shell. It also covers the strips that were used for sealing the connections and joints (038 I 039).



Bonding and sealing with full-surface, self-adhesive sealing strips

TEROSON FO 1 FOIL-TACK
and
TEROSON FO 50 FOIL-TACK

TEROSON FO 1 FOIL-TACK and FO 50 FOIL-TACK are plasterable window connection and sealing strips whose entire rear surface is coated with hotmelt adhesive. The strips are equipped with an asymmetrically divided release paper and can be repositioned for a while before pressing them firmly down to the window frame with a hard rubber roller.

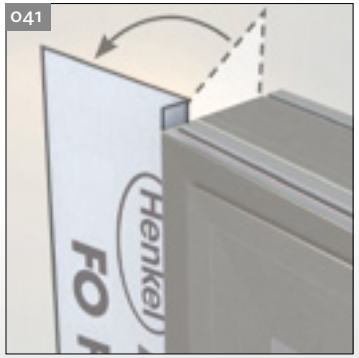
The sealing strips even adhere to slightly damp substrates (standing water must be removed). Thanks to hotmelt technology, they can be installed without primer on most substrates commonly found on site. To ensure the strips are able to carry the later applied plaster coat, they must be firmly pressed down to the wall with a hard rubber roller.

The substrate must be load-bearing and free of dirt or other adhesion-inhibiting substances (see adhesion tests on page 232).

040

Fix TEROSON FO 50 FOIL-TACK to the frame.

041



Fold the sealing strip back for inserting the window frame.

042

Remove the remaining release paper.

TEROSON FO 150 FOIL-TACK M+S and TEROSON FO KSK M+S

Also TEROSON FO 150 FOIL-TACK M+S and TEROSON FO KSK M+S are window sealing and connection strips that are self-adhesive over their entire surface. However, no later than 12 months after installation they should be faced, i.e. covered and protected against UV radiation. Both strips are coated on the rear side with a hotmelt adhesive and a bitumen adhesive. For this reason, both strips feature excellent waterproofing properties. When installing them on mineral substrates, the substrate must be pretreated with TEROSON PR Primer M+S.

043 Remove the narrow strip of release paper and align the strip.

044 Peel off the remaining strip of release paper.

Like plasterable systems, also this type of sealing strip must be firmly pressed down to the surface with a hard rubber roller.

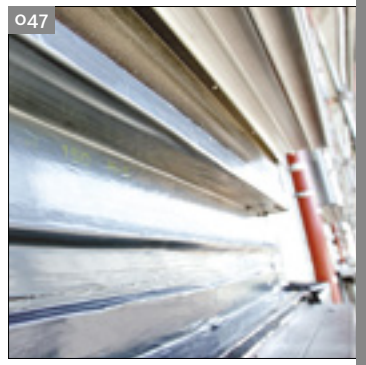
This type of strip is often used for sealing the connections between floor-to-ceiling elements and bitumen, between liquid membranes and the basement and between bitumen membranes and the terrace. Both TEROSON FO 150 FOIL-TACK M+S and TEROSON FO KSK M+S are bitumen-compatible.

According to our current state of knowledge and experience, the two sealing strips can be joined with bitumen roofing membranes or liquid-applied membranes without any problems. No incompatibilities have been observed.

However, bitumen roofing membranes/bitumen thick coatings that have been installed for longer than 6 weeks or are heavily soiled should be cleaned in the bonding area and pretreated with TEROSON PR PRIMER M+S. In the case of very uneven or slated bituminous sheeting, additional sealing products should be used, e.g. TEROSON RB 4006 (butyl-rubber sealant) or TEROSON AD KDS (adhesive and sealant paste). For bonding TEROSON FO KSK M+S sealing strip on top of an existing bitumen roofing membrane or bitumen thick coating, we recommend a bonding width of approx. 10 cm. To ensure a reliable bond with the other sealing products, we again recommend rolling the strips carefully down with a hard rubber roller.

045 Manually press the strip down without blisters before using a hard rubber roller.

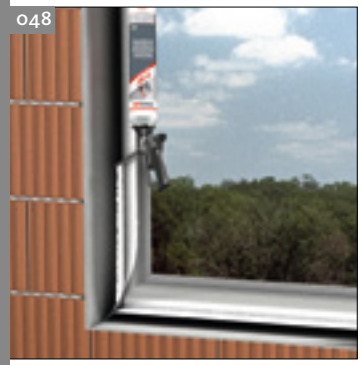
046 Carefully mold the sealing strip around corners/edges.



047 Finished!

Window connection inside (warm side of the building)

On the room-facing side, the uninsulated connection joint between window and building shell can be filled with TEROSON EF 537 foam sealant (048). Sealing on the inside is done with a vapor-impermeable sealing strip. On smooth surfaces, full-surface self-adhesive TEROSON FO 50 FOIL-TACK (DUO) can be used. Alternatively, TEROSON FO 50 SK can be fixed with TEROSON AD SP or AD KDS adhesive paste. Again, the strips must be rolled/pressed down to the building shell with a hard rubber roller or a plastic spreader (049).



Fill the window connection joint with a foam sealant.

Fix the inner sealing strip with a gun-applied adhesive.

Press the strip down with a hard rubber roller.

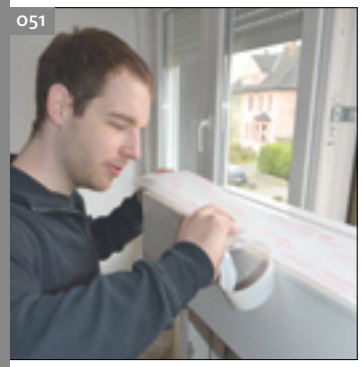
When applying full-surface self-adhesive sealing strips such as TEROSON FO 50 FOIL-TACK, the release paper can be easily removed thanks to the split finger lift. The 2 cm wide self-adhesive strip is fixed to the window element (050) and then firmly rolled down with a hard rubber roller. After installing the window, the 2nd part of the release paper is removed on the inner side and the strip is pressed down to the substrate with a hard rubber roller.

Deutsche Bahn Tower, Frankfurt, Heidersberger

Sealing of roller shutter boxes

Inside the building, the sealing strips can also be used for sealing roller shutter boxes. Practical experience has shown that the strip should be applied with overlaps in all corners (052). It is not possible to form loops due to the large number of corners around roller shutter boxes. Make sure to press the strip firmly down with a hard rubber roller, especially in corner areas (053).

051



Position the sealing strip along the roller shutter box

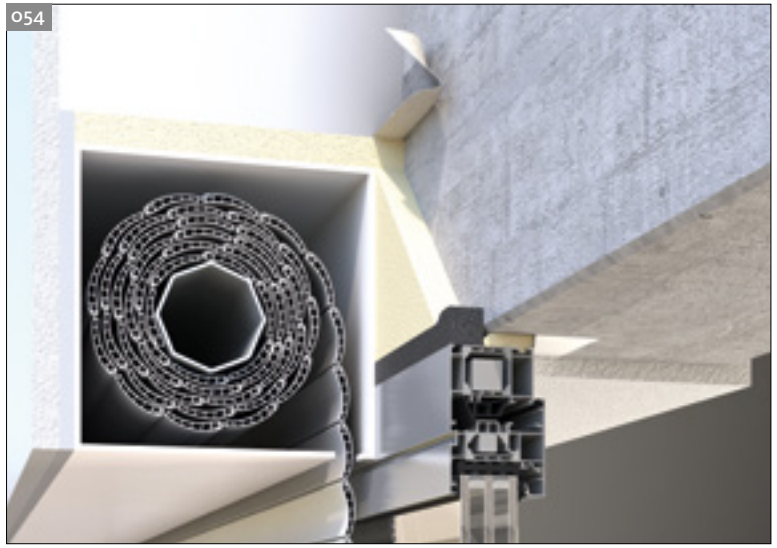
052

Apply the strip to the end faces of the roller shutter box.

053

Press the strip down in the corners.

054



Sealing with FO 1 FOIL-TACK and PT ecoMAX 600

055

Sealing with TEROSON FO 1 FOIL-TACK on the outside

Windowsill sealing: additional sealing layer below the windowsill (outside)

EXPERT TIP:

- If condensate is to be expected, it is necessary to produce a second water-draining layer.

Windowsills installed on the outside of window and facade elements are mostly made of aluminum profiles, sometimes of natural stone or, in exceptional cases, of wood. It is important that the end pieces of aluminum windowsills are watertight. If this is not the case or if condensation is expected underneath the windowsill, a second water-draining layer must be produced with a trough-shaped sealing strip (e.g. TEROSON FO 3 SK1). The strip is bonded to the substructure insulating profile of the window element and is guided over the external insulation layer to the facade plaster. The insulation is thus protected from moisture penetration.

It is recommendable to fix TEROSON FO 3 SK1 sealing strip with adhesive paste on the front edge of the facade plaster, thus producing an additional windtight layer. The trough-type sealing should end to the right and left side of the windowsill, below the upper edge of the windowsill. Lateral sealing in the joint between windowsill and facade plaster must be carefully planned and executed with suitable products, e.g. a gun-applied sealant (056 I 057).

056

Lateral sealing of the strip with adhesive paste

057

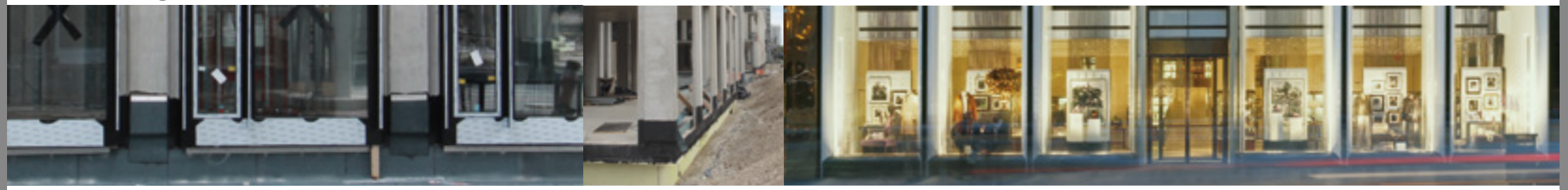
Window element with windowsill installed

058

ETIC system: 2nd sealing layer produced with TEROSON FO 3, PT ecoMAX 600 and SK1

059

Clinker facade: 2nd sealing layer produced with TEROSON FO 3, PT ecoMAX 600 and SK1



Floor-to-ceiling elements

EXPERT TIP:

- The sealing systems must often comply with the relevant standards (DIN 18533) and be compatible with bitumen.

When sealing window and facade connections, the main sealing work takes place in the joints between window/facade element and masonry resp. window parapet and lintel. Expert sealing of these joints according to the laws of building physics is of utmost importance.

But also the base area of floor-to-ceiling elements, the bottom connections of exterior doors and the connections to balconies and terraces require special attention.

Structural waterproofing: standards DIN 18531-5 and DIN 18533-1/-2 versus DIN 18195-4/-5

The main standard for waterproofing structures and building components used to be DIN 18195-4/-5. In the future, this will be replaced or supplemented by the new series of standards DIN 18531-18535, which is divided into 5 application areas.

The following standards have been newly published (edition 2017-07):

- DIN 18195 Waterproofing of buildings (contains only a definition of terms)
- DIN 18531 Waterproofing of non-utilized and utilized roofs
- DIN 18532 Waterproofing of concrete areas trafficable by vehicles
- DIN 18533 Waterproofing of elements in contact with soil
- DIN 18534 Waterproofing for indoor applications
- DIN 18535 Waterproofing of tanks and pools

Old standards	New standards
DIN 18195-1 to **-10** Waterproofing of buildings	**DIN 18195** Waterproofing of buildings – Definitions
DIN 18195-5 Waterproofing against non-pressing water on floors	**DIN 18531** Waterproofing of utilized and non-utilized roofs (new: utilized roofs)
DIN 18195-5 Waterproofing against non-pressing water on floors	**DIN 18532** Waterproofing of concrete areas trafficable by vehicles
DIN 18195-... Waterproofing against ... **-4** ground moisture **-5** non-pressing water on floors **-6** outside pressing water	**DIN 18533** Waterproofing of elements in contact with soil
DIN 18195-5 Waterproofing ... in wet areas	**DIN 18534** Waterproofing for indoor applications
DIN 18195-7 Waterproofing against water pressing from inside	**DIN 18535** Waterproofing of tanks and pools

TEROSON FO KSK M+S and FO 150 FOIL-TACK M+S were developed for the horizontal and vertical sealing of structures. The system consists of a sealing strip, which can be safely applied also on damp substrates, and a matching primer (TEROSON PR Primer M+S or AD Adhesive Spray). The sealing strip is made of an elastic, tearproof, double-laminated special material and is equipped with a self-adhesive plastic-rubber-bitumen compound.

TEROSON FO 150 FOIL-TACK M+S is equiped with a PSA Hotmelt coating.

TEROSON FO KSK sealing strip

TEROSON FO KSK is a sealing strip that has been designed for sealing against moisture (capillary water, retained water) as well as non-accumulating seepage water according to DIN 18533, parts 1 and 2.

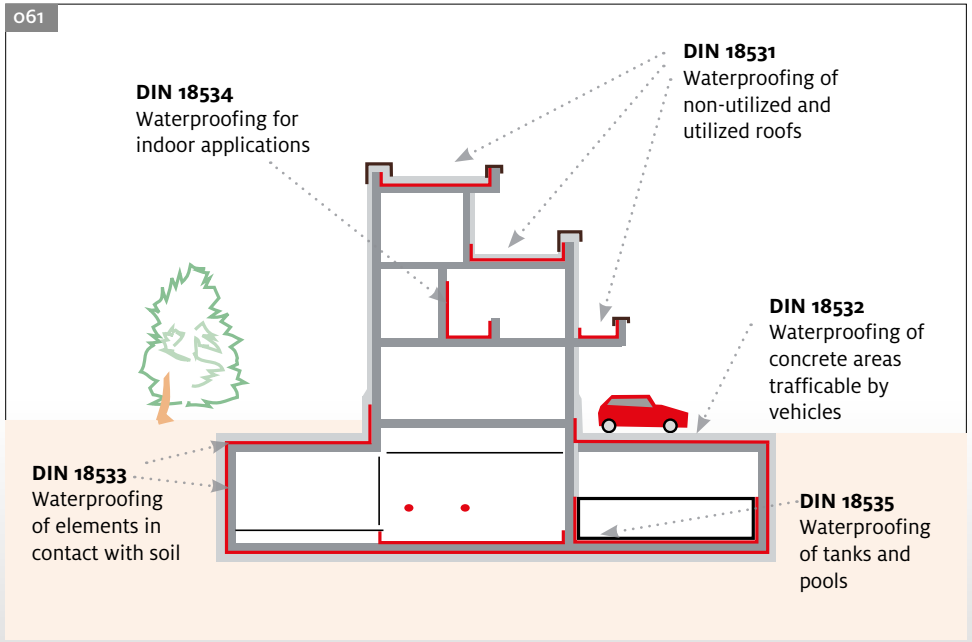
Due to its consistency, the sealing strip is especially suited for sealing connections in the base area according to the recognized rules of the trade and in compliance with DIN 18195, part 1. It is self-adhesive over its entire surface, immediately watertight and of 1.5 mm thickness as stipulated by the standard. In addition, it is radon-proof. Thanks to an asymmetrically divided release paper, it is easily workable and can also be used for producing inner and outer corners on the building shell (see pages 124-127). The relevant classifications for TEROSON FO KSK can be found in DIN 18531, part 5, and DIN 18533, parts 1 and 2.

060

Scale-down model of a planned house

TEROSON FO 150 FOIL-TACK M+S also meets the requirements of DIN 18533, in particular the requirements of water exposure classes W 1.1-E and W 1.2-E (critical floor connections).

061



Overview: The new standards and their fields of application

Structural connections in compliance with DIN 18533

TEROSON FO KSK is the product of choice for the external sealing of floor-to-ceiling elements in new-builds in compliance with DIN 18533. Before start of sealing work, a height difference of at least 150 mm above ground level must be planned between the lower edge of the doorsill resp. balcony doorsill and the water-draining layer. Below the building element (e.g. house door, balcony door or sliding door), the sealing strip should be applied in the form of a trough to produce a watertight layer.

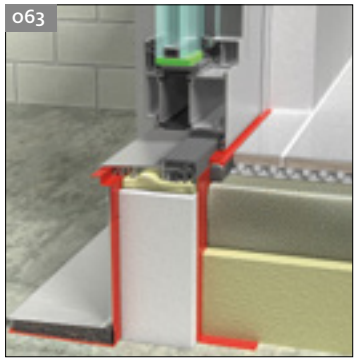
062

Structural connection of floor-to-ceiling elements (e.g. house and terrace doors) in new-builds according to DIN 18533, parts 1 and 2

Sealing of floor-to-ceiling elements in new-builds according to DIN 18533, parts 1 and 2

With this interior sealing job, the strip TEROSON FO 150 FOIL-TACK M+S is applied below the doorsill. After removing the release paper, the split self-adhesive strip is applied by approx. 2.5 to 3 cm under the profile (063). After that, the other part of the release paper is removed and the strip fixed to the building shell. The strip must cover the floor slab (in most cases concrete) over a width of at least 10 cm. Before start of sealing work, all mineral substrates must be pretreated with TEROSON PR Primer M+S. On the element side, TEROSON FO 150 FOIL-TACK M+S is applied to the reveal up to the lower edge of the doorsill. Make sure to press the strip firmly down to the substrate and building element with the help of a hard rubber roller.

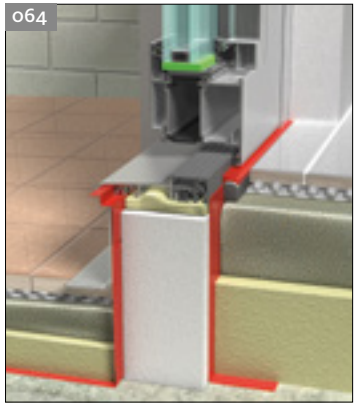
063



On the inside of the building element, TEROSON FO 150 FOIL-TACK M+S sealing strip can be applied in the same way as described above.

Sealing of floor-to-ceiling elements in old buildings according to DIN 18533, parts 1 and 2

064

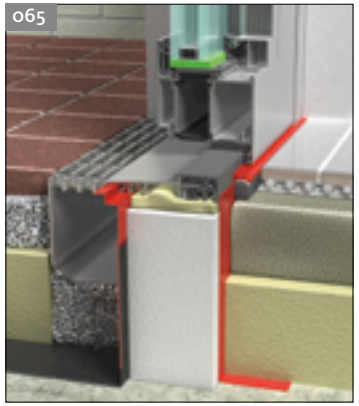


Also the external sealing of floor-to-ceiling elements in old buildings can be done with TEROSON FO 150 FOIL-TACK M+S. Sealing must comply with DIN 18533 “Waterproofing of elements in contact with soil”. The difference in height between the lower edge of the doorsill resp. balcony doorsill and the water-draining layer must be 150 mm as stipulated by DIN 18533. The structural conditions must be adapted accordingly (064). This precondition must be fulfilled before installing the new building element.

TEROSON FO 150 FOIL-TACK M+S sealing strip is applied below the doorsill. After removing the release paper, the split self-adhesive strip is fixed by approx. 2.5 to 3 cm under the profile (see figure above). After that, remove the other part of the release paper and fix the strip to the substrate. The strip must cover the floor slab (in most cases concrete) over a width of at least 10 cm. Before start of sealing work, all mineral substrates must be pretreated with TEROSON PR Primer M+S. Like in new-builds, a trough-shaped watertight layer must be produced with TEROSON FO KSK. Make sure to press the strip firmly down to the substrate and building element with a hard rubber roller. Sealing on the inside of the building element is done with TEROSON FO 150 FOIL-TACK M+S in the same way as described above.

Sealing of floor-to-ceiling elements according to DIN 18040-2: Construction of accessible buildings – Design principles – Part 2: Dwellings (new-builds)

065

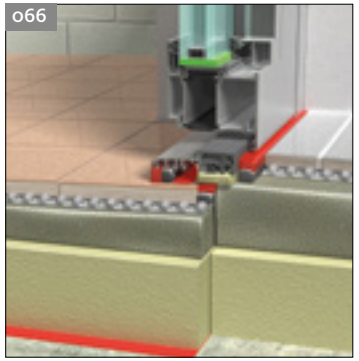


The external sealing of floor-to-ceiling elements in newly built accessible buildings and dwellings must be done in compliance with DIN 18040, part 2. According to this standard, a cold-applied self-adhesive membrane must be used for structural waterproofing. The doorsill must have a maximum height of 20 mm. A gutter must drain the rainwater directly away from the building. The adjoining terrace must have an adequate slope of > 3 % for draining the rainwater away from the building.

In this case, TEROSON FO 150 FOIL-TACK M+S sealing strip is fixed underneath the doorsill. After removing the release paper from one part, the self-adhesive strip is fixed over a width of approx. 2.5 to 3 cm under the profile (065). After that, the release paper is peeled off the remaining part of the strip and fixed to the substrate. The strip must cover the floor slab (in most cases concrete) over a width of at least 10 cm. It is essential to pretreat all mineral substrates with TEROSON PR Primer M+S. When forming the trough with the KSK sealing strip, it is important to press the strip firmly down with a hard rubber roller – both to the substrate and the building element.

TEROSON FO 150 FOIL-TACK M+S can be applied in the same way on the inside of the building element.

Sealing of floor-to-ceiling elements according to DIN 18040-2: Construction of accessible buildings – Design principles – Part 2: Dwellings (old buildings)



The sealing procedure for old buildings is more or less identical. First, the release paper is removed and the sealing strip fixed to the substrate. The strip must cover the floor slab (in most cases) over a width of at least 10 cm (066). It is absolutely necessary to pretreat all mineral substrates with TEROSON PR Primer M+S. The trough-like sealing using FO 150 FOIL-TACK M+S sealing strip is done in the same way as described for new-builds. Take care to firmly press the strip down with a hard rubber roller – both to the substrate and the building element.

TEROSON FO 150 FOIL-TACK M+S can be applied in the same way on the inside of the building element.

Use of gun-applied sealants

Sealants can often have several functions in one and the same application (see page 93: “Types of stresses acting on sealants/joints”). Expansion joints are expected to absorb the movement between two structural components (same or different building materials). The sealant used for sealing these joints must be flexible and allow for movement. In order to permanently accommodate the movement, some technical principles must be observed. First of all, define the design and the dimension of the joint so that it will be able to optimally absorb structural movement over a long time.

We distinguish between the following types of joints:

- Structural joints between building components, e.g. window frame and masonry
- Shadow gaps, e.g. between tiled floor and baseboard
- Glazing joints, e.g. between wooden frame and glass pane
- Maintenance joints
- Edge joints / seams
- Dummy (or false) joints

One and the same joint can be defined in different ways. Depending on the classification criteria, the description of joint types can be based on:

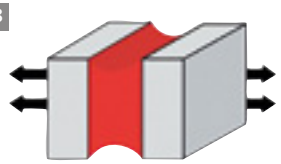
- the material combination, e.g. glass joint
- the type of stress acting on the joint, e.g. expansion joint
- the geometry of the joint, e.g. triangular joint

What are sealants needed for?

- Movement accommodation between structural elements
- Barrier against moisture/water, heat loss, dust, dirt, chemicals, noise, vibrations, fire or for electrical insulation
- Improvement of the visual/aesthetic appearance of joints
- Bonding: Some sealants can also be used as adhesives.

067

068



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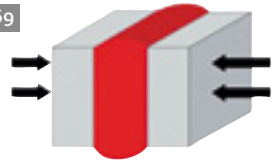

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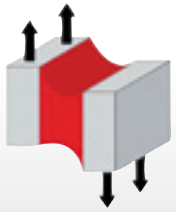


Types of stresses that may act on sealants / joints:

- Permanent stress caused by weather exposure (e.g. UV radiation, rain, wind, hail)
- Cleavage (067)
- Elongation (068)
- Compression (069)
- Shearing (070)
- Vibration
- Abrasion (e.g. floor joints subject to foot traffic)
- Chemical stresses (e.g. laboratory tables, cleaning agents)
- Dust or dirt
- Permanent exposure to water (e.g. in swimming baths)

EXPERT TIP:

- A suitable sealant is selected by the planner or installer according to the requirements of the application, the sealant‘s capacity to absorb movement and its fitness for the purpose (e.g. compatibility with paints).

According to the different requirements that joints are expected to fulfill, there are different types of sealants with special properties from which the user can choose:

- Silicones
- Polyurethanes (PU)
- Silane-modified polymers (SMP)
- Polysulfides
- Acrylates
- Synthetic rubbers
- Butyl sealants
- Bituminous sealants
- Solvent-based sealants

It is, however, important that the sealant was tested and approved by the manufacturer as suitable for the intended application.

Expert design and construction of joints

- The sealing of structural joints with gun-applied sealants must be carried out according to the specifications in the Bill of Quantities and in compliance with the applicable standards and regulations (DIN 4108, 18540 etc. or IVD leaflets).
- Connection joints must be planned and executed individually, taking the respective situation on site into account. The tendering parties must provide the planning service.
- Maintenance joints must be agreed upon in writing before placing the order. Also the required maintenance intervals must be specified.

Preparatory work before sealing joints

Before start of sealing work, the following points should be checked:

- Good adhesion of the sealant to the joint edges
- Use of a primer: check the manufacturer's instructions for special substrates
- Compatibility of the sealant with existing paint coats
- Compatibility of the sealant with adjoining building materials (plasticizer migration)
- Dimensions of the joint (width/depth) required for accommodating the expected movement between the structural components

Before starting the sealing work, make sure the joint edges are clean and not crumbling. When doing renovation jobs, the old sealant should be completely removed. Depending on the manufacturer and type of sealant, some substrates need to be primed before applying the sealant. This means that the joint edges are pretreated with an adhesion promoter, thus ensuring a better bond between sealant and joint edges. After that, a backfill material of the appropriate thickness is placed into the joint – usually a closed-cell PE round cord (also called backer rod). This ensures that the sealant does not adhere to the backfill material and that an optimum joint geometry is achieved.

The backfill material must not be pressed into the joint with a pointed object, as the round cord could be damaged. It should also be slightly thicker than the joint width. The depth of the joint depends on the joint width.

Classification of sealants with respect to their elasticity in compliance with DIN EN 15651-1:

- 25 LM (low modulus)
- 25 HM (high modulus)
- 20 LM
- 20 HM
- 12.5 E (elastic)
- 12.5 P (plastic)
- 7.5 P (plastic)

Smoothing agents

The purpose of smoothing agents is to make the smoothing tool glide as easily as possible over the joint edges and the sealant surface. The smoothing tool is immersed in the smoothing agent to prevent excess sealant adhering to the tool when skimming the surface. If, due to adverse conditions, it is not possible to achieve a perfectly smooth surface, the smoothing agent can also be sprayed or brushed directly onto the sealant before skimming the joint with the smoothing trowel.

EXPERT TIP:

- It is important to use smoothing agents only in the smallest possible quantity to avoid washout loss.
- After smoothing, residues of smoothing agent around the joints should be removed with a cloth.

Hyatt Hafenspitze, Düsseldorf, Drees & Sommer

Use of precompressed foam tapes

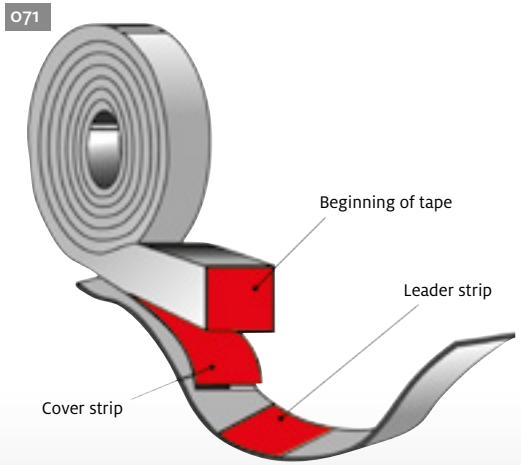
Precompressed sealing tapes are polyurethane-based foam tapes that have been impregnated with water-repellent synthetic resin polymer. They come precompressed on a roll. After being placed in the joint, the tape expands and thus closes the gap.

The speed of expansion can vary greatly, depending on the season (summer or winter) and also on the date of manufacture. Make sure to comply with the joint dimensions indicated on the carton, i.e. choose the right tape for the respective joint width. Sufficient compression of the tape must be ensured to provide watertightness. In addition, pay special attention to the corner joints as there is a high risk of faulty workmanship during installation.

EXPERT TIP:

- Incorrect dimensions and lack of attention in the corner joints are the main reasons of faulty workmanship with this sealing product.

071



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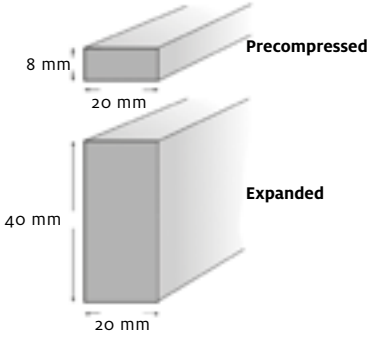


The example above shows a sealing tape in its precompressed state with a height of 8 mm. When fully expanded, the height increases to 40 mm. However, the tape must only expand to a maximum of 20 mm in order to fulfill its function (watertightness).

Application fields

Foam tapes offer many advantages, especially in old buildings and with exposed brickwork. Thanks to their ability to level out small irregularities and their compatibility with alkaline and mineral substrates, they provide a reliable connection between the window and the brickwork or clinker.

Resistance to driving rain 300/600 Pa

Precompressed foam tapes are available in different qualities. The right choice of tape depends on the application (type and height of building). If the tape is used for a simple application like decoupling, a low impregnation grade offering 150 Pa watertightness is sufficient.

For buildings up to 20 m height, it is sufficient to use a tape providing watertightness up to 300 Pa. For buildings above 20 and up to 100 m height, the tape must be able to offer resistance up to 600 Pa. TEROSON PT ecoMAX 600 is the “all-rounder” in the market and meets all requirements.

Preparation

In a first step, determine the joint width and choose a suitable TEROSON PT joint sealing tape to meet the specified tolerances. Required tools: measuring tape, spatula, scissors or knife.

Substrates

Dust, sand and loose particles such as building dirt and mortar residues must be removed before start of sealing work.

Expansion time

Not only ambient and substrate temperature play an important role but also the tape’s own temperature. For this reason, the tape should always be stored at standard climatic conditions. When sealing expansion joints, tape thickness must be chosen to match the expected maximum joint width.

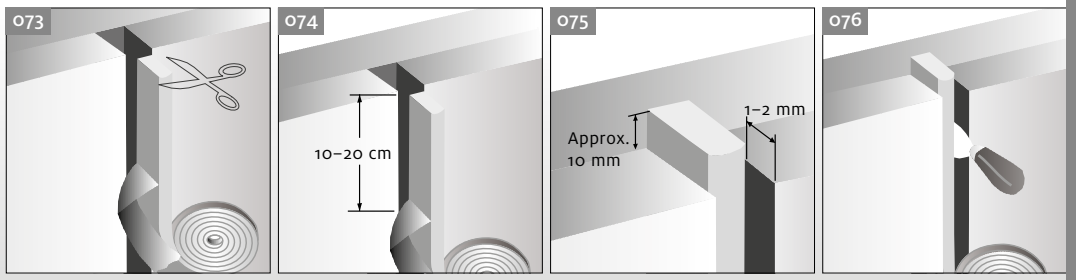
After unpacking, start by peeling the leader strip off the roll. Cut the beginning of the tape at right angles using a pair of scissors and immediately start application. Pull off the cover strip approx. 10-20 cm from the self-adhesive side of the tape (073 I 074).

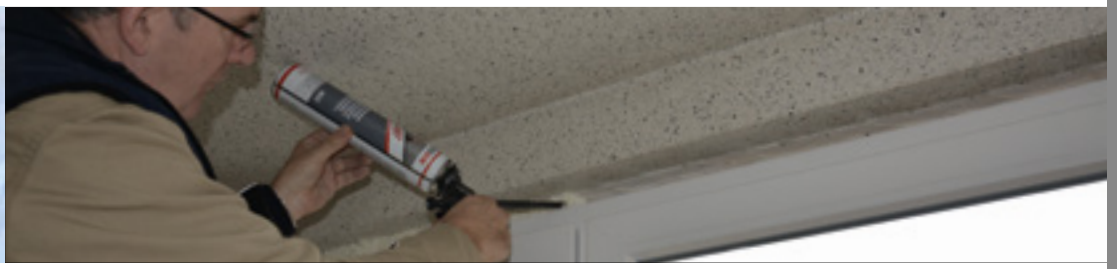
EXPERT TIP:
As a general rule, heat accelerates and cold delays the expansion.

Press the self-adhesive side by hand or spatula against the joint edge, building component or part to be assembled, fix it in place but do not stretch it. Continue to peel the cover strip from the self-adhesive side. When cutting the tape to length, allow for 1 cm “expansion reserve” per meter of sealing tape to compensate for movement. In the case of wider joints, keep a distance of 1-2 mm from the front edge of the joint (075 I 076). After expansion, the tape will snugly fit to the joint edges. Any unevenness will be compensated thanks to its elasticity.

Advantages of precompressed sealing tapes:
+ Can be used with exposed masonry
+ Good compatibility with mineral substrates
+ UV resistance
+ No need for priming mineral joints or for dust removal

Disadvantages:
– Difficult design of corner joints
– Maintenance joints (10 years)
– Limitations in joint dimensioning





Use of PU insulation foams

In window installation, 1-component insulation foams (such as TEROSON EF 537) have been successfully used for many years. Professional users apply them with the help of foam guns. The advantage: better control of foam dosage. After opening, the foam cans can be used for several days without any problems.

EXPERT TIP:
The advantage of PU foam over mineral wool is that it is much more uniform, faster and easier to apply.

A major benefit of PU foams is that they provide optimum thermal and acoustic insulation even if the window connection joints do not run parallel or are unevenly spaced. This is a big advantage, for example, over 3-level sealing tapes. Uneven joints are often found when renovating windows in old buildings.

Window connection joints can also be filled with mineral insulation materials, but optimum sealing is only possible from a joint width of more than 15 mm. Below this width, it is very difficult to fill the joint with mineral materials over the entire window profile depth. The advantage of window foams is that they do not absorb moisture and even in large joints do not collapse after curing. Moreover, they have a stabilizing effect and provide extra safety for mechanically fastened windows. After curing, 1-component gun foam TEROSON EF 537 features long-term flexibility and is able to accommodate movement of the building element caused e.g. by changing wind loads.

Advantages of 1-component PU foams:
+ Very efficient use
+ Easy application
+ Optimum acoustic and thermal insulation
+ No need for complicated molding/ filling of corner joints
+ Can be applied at low temperatures
+ Nearly independent of joint dimensions

Disadvantages:
– Hazardous material
– Material residues on the frame if the foam is not applied precisely
– Cleaning of the foam gun required
– Curing process requires moisture

Window sealing with PU foams

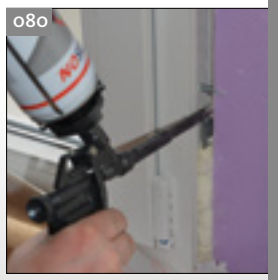
When working with 1-component PU assembly foams, make sure to carefully shake the can before use (077) so that the components of the formulation (e.g. prepolymer, propellant) are thoroughly mixed. Due to its lower density, the propellant tends to deposit very quickly at the bottom of the can. The importance of shaking is often underestimated by product users although it has a major impact on foam expansion and quality and thus on its thermal and acoustic insulation performance. A 1-component foam requires moisture for curing. On normal days, air humidity is sufficient for the foam to develop its optimal structure. On days with low humidity (e.g. in winter) or when filling very wide or deep connection joints, it is necessary to add extra moisture (see page 103: “Foam application in winter”).

The chemical reaction starts as soon as the foam absorbs the external moisture (078). The 1-component foam first forms a skin on the outside. Then the moisture slowly moves to the inside of the foam. With very wide joints or when filling large cavities, it may be advisable to fill the joints twice. If the foam absorbs enough moisture during the curing process, it will usually have a fine cell structure (depending on the formulation). If, however, an insufficient amount of moisture is absorbed, the cell structure will be irregular with larger cells. With large vertical connection joints of more than 4 cm width, the joints should be foam-filled from the bottom up (079 I 080). This ensures better adhesion of the foam to both element and building shell and prevents the foam from falling out of the joint while still fresh.

Shake the can well before use.

Curing process of a 1-component PU foam

Foam-filling of horizontal joints



Foam-filling of vertical joints (bottom-up)

Further application details

How to replace PU foam cans

Ideally, the old foam can should be unscrewed while holding it over a waste bin so that any residual foam can be caught in the bin (081). Foam can escape, for example, when the cans are not stored in an upright position or when the rubber seals in the valves have become brittle. When using foam guns equipped with a valve system to match the foam cartridge, only as much foam will escape as is still present in the valve stem. When unscrewing the can, the valve should close immediately and allow only a small amount of foam to escape. Immediately after removing the old can, it should be replaced by a new one. Screw the new can onto the gun with the valve facing up (082).

Since the thread depth of PU foam guns is not standardized, it is possible to prevent the premature release of foam (caused by early opening of the valve) when the valve faces upwards. However, old foam residues adhering to the threaded basket must be removed before screwing on the new foam can. This makes it possible to screw the thread of the can completely into the threaded basket. Now, the valve inside the can opens fully and ensures the flow rate specified by the manufacturer. When replacing old foam cans, a little moisture always gets inside the gun. To avoid chemical reaction inside the gun, it has proven useful to spray out some foam together with the trapped moisture directly after replacing the can.

Foam application in winter

During the cold season, the application of PU assembly foams can sometimes be difficult. Many PU foam manufacturers specify a minimum application temperature of +5 °C for their products. TEROSON EF 537 foam is also suitable for use in cold weather: it can be applied down to an ambient temperature of -10 °C. On winter days with low humidity, it is advisable to add extra moisture to the foam. In winter, it is also absolutely necessary to first foam-fill the window connection joint before moistening the foam with water from a spray bottle (083). If done the other way around (i.e. first spraying water before applying the foam), a layer of ice will immediately form on the masonry and impair adhesion of the foam to the structure.

EXPERT TIP:
To ensure more or less the same flow rate as in summer, foam can temperature should be not lower than 0 °C.

In winter, first fill the joint with foam, then spray the foam with water.

How to clean
PU foam guns

084

Foam guns only need to be cleaned if the flow rate of the foam decreases considerably during application. Cleaning is done with the help of a PU cleaner. After unscrewing the empty foam can, screw the cleaner can onto the gun (084). After that, residual foam must be sprayed out until cleaning solution flows out of the gun. The cleaner can be left on top of the gun overnight so that it can dissolve the cured foam residues inside the gun. The next morning, the foam residues should be sprayed out along with the cleaner. Finally, unscrew the cleaner can and screw on a new PU foam can. After this procedure, the flow rate should be back to normal.

In Germany, PU foam cans are disposed of via the PDR system.

EXPERT TIP:
Always store PU foam cans upright according to the marking on the packaging (085). This ensures long-term functioning of the foam valve. During transport, keep the cans in a suitable box and transport them in the cargo area of the vehicle in compliance with Gefahrgutbeförderungsgesetz GGBefG (Dangerous Goods Transport Act). It is not permitted to transport the cans in the rear of the vehicle.

085

Symbol for upright storage

TEROSON®

Facade sealing technology

Facade sealing technology

For our sealing products, we make a clear distinction between facade and window constructions (see diagram).

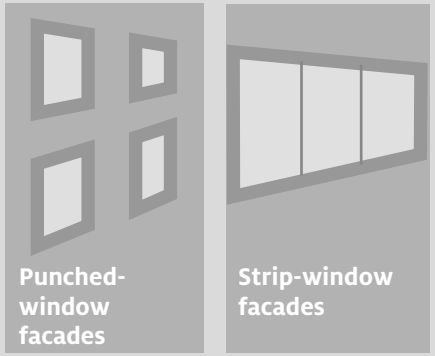
Since different solutions and sealing systems are required depending on the construction, we distinguish in our TEROSON Guide between facade sealing and window sealing. Chapter Facade Sealing describes how to seal the most important facade constructions with the help of TEROSON products (i.e. ventilated curtain wall facades, double-skin facades, element facades, mullion-transom facades, hybrid facades).

Chapter Window Sealing provides a detailed description of how to seal classic punched-window and strip window facades with TEROSON product systems.

086

Window sealing
TEROSON Bautechnik

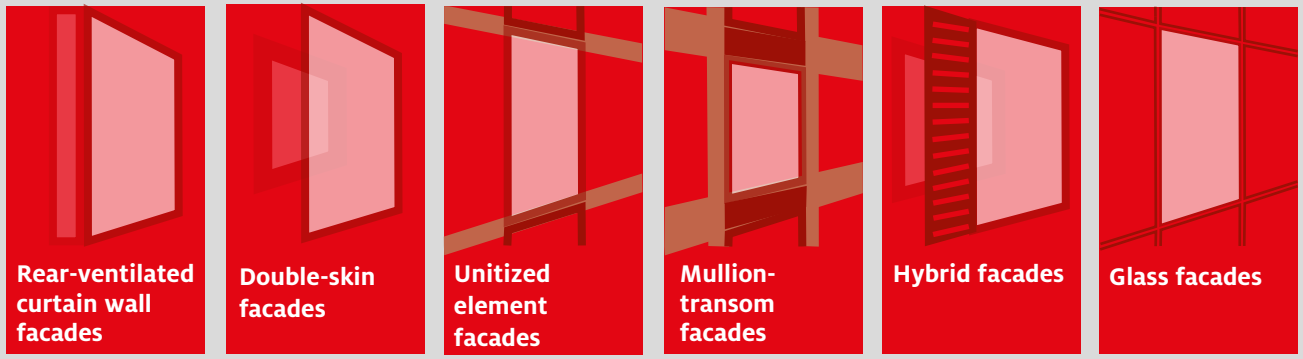
Solid facades
Solid wall construction
(load-bearing facades)



Predominant use of plasterable sealing strips, adhesives, sealants, foams etc.

Facade sealing
TEROSON Bautechnik

Curtain wall facades
Light-weight facade construction (non-load bearing facades)



Predominant use of sealing strips, adhesives, sealants etc. that can be faced

Sealing of curtain wall facades

The frame construction of a curtain wall facade contains permanently installed infills, used e.g. as a design element, as well as transparent glass elements, either as fixed-glazed elements or windows that can be opened. With curtain walls using a unitized system, the individual panels are only sealed along the parapet and in the base point area. With curtain walls making use of a mullion-transom construction, the individual elements are sealed around their perimeter, between the element and the adjoining mullions and transoms.

Sealing of rear-ventilated facades

Rear-ventilated curtain facades can be frequently found in the construction of industrial and office buildings and in residential construction. Typical of this building envelope is the air layer between the insulated building and the weather-exposed facade. It ensures permanent rear ventilation of the outer shell and protects the inside of the building envelope from moisture and heat. In this way, it is possible to prevent condensation between facade and insulation. With rear-ventilated facades, sealing work is normally done floor by floor around the perimeter of the building. As a rule, sealing strips or membranes are used that can later be faced. On the inside, it is customary to plan for plastered reveal connections.

Sealing of double-skin facades

(multiple-skin facade systems)

Double- or second-skin facade consist of two skins placed in such a way that air flows in the intermediate cavity. They are equipped with window elements that sometimes extend from floor to ceiling (storey-high). The correct design according to the laws of building physics is as follows: Operable window elements (mostly made of insulating glass) are fitted into the room-facing primary facade. The second, outer skin is equipped with fixed glazing (single-pane safety glass, mostly solar control glass). The cavity between the two skins is equipped with solar shading and dazzle protection devices, protected from dirt pick-up and weather influences (especially wind). Solar shading can also be used to optimize the energy performance of the building.

The challenge for double-skin facade design is the integration of openings that provide natural ventilation for the building. In summer, they should allow cool night air to lower the building's temperature while reducing heat loss in winter. Another challenge is the improvement of sound insulation in order to reduce outside noise. From a structural point of view, this calls for quite different measures.

We distinguish between four types of double-skin facades:

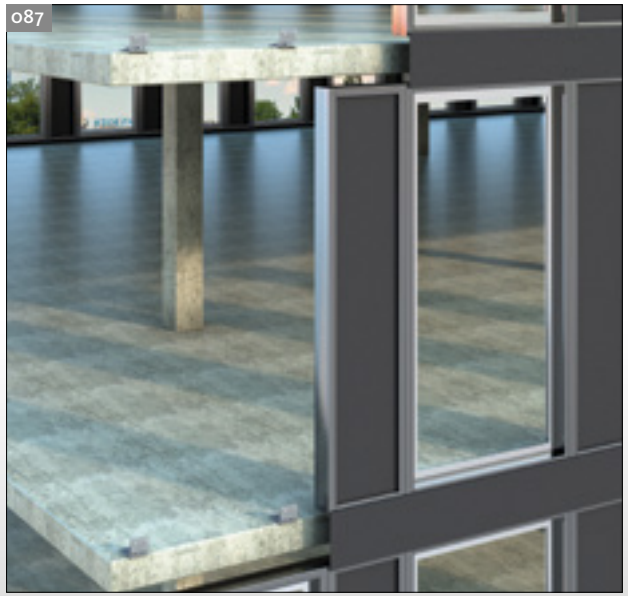
- box window double-skin facades
- shaft-box double-skin facades
- corridor double-skin facades
- multi-storey double-skin facades

Sealing of unitized element facades

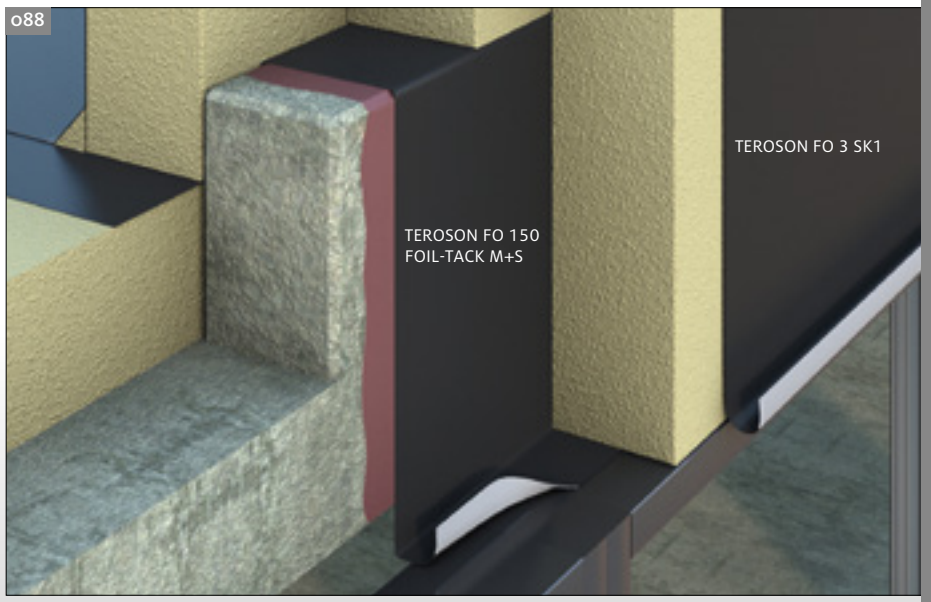
This type of facade consists of prefabricated, factory-mounted elements of at least storey height (087). The elements can be designed for single- or double-skin facades. By means of coupling profiles with overlapping sealing levels, the elements can be connected with each other – both vertically and horizontally. As a rule, the profiles are designed to match the special requirements of the building (field size, fire and noise protection) and those of element manufacture (design of the coupling profiles). Most often used are thermally separated profiles made of extruded aluminum. They are installed in front of the building shell, floor by floor, moving from the bottom to the top.

Especially for large facade areas of uniform design (e.g. high-rise buildings), they provide a visibly enclosed space. The glazing is mostly installed from the room-facing side to facilitate e.g. repair work.

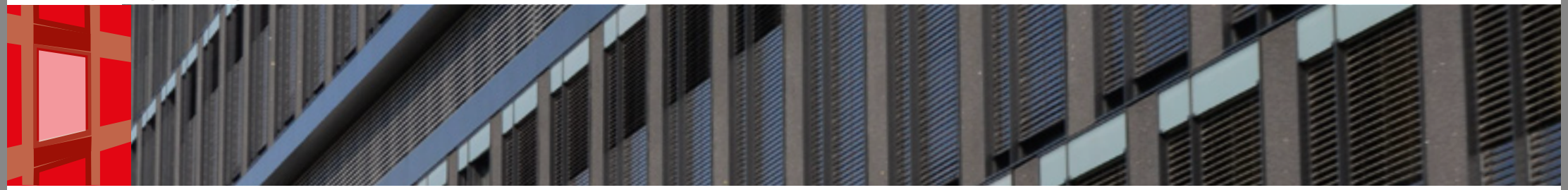
Unitized element facades are usually sealed around the perimeter of the building, both along the base point and the parapet. In the base area, sealing must be carried out in compliance with DIN 18533. This is where TEROSON FO 150 FOIL-TACK M+S sealing strips come into play. They should be bonded with an overlap of at least 100 mm onto an already existing basement waterproofing layer (e.g. bituminous thick coating) or a terrace waterproofing layer. The parapet connection is sealed along the perimeter, on the warm side of the component, between window element and building shell, using TEROSON FO 150 FOIL-TACK M+S. After installing the insulation, vapor-permeable TEROSON FO SK 1 is bonded on top, running from the window element over the insulation layer up to the parapet (088).



Construction of a unitized element facade



Sealing of the parapet connection



Sealing of mullion-transom facades

Suitable sealing products
TEROSON FO 150 FOIL-TACK M+S
TEROSON FO 3 SK
TEROSON AD KDS

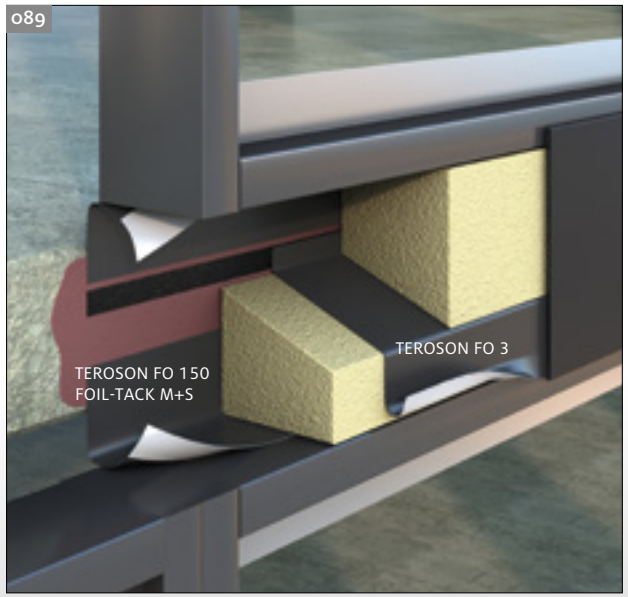
Mullion-transom facades are constructed from load-bearing profiles. They are primarily used for buildings where particularly high installation heights are to be achieved. This type of construction allows the installation of large openings but also of fixed facade elements. Advantage: By using profiles of variable dimensions as well as different materials such as aluminum, steel or wood, the design can be flexibly adapted to nearly all installation requirements.

The individual facade elements can be manufactured in advance, saving time and money, and then quickly be installed on site.

The necessary sealing work between facade elements and building shell must be carefully planned and executed on site. The product of choice for sealing the upper and lower connections of the elements between the individual floors is TEROSON FO 150 FOIL-TACK M+S sealing strip. After that, a so-called insulation wedge is inserted, which is protected by a TEROSON FO 3 SK sealing strip bonded on top (089).

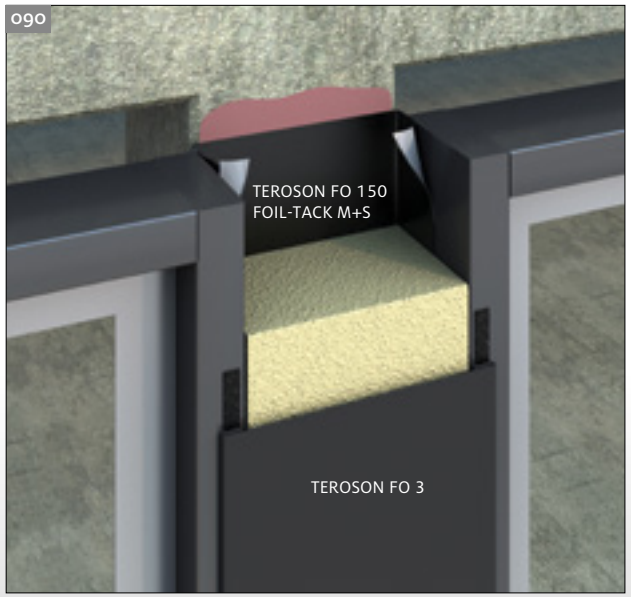
TEROSON products are mainly used for sealing the facade elements between the mullions and transoms (090). For this purpose, TEROSON FO 150 FOIL-TACK M+S is applied to the building shell, between the single window elements, before installing the insulation layer.

089



Upper and lower connection between facade elements

090



Lateral connection between two facade elements

Sealing of hybrid facades

Suitable sealing products
TEROSON FO 150 FOIL-TACK M+S
TEROSON FO 3
TEROSON AD KDS

Double-skin facades have long been the state of the art. Meanwhile, they have been further developed and combined with single-skin facades to produce so-called hybrid facades. During the cold season, the preheated air from the space between the two facade skins can be used to ventilate the building. The single elements of this facade type are sealed separately from the building shell.

Sealing of glass facades

Suitable sealing product
TEROSON TA ALU

Glass facades are becoming increasingly popular due to their representative design in combination with natural lighting. However, this type of facade must be carefully planned, especially with regard to possible energy savings, sound and heat insulation as well as ventilation. Due to the building's high transparency, external shading must be provided in most cases.

Basic information on sealing strips and membranes

In the area of window sealing, various technologies have established themselves. Meanwhile, sealing strips have become very popular since they offer versatile use and produce safe and reliable results. Sealing strips are also ideal for meeting the building's structural-physical requirements.

Depending on the installation requirements, builders can choose from different materials for sealing strips:

- Textile materials: fleece-backed sealing strips with capillary action to improve the adhesion of subsequently applied plaster coats – mainly for sealing punched windows (solid facades)
- Plastic materials: sealing strips with a smooth surface that can be faced – mainly used for shadow gaps in the curtain wall

In addition to the material, also the diffusion behavior of sealing strips plays a crucial role.

- If the strips are installed on the cold side of the building (i.e. on the outside), they must be permeable to water vapor diffusion.
- If the strips are used on the warm side of the building (inside), they must be vapor-retarding or impermeable to water vapor diffusion.

The planned construction type and installation situation determine the way in which the sealing strip is fixed.

On window frames, the strip can either be clamped, bonded or fixed mechanically. If it is to be bonded, it must be equipped with a self-adhesive film.

Especially on masonry or other substrates, the use of a reliable adhesive is key. The strip can either have a single self-adhesive strip, be self-adhesive over its entire surface or be fixed with an adhesive paste.

- On smooth substrates, full-surface self-adhesive sealing strips can be applied very quickly and efficiently.
- On uneven or not properly prepared substrates, it is highly recommended to apply adhesive pastes. This is also the safest method since it is able to compensate for unevenness and other irregularities in daily construction work. After curing, a wet adhesive is also much more resistant to tensile and shear stresses.

However, depending on the condition or structure of a building (e.g. clinker, exposed brickwork on the outside), sealing strips are not always the first choice. In renovation projects for buildings under monument protection, they are excluded from use for reasons of product performance and cost-effectiveness.

Advantages and disadvantages of sealing strips at a glance:

Advantages:

+ For all solid substrates (combined with a suitable adhesive paste)
+ For accommodating variations in joint size
+ Immediately watertight (self-adhesive sealing strips)
+ No maintenance joint
+ Safe sealing of corners
+ Ideal s_d value (inside or outside the building)
+ Perfectly suited for pre-wall installation
+ Can be prefitted in the workshop

Disadvantages:

– No permanent UV resistance when exposed to direct weathering
– Cannot be used on exposed masonry in renovation projects
– Additional plaster work necessary in case of renovation

Floor-to-ceiling elements

In facade sealing, it is common practice to use strip or membrane systems that can be faced. They have proven their worth over many years and are, due to their high vapor diffusion gradient, optimally suited for sealing the space between facade elements and building shell – also from a structural-physical point of view.

For sealing the bottom connection of floor-to-ceiling elements, it is necessary to meet the special requirements of the following standards:

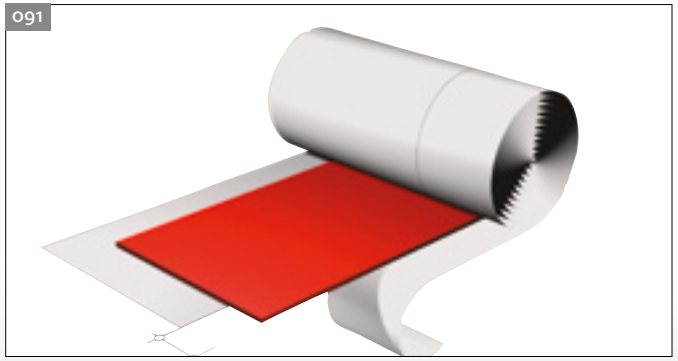
- DIN 18531 – Part 5: Balconies and walkways
- DIN 18533 – Parts 1 and 2: Waterproofing of elements in contact with soil
- DIN 18040 – Construction of accessible buildings – Design principles – Part 1: Publicly accessible buildings
- DIN 18040-2:2011-09: Construction of accessible buildings – Design principles – Part 2: Dwellings

The floor connection is sealed with self-adhesive and immediately waterproof vapor-retarding strips or membranes like our TEROSON FO KSK and TEROSON FO 150 FOIL-TACK M+S, which also meets the requirements of DIN 18533. It is self-adhesive over its entire surface and equipped with a split release paper (091). After removing the narrow strip of release paper, the sealing strip can be positioned and bonded to the facade element (092).

After that, the adhesive surfaces of the sealing strip must be rolled down to the building element with a hard rubber roller. This is strictly necessary to produce a firm bond with the facade element.

When bonding TEROSON FO sealing strips to mineral substrates, it is necessary to pre-treat the substrate with TEROSON PR PRIMER M+S or TEROSON PR PRIMER SPRAY M+S. The sealing strips can only be applied on top when the solvent contained in the primer has completely evaporated. The surface film left by the primer remains slightly tacky (093).

091



TEROSON FO 150 FOIL-TACK M+S and TEROSON FO KSK M+S sealing strips are equipped with split release paper.

092

Sealing strip for the lower connection

After that, the facade element is inserted into the wall opening, aligned with a spirit level or laser and screwed to the building shell using approved mechanical fasteners. In the next step, sealing strip TEROSON FO sealing strip is pressed down to the substrate using a hard rubber roller. Mineral substrates need to be pretreated with TEROSON PR Primer M+S. After the solvent has evaporated, the remaining release paper can be peeled off. The sealing strip should be fixed to the substrate as bubble-free as possible (094).

Please make sure to press the sealing strip firmly down to the facade element and the building shell with a hard rubber roller (095). This produces a firm bond between the sealing strip and the substrate or building element, thus preventing capillary absorption of moisture.

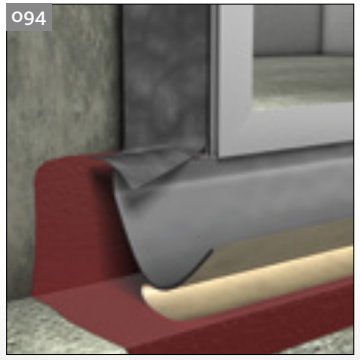
Elements installed with a perimeter insulation wedge

If the facade elements are installed in front of the building shell (in the insulation layer), a so-called insulation wedge is inserted around the perimeter of each element. This insulation wedge must be sealed with a vapor-permeable sealing strip such as TEROSON FO 3 SK1. The strip is fixed to the frame with the self-adhesive strip and then rolled down. On the building shell, it is fixed with TEROSON AD KDS paste.

093

Pretreat mineral substrates with a primer.

094



Remove the remaining release paper.

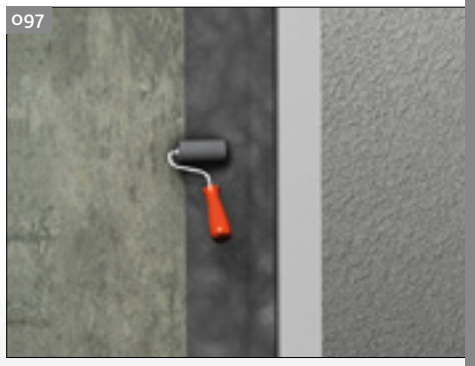
095

Roll the sealing strip down to the primed substrate.

096

Seal the insulation wedge above the element.

097



Press the sealing strip down with a rubber roller.

Floor-to-ceiling elements



Connection to the vapor-permeable vertical sealing strip (TEROSON FO 3)

When producing the connection to the vertical sealing strip (FO 3), it must be ensured that this is applied outside on top of the horizontal sealing strip (FO KSK in the lintel area). Before bonding, the area where the vertically applied TEROSON FO 3 overlaps the TEROSON FO KSK M+S strip must be cleaned with TEROSON SB 450 PRIMER (098). TEROSON AD KDS adhesive paste is best applied along the cutting edges of the vertical TEROSON FO 3 strip.

098

Pretreat the bonding area with TEROSON SB 450 primer.

099

Apply the adhesive paste.

100

Roll the sealing strip down into the adhesive.

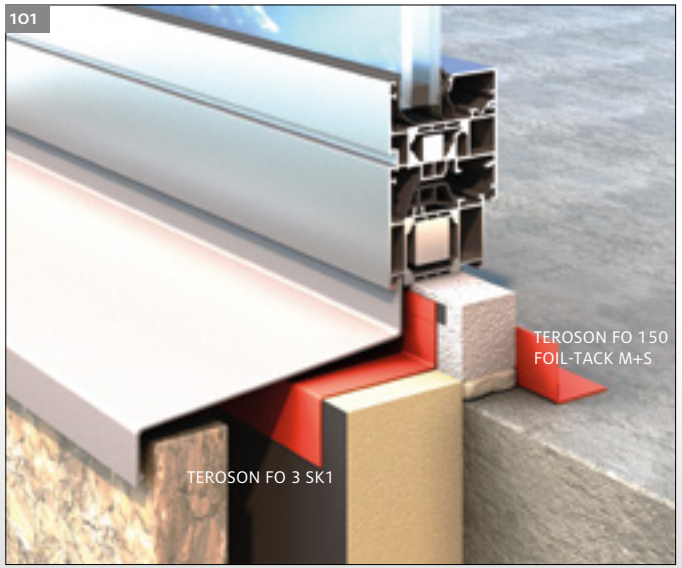
This prevents the capillary rise of moisture since the adhesive covers and additionally seals the edge area of the sealing strip (099). After that, use a rubber roller to press the sealing strip into the adhesive bed, thus spreading the adhesive over the required width (100). Finally, the facade can be externally insulated, for instance with insulating wool.

Windowsill sealing: protective strip under the windowsill (outside)

How to produce a second watertight layer

Windowsills installed on the outside of window and facade elements are mostly made of aluminum profiles. If condensation is expected under the windowsill or if the windowsill end pieces cannot be sealed against rain, it is necessary to produce a second watertight layer with the help of a sealing strip (e.g. TEROSON FO 3 SK1). The strip is fixed to the substructure insulating profile of the window or facade element and then run over the external insulation layer down to the water-draining layer of the insulation material. The strip must be fixed with an overlap of approx. 5 cm to prevent it from folding up. This also protects the insulation material from moisture penetration (101). It is not necessary to bond TEROSON FO 3 SK1 to the insulation material.

101



How to apply TEROSON FO 3 SK1 sealing strip under the windowsill



Sealing of outer corners

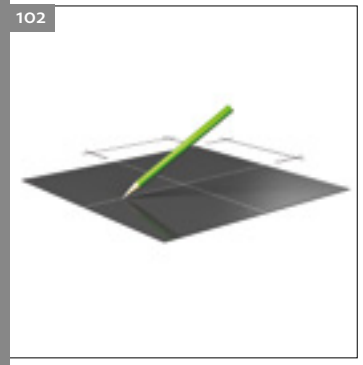
The inner and outer corners of facade elements can be easily sealed on site with the help of full-surface self-adhesive sealing strips (either plasterable strips or strips that can be faced).

Proceed as shown in the pictures below. Start by marking the desired size of the corner (102). Use a cutter knife to cut along the marked lines (103). Afterwards fold back one half of the strip (104). Now fold the cut corner to the inside. Remove the release paper from the raised corner of the strip (105).

Carefully fold down the second, adhesive-covered corner onto the other part of the strip. Take care to entrap as few air bubbles as possible and to fix the adhesive-covered part over its full surface with the other part of the strip (105 I 106).

Next, put the folded corner on a smooth surface and carefully roll over the bonded part with a rubber roller to squeeze out air bubbles and produce a firm bond (107). Make sure that the tips overlap and are 100 % tight. Otherwise, they need to be patched.

102

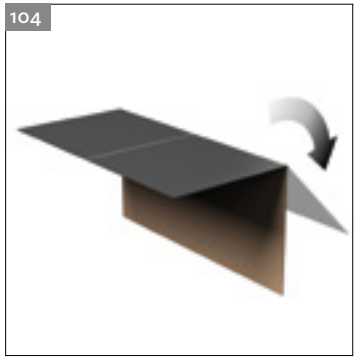


Mark the desired size of the corner.

103

Cut along the marked lines with a cutter knife.

104

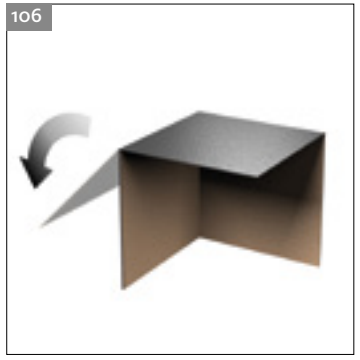


Fold back one half of the strip.

105

Remove the release paper.

106



Fold down the adhesive-covered surface.

107

Roll over the bonded surfaces with a hard rubber roller.

After that, peel off the release paper inside the corner and fix the corner to the building shell. Depending on the structural situation on site, this work step can also be carried out directly on the building shell. Mineral substrates must be pretreated with TEROSON PR Primer M+S.

Sealing of inner corners

Proceed as shown in the pictures below. Start by marking the required size of the corner that needs to be sealed (108).

Use a cutter knife to cut along the marked lines (109).

Fold one half of the strip up, parallel to the line that has been cut (110).

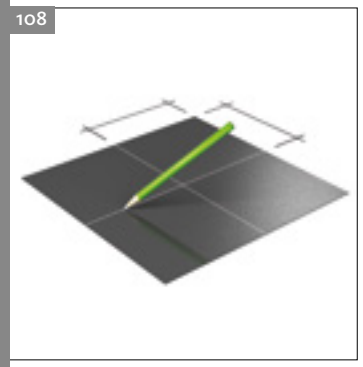
Now fold the upper cut corner to the inside and remove the release paper (111).

Fold up the second half of the strip. Take care not to entrap any air bubbles (112).

Put the bonded areas on a smooth surface and firmly roll them over from the inside and outside using a hard rubber roller (113).

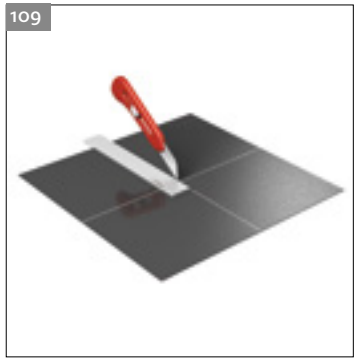
After that, strip off the release paper from the outer side of the corner and fix the corner to the building shell. Mineral substrates must be pretreated with TEROSON PR Primer M+S.

108



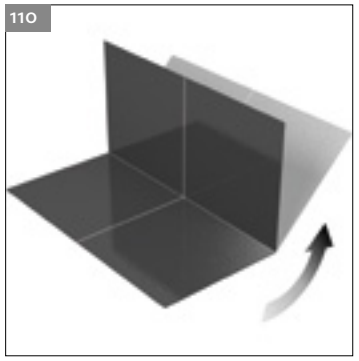
Mark the required size of the corner.

109



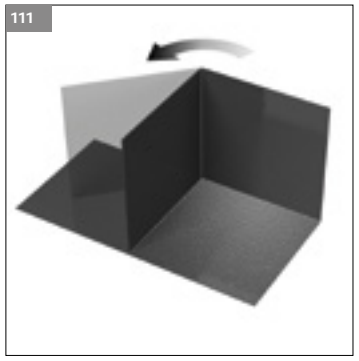
Cut along the marked lines with a cutter knife.

110



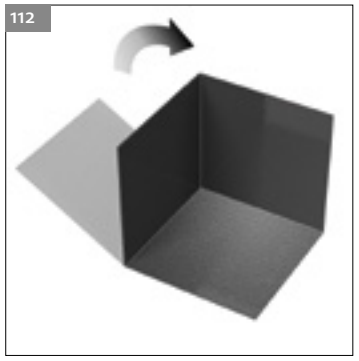
Fold up one half of the strip.

111



Remove the release paper.

112



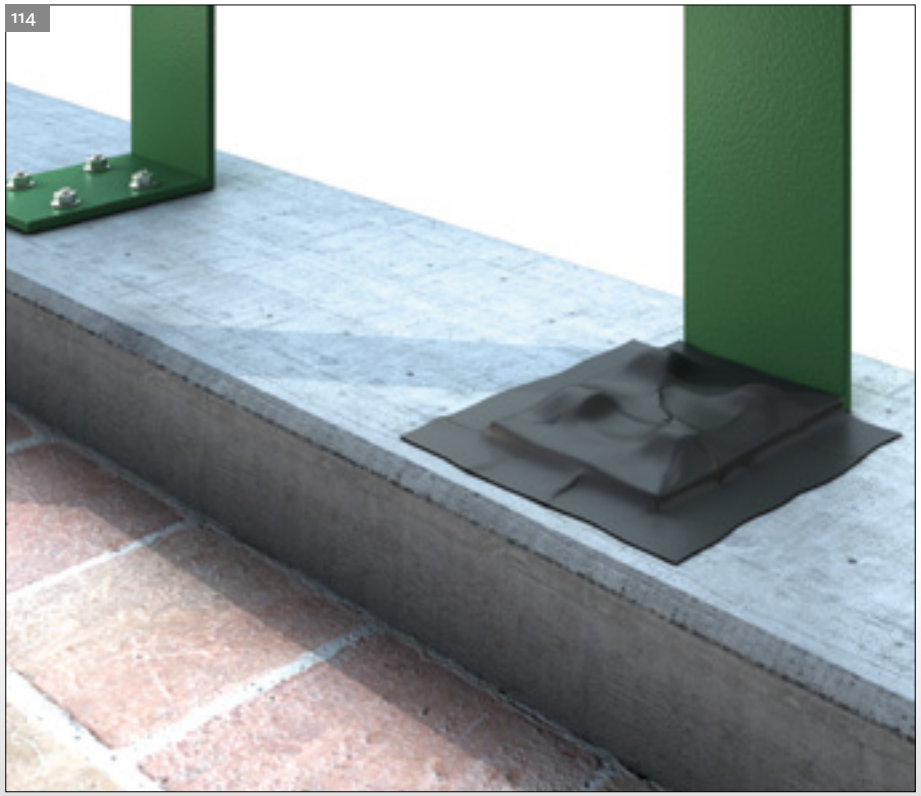
Fold up the second quarter of the strip.

113

Roll over the bonded surface with a hard rubber roller.

Sealing of facade anchors

114



Sealing of facade anchors with TEROSON FO 150 FOIL-TACK M+S

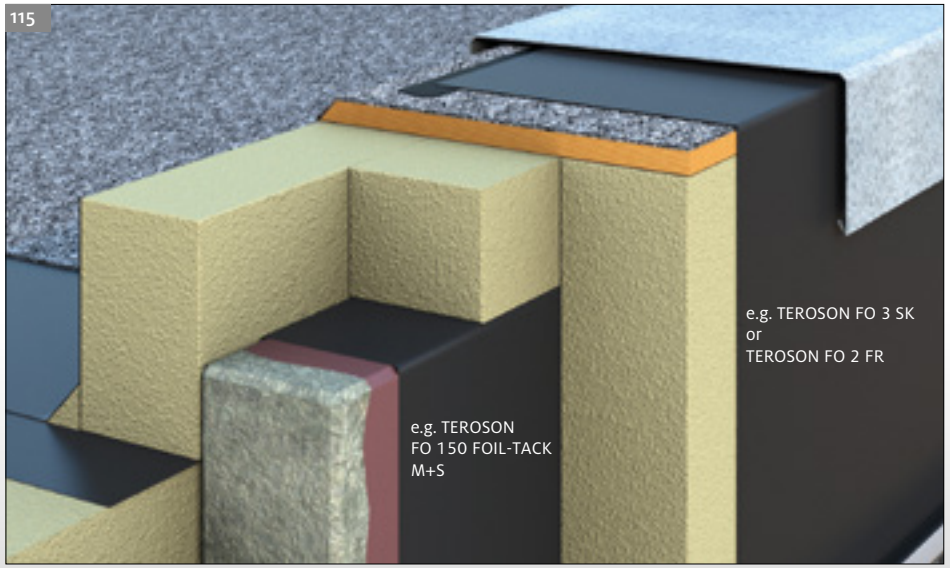
Sealing the parapet connection

Suitable sealing products
TEROSON FO 150 FOIL-TACK M+S
TEROSON FO 3 SK
TEROSON AD KDS

Product compatibility across all trades is one of our most important principles.

The connection between the facade elements and the parapet (upper connection to the roof) is sealed on the warm side of the building with TEROSON FO 150 FOIL-TACK M+S. After sealing, the insulation layer is installed between the upper edge of the facade element and the upper edge of the parapet. After that, the vapor-permeable sealing strip TEROSON FO 3 SK can be applied on top, starting from the facade element up across the parapet to the inner roof-facing side of the parapet. This strip is fixed with TEROSON AD KDS adhesive paste. Before connecting the parapet sealing strip TEROSON FO 3 SK to the waterproofing membrane of the flat roof, it is necessary to test the compatibility of the products that will be in direct contact with each other (115). In addition, the substrate must be properly prepared (use of the right primer, adhesive, cleaner etc.).

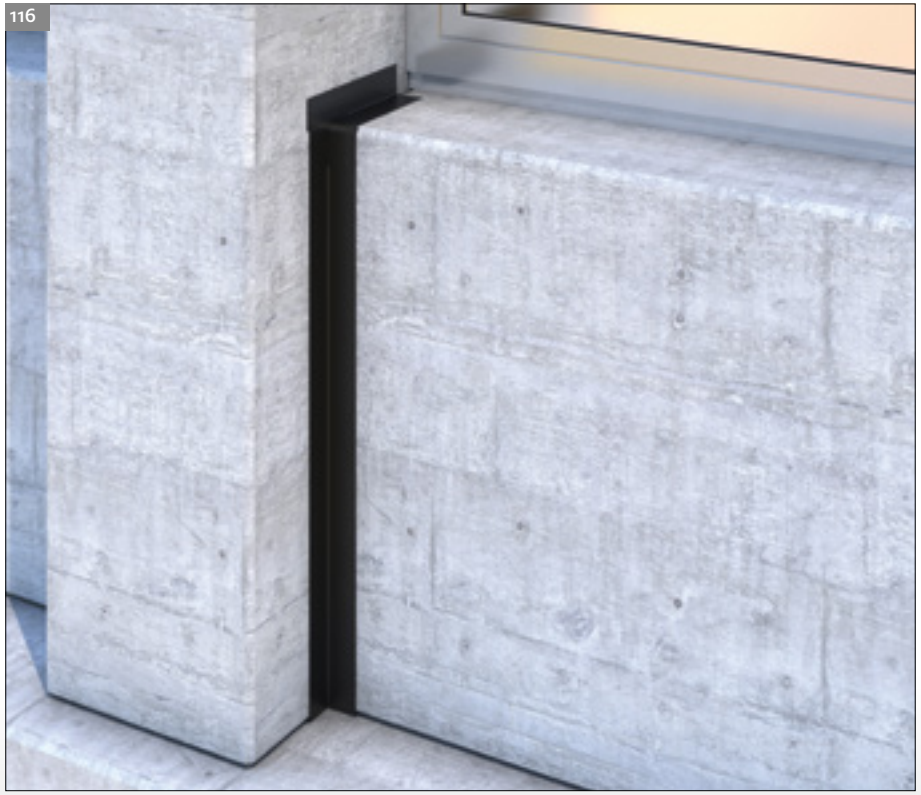
115



Parapet connection

Sealing of precast concrete elements

Precast concrete elements that do not statically move against each other often need to be sealed with sealing strips to ensure air tightness.



Sealing of precast concrete elements with TEROSON FO 150 FOIL-TACK M+S

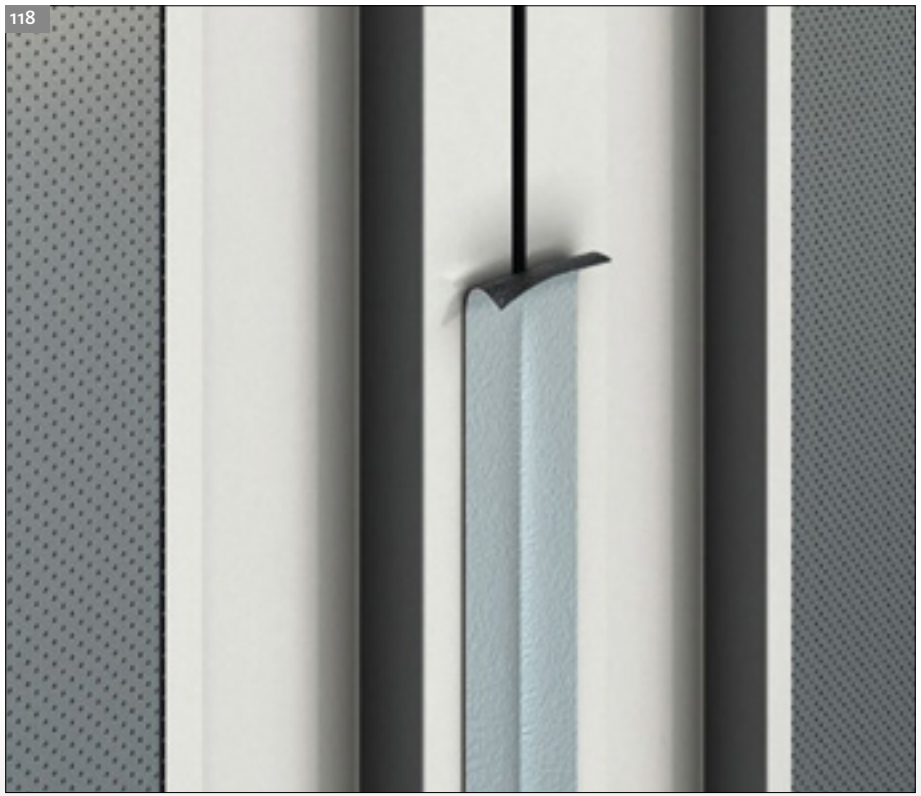
For the interior of facades, we recommend using TEROSON FO 150 FOIL-TACK M+S. If subsequent plastering work is planned, TEROSON FO 50 FOIL-TACK should be used.

Sealing around circular components

Sealing around circular components with TEROSON FO 150 FOIL-TACK M+S

Sealing of facade panels

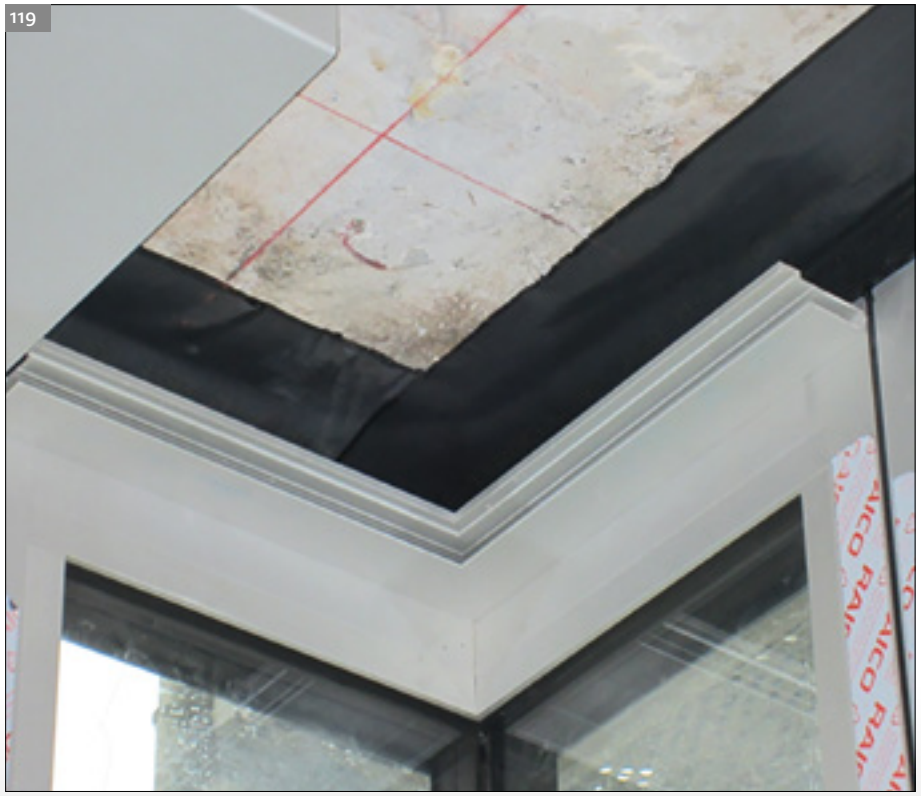
118



Sealing of facade panels with TEROSON TA ALU sealing strip

Sealing of the lintel area

119



Sealing the lintel area with TEROSON FO 150 FOIL-TACK M+S sealing strip

Powerful adhesion as ever, fast curing as never before.

www.teroson-bautechnik.com

TEROSON AD MS 2100

Special assembly adhesive featuring very fast curing

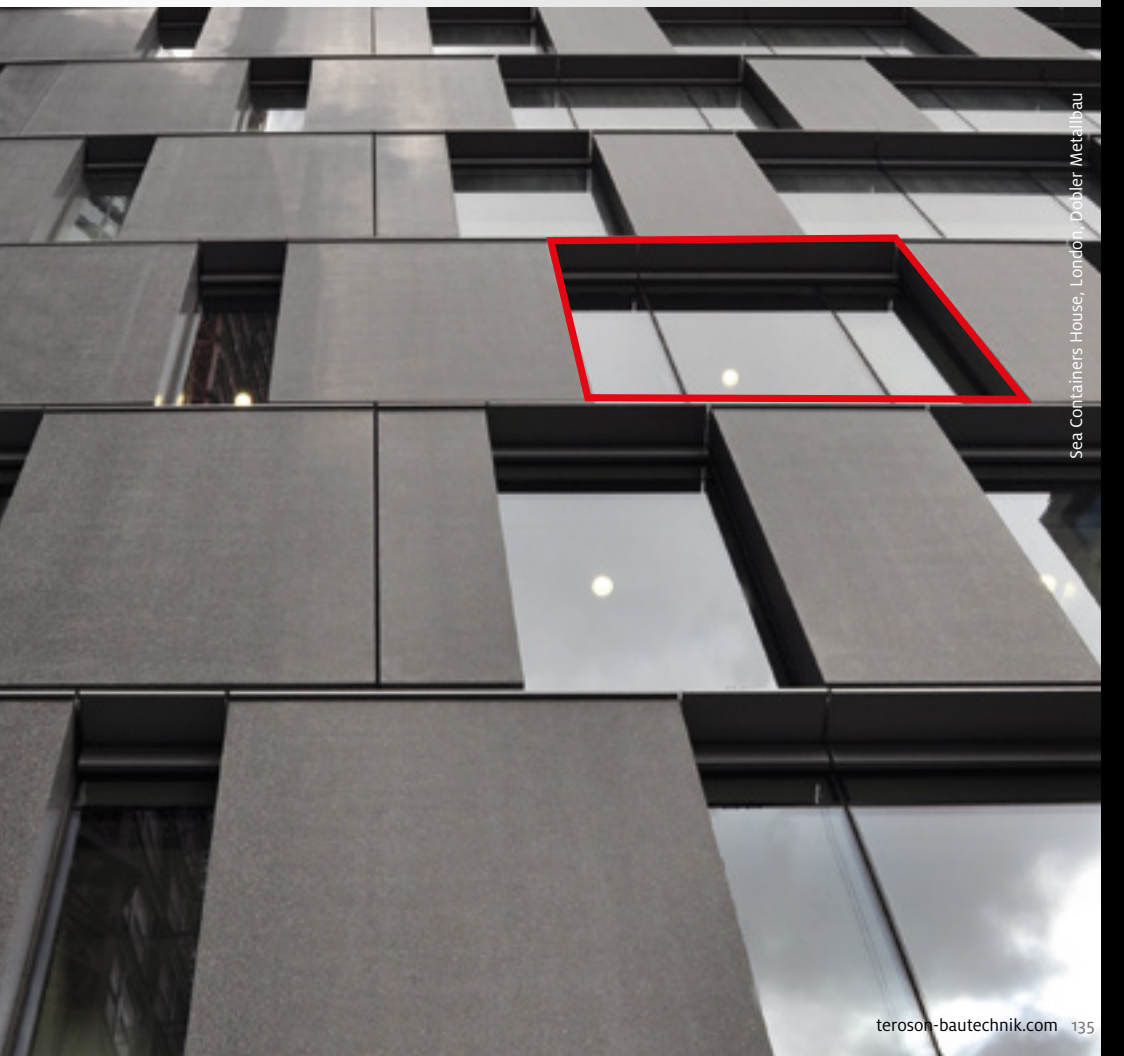
Extremely strong bonding solution based on MS polymers

- Very high initial tack
- Very fast curing
- Can be painted and sanded
- For indoor and outdoor use
- Good gap-bridging ability
- EMICODE® EC1^{PLUS} certified

Henkel

TEROSON®

Adhesive bonding in metal construction

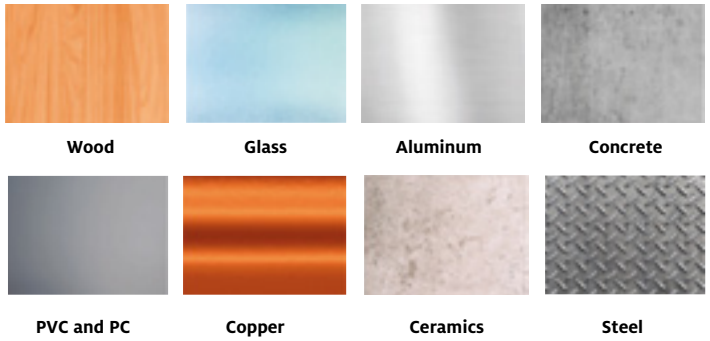


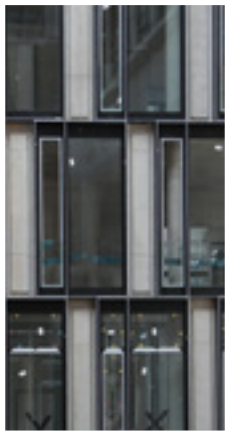
Sea Containers House, London, Dobler Metallbau

Adhesive bonding in metal construction

In the metalworking trade, the demands on construction and design are constantly increasing. In order to meet these requirements, adhesive bonding is an ideal supplementary joining technique.

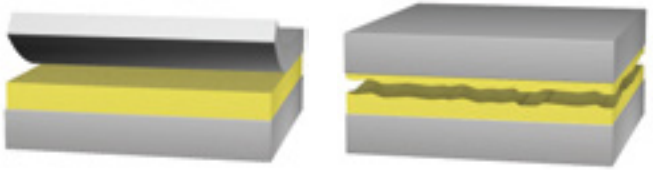
Compared to other established joining techniques like screwing, riveting and welding, adhesive bonding offers several advantages. For example, bonding makes it possible to join many different materials with each other. Adhesives are not only able to join two components but also fulfill additional functions. They can, for instance, be used as sealants, corrosion protectors, insulators against heat and electricity but also vibrations.





The best-known applications of adhesives in the metal sector include threadlocking, joining of shaft-hub connections as well as thread sealing and surface sealing. Bonding, however, offers a variety of other possibilities. Elastic adhesives, for instance, are used for metal claddings, facades and roof elements. Here, the adhesive provides resistance to impact and bending stresses as well as resistance to thermal expansion, vibration and shrinkage. These are just a few examples to illustrate the versatility of adhesives.

120

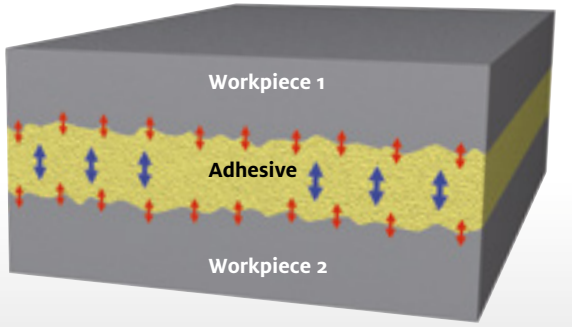


Adhesive failure

Cohesive failure

Adhesion
is the force of attraction between the molecules of different materials.

Cohesion
is the internal strength that holds molecules of the same material together.



Why adhesive bonding?

The basics of adhesive bonding

Adhesive bonding in the narrower sense is the joining of two parts by means of an adhesive. In the metalworking industry, adhesive bonding has a number of advantages over other joining techniques.

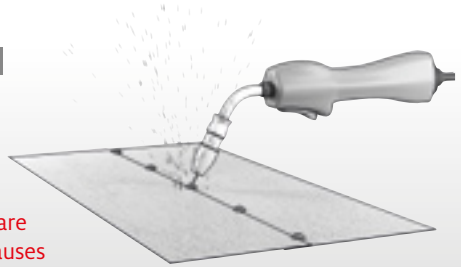
1. Uniform stress distribution
During the welding process, high temperatures cause structural changes in the material which lead to irregular stress distribution. In contrast, adhesive bonding does not result in thermally induced distortion of the component.

With spot-like connections by screws and rivets or by spot welding, weak points occur in the material due to drill holes or welding spots. These are due to stress peaks that, under load, form along the edges of the material and can be the starting point for a fracture of the joint. Bonded joints, however, do not show such weakening. Being a full-surface connection, the advantage of bonding is the uniform stress distribution. The lines of force in adhesive layers are very homogeneous. This results in uniform force application during the bonding process.

EXPERT TIP:
concerning structural connection joints

- The surfaces to be joined must be properly prepared.
- The time for curing or cross-linking must be sufficiently long before the bond can be subjected to loads or stresses.
- Ambient conditions, e.g. high temperatures, must be considered.
- Hazards that affect occupational safety and health must be eliminated.

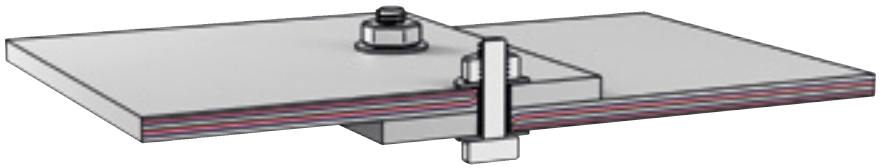
121



Please note: Flying sparks are one of the most common causes of fire during construction and renovation.

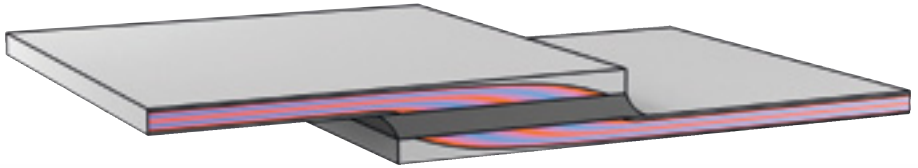
2. Combination with other joining techniques
Adhesive bonding can be combined very well with other joining techniques. Additional riveting or screw-fastening provides redundant safety. Also the sealing effect of adhesives can be used to advantage.

122



3. Great variety of materials to be joined
Adhesive bonding can be used to join a wide variety of materials. New, innovative areas of application are constantly emerging, for which the adhesives can be adapted.

123



Adhesive bonding: preparation is key

EXPERT TIP:

- Always shake the primer before use.
- Correct primer dosage: As little as possible, as much as necessary!
- Observe the flash-off time.
- Close the container immediately after use.

Objectives of surface preparation

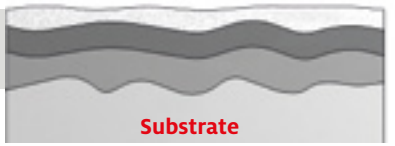
- Produce a bonding surface of defined size and condition
- Improve the adhesion
- Improve the long-term stability
- Ensure reproducible adhesive joints

These objectives can be achieved by

- removing all adhesion-reducing layers
- modifying the surfaces to increase wetting and adhesion (surface activation)
- preserving the surface condition over an extended period of time

124

These layers need to be removed.



1. Classical surface treatment

a) Clean the surface if it is heavily soiled.
b) Produce a defined bonding area (e.g. by deburring).
c) Degrease the surface with suitable cleaning agents.

125

2. Mechanical surface treatment

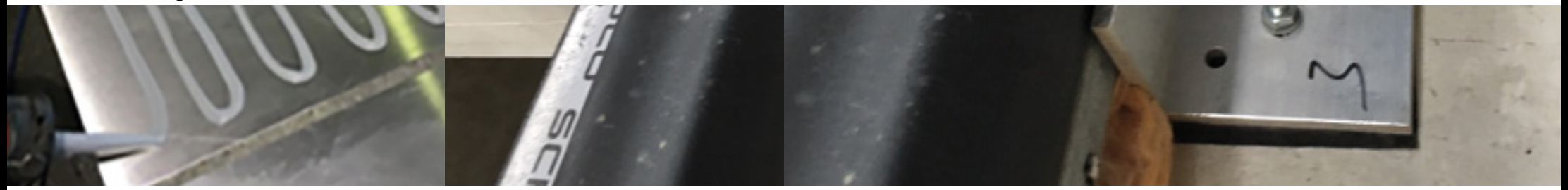
Methods of mechanical surface treatment include sanding, abrasive blasting, grinding, milling and turning. The following effects are achieved:
a) cleaning
b) increase in surface area
c) activation of the surface during blasting

126

3. Wet-chemical surface treatment

Before the adhesive, a primer or adhesion promoter is applied to the bonding area. It creates a bonding bridge between the adhesive and the material.
This not only improves the bonding strength but also the durability of the bond. Without primer, some materials cannot be bonded or only with difficulty.
Primers help achieve the following effects:
a) improve the abrasion resistance
b) increase the ageing resistance
c) preserve the surface condition
d) provide a perfect bond between adhesive and surface
e) increase the strength of the bond (by up to 50 %)

127

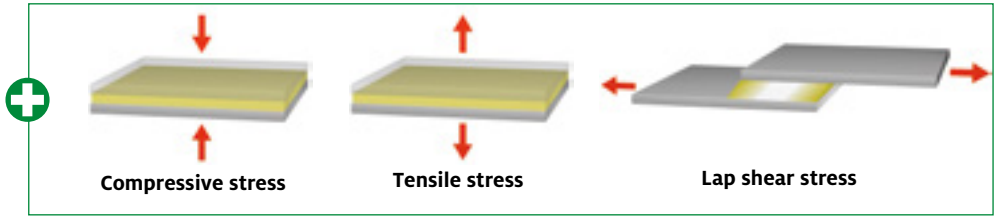


Structural bonding in metal construction

Structural design of bonded joints

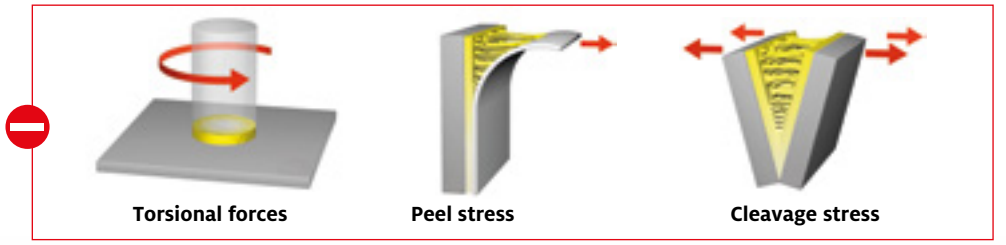
The basic rule in the structural design of adhesive joints is that all distance-increasing stresses, e.g. tensile stress, must be avoided. By contrast, shear or compressive stresses are recommended.

128



Peel or cleavage stresses acting on the adhesive joint are most critical. Here, the entire force acts on a very small surface or even on a line. When designing the joint, overlap bonding should always be preferred to butt joint bonding. If possible, the bonding area should be enlarged to enable a higher transmission of force.

129



Critical peel stress can be reduced by reinforcing the bond mechanically. Mechanical reinforcement absorbs the peel stress, thus relieving the stress acting on the adhesive. It is possible by means of

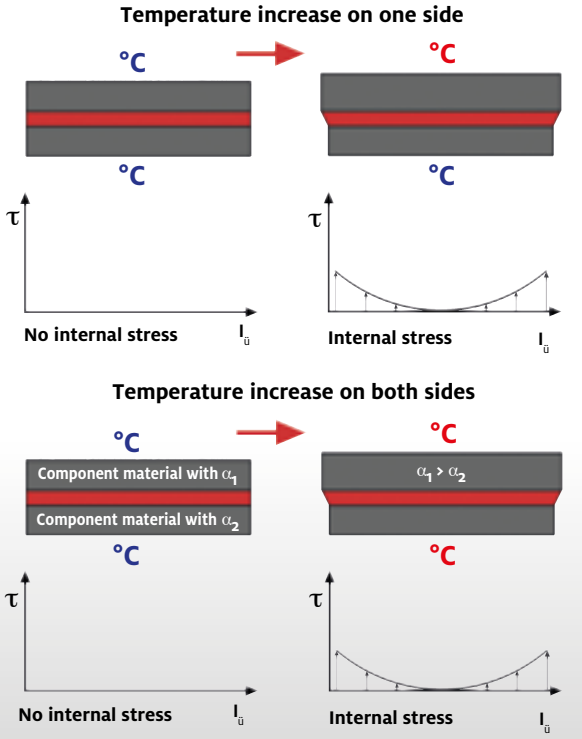
- rivets or screws
- welting
- material reinforcement
- enlarging the bonding area

Bonding different materials

When bonding different materials and surfaces, further aspects need to be considered:

- Different materials have different coefficients of thermal expansion. Under the influence of heat, excessive stresses may occur in the adhesive.
- Due to different surface properties, there can be differences in surface wetting.
- Pretreatment may be necessary depending on surface type and contamination.
- For every surface the right primer (adhesion promoter) must be used.
- The adhesive must be suitable for both surfaces.

130



Different materials with different coefficients of thermal expansion

τ = Internal stress
α_x = Coefficient of thermal extension
$l_ü$ = Length of bonded joint

Structural bonding in metal construction

EXPERT TIP:

- The thermal expansion of metals is usually higher than that of adhesives.
- Internal stresses inside the metal may cause a stress increase on the adhesive layer.
- Metal is a dense material. Since solvents or air humidity cannot diffuse through the material, solvent- and dispersion-based adhesives are of limited suitability for use with metals. This also applies to large-area bonding with moisture-curing adhesives.

Thermal expansion

When designing a bonded joint, it is essential to take the thermal expansion coefficients of the materials to be bonded into account. Internal stresses in the component are, for example, caused by:

- different materials
- different temperatures

These internal stresses can be minimized not only by the right choice of material and adhesive, but also by a clever design of the bonded joint.

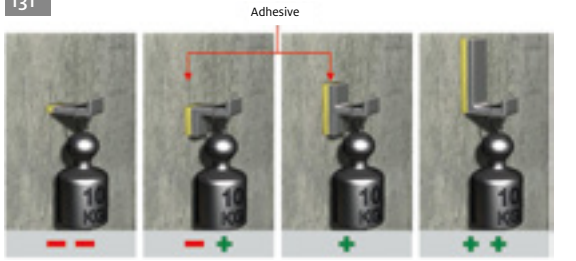
Thermal expansion coefficient α of different materials

Material	Thermal expansion coefficient α in 10^{-6} K^{-1}
Acrylic glass	80.0
Aluminum	23.5
Concrete	11.0
Tiles	6.0
Rigid PVC	80.0
Wood, along the grain	7.0
Clinker	7.0
Porous concrete	11.0
Earthenware	2.4
Zinc	36.0

Elastic bonding, sealing and coating

Today, elastic adhesives are firmly established in metal construction, because they provide optimum resistance not only to impact and bending stresses but also to thermal expansion, vibration and shrinkage. TEROSON offers 1-component moisture-curing adhesives (SMP or MS) that feature excellent resistance to weathering and ageing. They have been specially designed for elastic bonds that are subject to high mechanical loads. TEROSON MS adhesives meet the requirements of modern design and open up new applications in many areas of industrial production and assembly.

131



Our TEROSON MS range is based on silane-modified polymers (SMPs) which cure by reaction with atmospheric moisture to form high-performance elastomers. Formulated with an adhesion promoter (primer), these products feature an extremely broad adhesion spectrum. This makes them compatible with a great variety of materials. In many cases, they can even be used without additional primer.

Thickness of the adhesive layer usually ranges from a few millimeters to several centimeters. Additionally, these adhesives can be used as sealants in the area of joint sealing. The adhesive reaction starts immediately on contact with atmospheric moisture. Curing takes place from the outside to the inside. Ambient conditions such as humidity and temperature influence the curing process.

Bonding and sealing in one operation

Product features
- Good ageing properties
- High UV and weather resistance (usually more resistant than PU)
- Adhesion to different material combinations: metals, paints, plastics and minerals
- Low shrinkage during the curing process
- Elastic behavior
- Flame-retardant (depending on the formulation)

Typical applications
Sheet metal flashings, sandwich panels, collars, gutters, pipes, insulation boards, connection and end rails, PVC and EPDM strips/membranes, windowsills, moldings, brackets, glass panes, angle irons, reinforcing sheets, profiles, fittings, sandwich components, metal sheets, superstructures, claddings, covers, connection joints for wall, facade, roof, window and door elements; flange and surface sealing; sealing of wood/metal windows and doors, sealing of skylights and conservatories, sealing of pipe and cable ducts

Advantages:
+ Adhesion without primer
+ Wide range of applications
+ Wide range of products (adhesives, sealants, coatings) for standard and customized solutions
+ Higher quality

Disadvantage:
– Limited suitability at high temperatures and permanent exposure to moisture

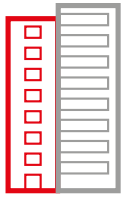
All features at a glance

The advantages of bonding and sealing in one operation
- Reduces costs, minimizes waiting times
- Offers more design flexibility for producing clean transitions
- The stored products are not susceptible to frost attack.
- High storage stability, even after repeated opening and closing

Special product benefits
- One-component formulation
- Odorless
- Free of solvents, isocyanates and silicones
- Not subject to labelling as an environment- and health-hazardous substance
- Does not contain water
- Easy to use, even at high or low temperatures
- Moisture-curing
- Suitable for indoor and outdoor use
- Workpieces can be repositioned after application
- Gap- and crack-bridging
- No swelling
- Good adhesion to paints and lacquers, also wet-on-wet
- Broad adhesion spectrum (see table on page 232)
- Permanently elastic, even at high or low temperatures
- Excellent compatibility with PU foams, epoxides and acrylates
- Bubble-free curing
- High UV and weather resistance
- Excellent mechanical properties (no “chewing-gum effect”)
- Low dust absorption
- Low shrinkage
- Long-term temperature resistance from -40 °C to +90 °C (short-term exposure up to +200 °C for approx. 10 min)
- Non-corrosive on surfaces and paints/lacquers
- Excellent insulation of structure-borne sound and impact sound
- Impact-, vibration- and shock-absorbing
- Compensates thermal expansion and material stresses
- Good resistance to water, salt water, aliphatic solvents, oil, grease, diluted organic acids and alkalis

Areas of application

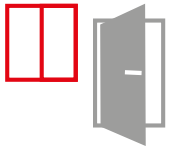
132



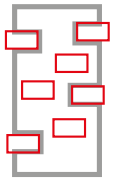
Building construction

Facade sealing

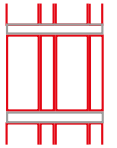
Roof construction



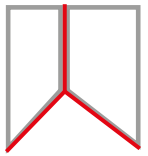
Window and door installation



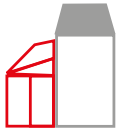
Modular construction



Metal construction



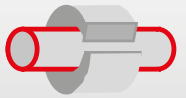
Joint sealing



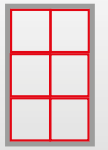
Conservatory construction

Heating, ventilation & airconditioning systems

Prefabricated construction



Sealing & insulating



Glass construction

The methods of adhesive application

What is needed?

- With adhesive cartridges use a cartridge gun, with tubular bags use an applicator gun.
- If necessary, use a suitable spatula for applying the adhesive on large areas.
- Use spacers for heavy workpieces to ensure the adhesive layer is not compressed to less than 1 mm by the dead weight of the workpiece.
- During the bonding process: check the amount of adhesive, adhesion to the workpiece surface etc.

There are different opinions among metalworkers as to how an assembly adhesive is best applied. Often, the following questions are raised: Which application method is recommended? Does the application method influence the quality of the bond? What needs to be considered when bonding, for instance, a metal profile to a concrete wall?

EXPERT TIP:
Moisture is a “killer” for most adhesives if it is allowed to act on the bond for a long period of time. Direct exposure to moisture or condensation has a strong impact on the service life and durability of the bond. Any kind of moisture influence must therefore be carefully considered when designing bonded joints.

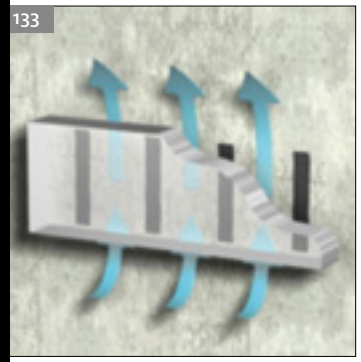
Different application methods

Vertical bead application

The advantage of vertical application is that moisture cannot accumulate. It is allowed to escape below the workpiece (e.g. as condensate). In addition to this drainage effect, there will be a slight circulation of air comparable to the stack effect (133). As a result, moisture can reach the adhesive from all sides, thus accelerating the chemical reaction (134).

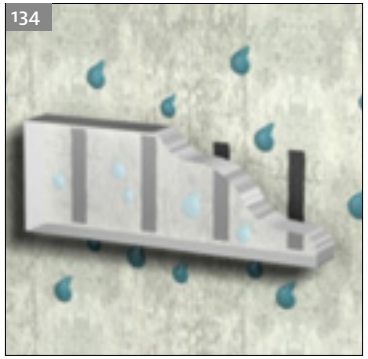
Vertical application is particularly recommended for medium to heavy workpieces. When pressing the workpieces down, make sure that the adhesive beads do not run into each other and coalesce. Depending on the workpiece weight, it is recommended to apply the beads at a distance of approx. 10 to 25 cm from each other.

133



Air circulation during the curing process

134



Vertical adhesive application: moisture cannot accumulate.

Spot application

When bonding lightweight components, it is also possible to use the spot application method (135). The effect of spot application is similar to that produced by vertically applied beads. Here as well, air is allowed to circulate between wall and workpiece so that the adhesive can cure relatively fast (136).

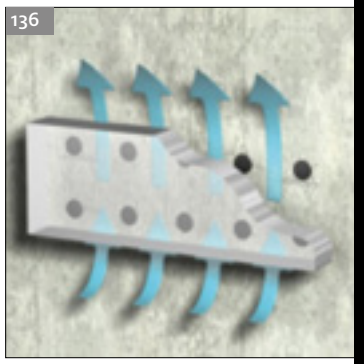
Horizontal bead application

The disadvantage of horizontal application is that moisture can accumulate. The drying process of the trapped moisture is much slower as no air can circulate. If the bond is additionally exposed to moisture that cannot evaporate over a long time, there is risk of mold growth on mineral substrates or of corrosion on metal sheets. For this reason, the application of horizontal beads is not recommended for bonds exposed to moisture (137).

135

Spot application: moisture cannot accumulate.

136

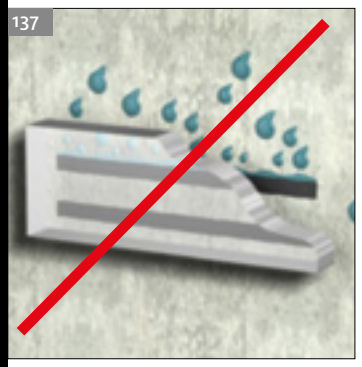


Air circulation during the curing process

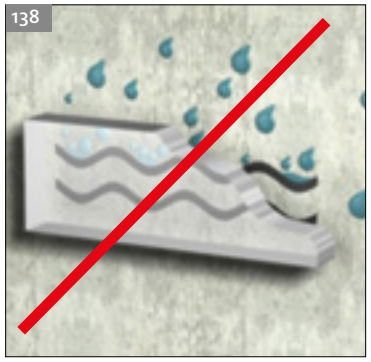
Wavelike application

Adhesive application in the form of wavy strands is quite common in the building trade. However, it is not at all recommended if the bonded joint is likely to be exposed to moisture.

Moisture can accumulate behind the workpiece. With outdoor applications in winter, this can lead to bond failure caused by frost attack (137 I 138).



137 Don't apply horizontal beads in the presence of moisture.



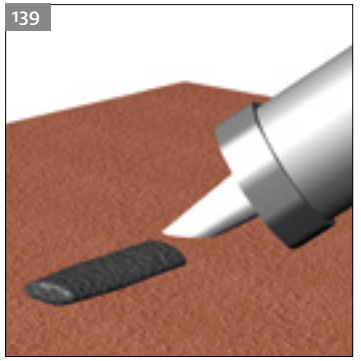
138 Avoid wavelike application if there is risk of moisture.

Bonding on smooth substrates

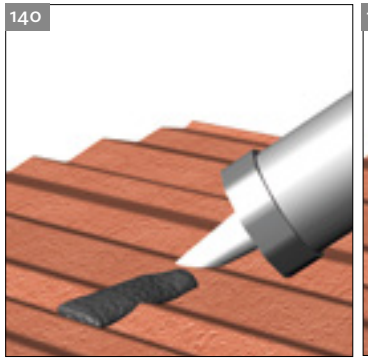
When working with assembly adhesives, the tip of the cartridge is often cut off at an angle. After that, the adhesive is applied with the beveled tip facing down. This usually produces a bead that is shaped like a flattened ellipse. On smooth substrates, this application method is not a problem (139).

Bonding on uneven substrates

However, when using the same method on uneven surfaces, the adhesive would be squeezed into the surface depressions. As a result, the adhesive layer may be too thin to ensure successful bonding (140). When pressing the components together, the bond may fail because there is no contact between them in the area of the depressions. As a result, the bonding area between the components may be too small to withstand loads or stresses.



139 Adhesive application on smooth substrates



140 Beveled tip down: wrong application on uneven substrates

141 Beveled tip up: correct application on uneven substrates

This problem can be avoided on uneven substrates by turning the cartridge tip so that the beveled tip faces upwards. As a result, the adhesive bead is higher and has a larger contact resp. bonding area with the component when it is pressed down into the adhesive (141).

Securing the workpieces

- Please note that the workpieces can only be adjusted or repositioned within the open time of the adhesive. During the curing process, the workpieces must not be moved any more.
- Secure the workpieces only if necessary. Heavy components, profiles and the like must be secured for at least 24 hours. All fastening devices are suitable that prevent the workpieces from shifting during the curing process, for example clamps, wedges and the like.
- Remove excess adhesive while still fresh.

Curing of the adhesive

The curing process depends on several factors. These include among others:

- ambient and workpiece temperature
- moisture content of workpiece and substrate
- air humidity (some adhesives require humidity for curing)
- absorbency of the components to be joined
- thickness of the bonded joint
- air circulation
- application method (see recommendations given in the Technical Data Sheets)

Favorable conditions for chemically curing assembly adhesives are temperatures between 20 and 35 °C and air humidity above 50 %. These conditions accelerate the curing process, while lower humidity and temperature slow down the process.

After application

- Readjust the position within the first few minutes of joining the parts (usually 10-15 minutes, depending on the adhesive).
- Immediately remove excess adhesive while it is still fresh.
- After bonding, clean the workpieces as recommended by the adhesive manufacturer.
- In most cases and under optimal conditions, the bond can be subjected to loads after 24 hours.
- Final bonding strength is usually reached after a few days.

Adhesion tests

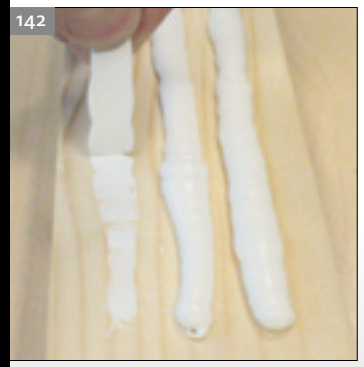
EXPERT TIP:
When testing the bonding strength of adhesives, always carry out at least three trials in order to obtain more reliable results. Apply the adhesive very carefully and label the tests accordingly in order to facilitate later replication.

Before bonding on difficult substrates, it is advisable to carry out preliminary tests. These tests help assess the properties of different adhesives and their suitability for the job at hand. A good method for this purpose is the bonding test (142). It determines the adhesion of an adhesive to a given substrate and is mainly used for chemically curing adhesives.

For test purposes, apply three beads of adhesive (diameter: approx. 8 mm) to the substrate. After a curing time of 7 days at 23 °C and 50 % RH, try to pull the beads off the substrate. Use a cutter knife to lift approx. 2 cm bead off the substrate. After that, try to further pull the bead off the substrate. If it comes off easily, the adhesive has poor adhesion. If the bead breaks without coming off the substrate or if the substrate breaks, adhesion is considered to be good.

When working with water- or solvent-based adhesives, the workpieces are normally glued directly to each other. After sufficient drying (7 days at 23 °C and 50 % RH), the test specimens are broken apart. Analysis of the fracture pattern provides information on the strength of the bond. If the bond fails, the weakest point is quickly revealed.

142



Adhesion test

Bonding of aluminum rails

The photos below (143 I 144 I 145) show the correct application of adhesive when gluing an aluminum rail into place. Make sure to apply the adhesive in such a way that no moisture can accumulate under the rail or profile which, in winter, may cause frost heaving as a result of ice forming beneath the rail.

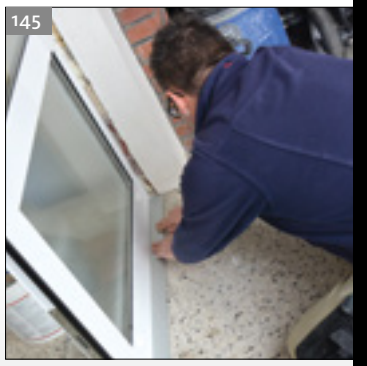
143

Apply the adhesive bead.

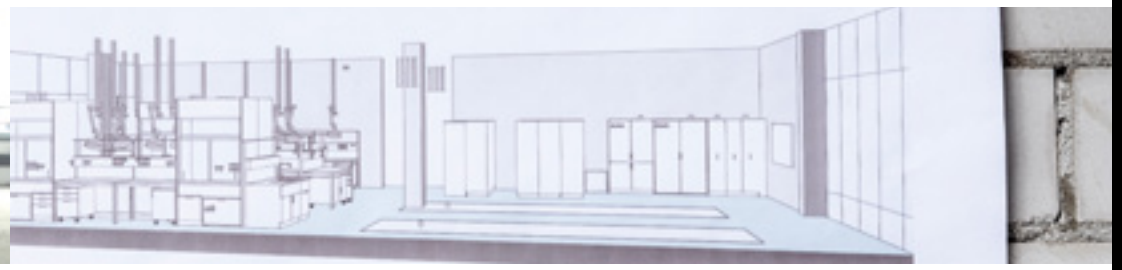
144

Place the aluminum rail into the adhesive.

145



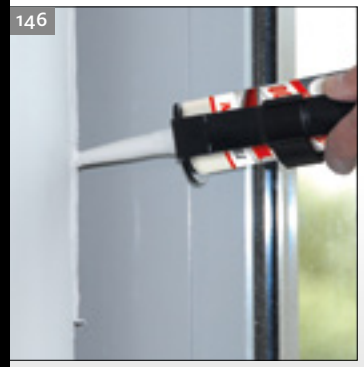
Press the rail down to the surface.



Bonding of joint-covering profiles

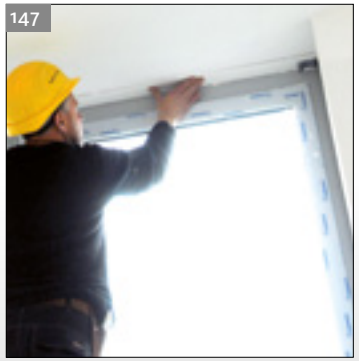
When bonding powder-coated aluminum profiles to the inside of a window element, it is advisable to use an adhesive with high initial tack. Depending on the type and condition of the substrate, either bead or spot application should be chosen. The high initial tack of assembly adhesives is of particular importance when bonding profiles under the concrete lintel along the upper edge of the window. When installing strip windows (horizontal lines of windows), several window elements are connected with each other. The cover profiles on the inside of the building can have a length of 4 to 5 meters. Due to the high initial tack, the window installer can fix the profile over half its length and then move the ladder or work platform to the other end without the profile coming off the surface. After moving, also the second half of the profile can be pressed into the adhesive. Thanks to the high initial tack, a second installer is not necessary for fixing long profiles (146 I 147 I 148).

146



Adhesive application on vertical surfaces

147



Pressing the profile under the ceiling – no need for mechanical fastening

148

Joint-covering profile after installation

Bonding of cable, pipe and screw penetrations

149

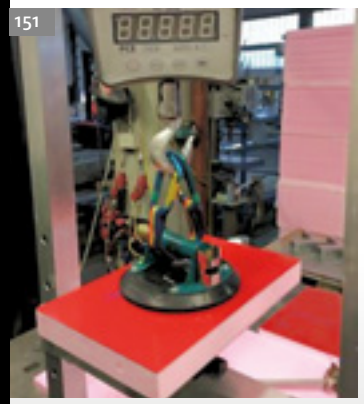
Bonding and sealing of penetrations with TEROSON SE 2000 MF and TEROSON FO 150 FOIL-TACK M+S

Bonding of panels

Bonding of metal section ends

150

151



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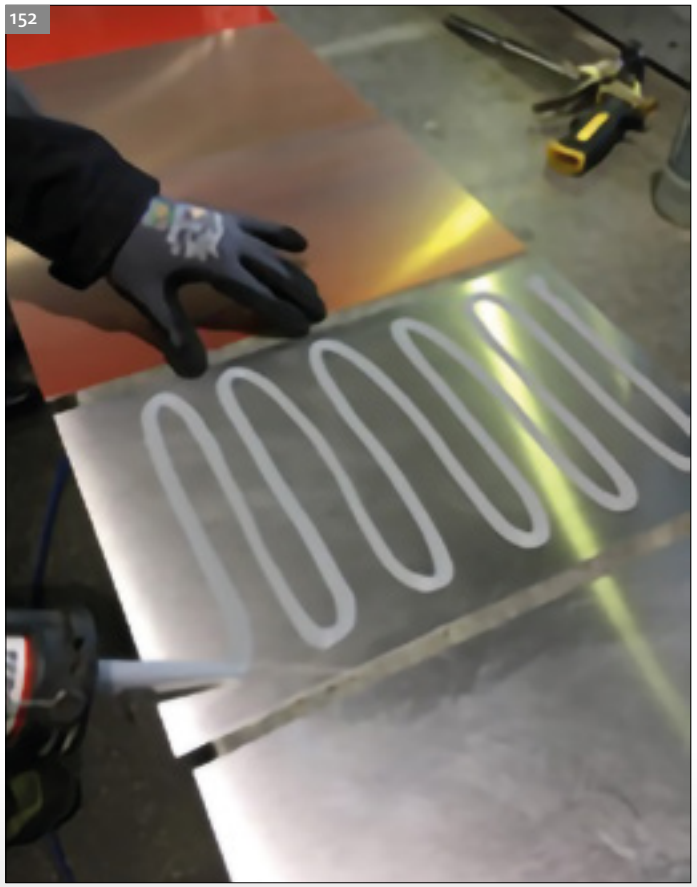


Bonding of panels with TEROSON SE 2000 MF without mechanical fastening

153

Bonding of metal section ends with TEROSON SE 2000 MF

Bonding of sealed seams

Bonding of edge seals

154

Bonding of sealed seams with TEROSON AD KDS

155

Bonding of edge seals with TEROSON AD KDS

Bonding on polyethylene sheeting

Bonding with TEROSON AD MS 2100

TEROSON FO 150 FOIL-TACK M+S and TEROSON FO KSK M+S are sealing strips whose upper side consists of polyethylene sheeting. It is therefore a challenging task to bond other building components on top of these strips: most adhesives do not stick to the material. In order to fix e.g. a windowsill on the inside of a window element, the sealing strip must be pretreated with TEROSON SB 450 primer before applying the adhesive (156). After the primer has dried, the windowsill can be fixed on the sealing strip with TEROSON AD 2100 MS adhesive (157 I 158).

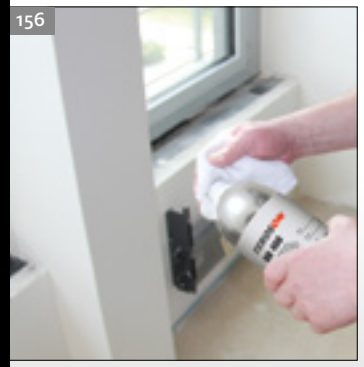
Bonding of mineral fiber insulation materials and plastic/rubber membranes

Use of contact adhesives

TEROSON AD Adhesive Spray is used for both surface and connection bonding of fabric-backed plastic and rubber membranes (e.g. EVA, EPDM) as well as non-fabric-backed facade sealing strips (e.g. EPDM). The spray is suitable for one-sided but also double-sided application (contact bonding).

But contact adhesives like TEROSON AD Adhesive Spray can also be used as an installation aid when bonding mineral fiber insulation materials (e.g. Isover, Rockwool) to each other and on facades made of concrete, plastered masonry, steel or aluminum.

156



First apply adhesion promoter TEROSON SB 450.

157

Now apply TEROSON AD MS 2100 adhesive.

158

Finally place the windowsill into the adhesive bed.

159

Bond the insulation wedge to the wall.

160

Seal the insulation wedge with TEROSON FO 3 membrane.

Bonding and sealing of glass-metal constructions

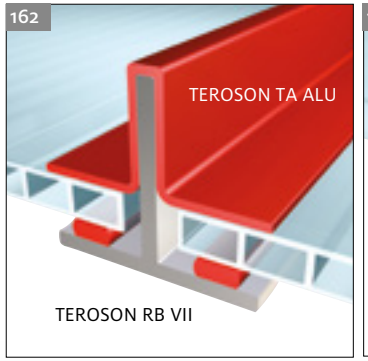
Bonding and sealing with TEROSON TA ALU

Vapor-impermeable TEROSON TA ALU is an aluminum-coated sealing membrane featuring a very high s_d value of > 1500 m. On its rear side, the membrane is coated over its entire surface with a self-adhesive butyl-rubber compound for producing highly gas- and vapor-tight seals. Moreover, the membrane is resistant to screw penetration and therefore ideally suited for the applications shown below. Thanks to its special composition, the membrane is highly resistant to weathering and ageing. However, permanent exposure to standing water should be avoided. As described above for other sealing strips, the membrane should be firmly pressed to the building shell with a hard rubber roller.

161

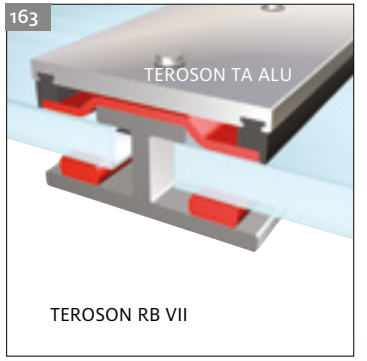
TEROSON TA ALU for sealing glass roofs

162



Sealing joints between twin-wall sheets

163



Sealing under clamping profiles

Bonding and sealing of compression seals

Bonding and sealing with TEROSON RB 81 and TEROSON RB VII

In metal, glass and facade construction, self-adhesive extruded butyl sealing tapes and sealing cords (supplied on rolls or spools) ensure reliable, long-term sealing. They are simply installed manually without need for additional tools – either before or during installation of the building components.

We differ between the following types: overlapping, self-adhesive and compression seals (with mechanical fastening). **Overlapping seals** are used e.g. for fixed glazing. Due to the powerful bond between glass pane and window frame, this type of sealing increases the resistance to dynamic loads. Stresses occurring within the joints, caused e.g. by thermal changes in length, are reduced. Overlapping seals also protect the joint area against adverse weather conditions and create an optically perfect surface.

164

Self-adhesive elastic seals help simplify the structural design and make installation safer. In some cases, they even eliminate the need for conventional mechanical fastening. This type of seal is also used to protect against the risk of corrosion when there is contact between the building components. In addition, elastic seals can absorb the sound transmitted through structural components: they reduce or even prevent the transmission of vibrations.

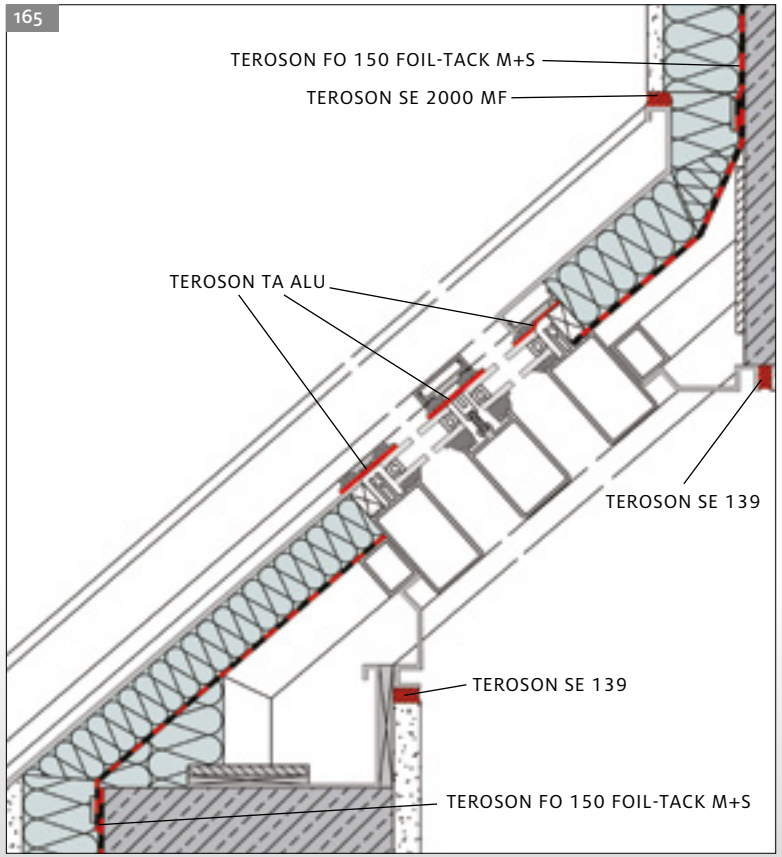
Mechanically fastened components can be sealed by the use of **compression seals**.

Bonding and sealing of conservatories

In the construction of conservatories, TEROSON FO 150 FOIL-TACK M+S is often used for sealing the upper and lateral connections between the conservatory and the main building. The lower connection between the building component and the foundation is sealed with TEROSON FO KSK M+S sealing strip (165 I 166).

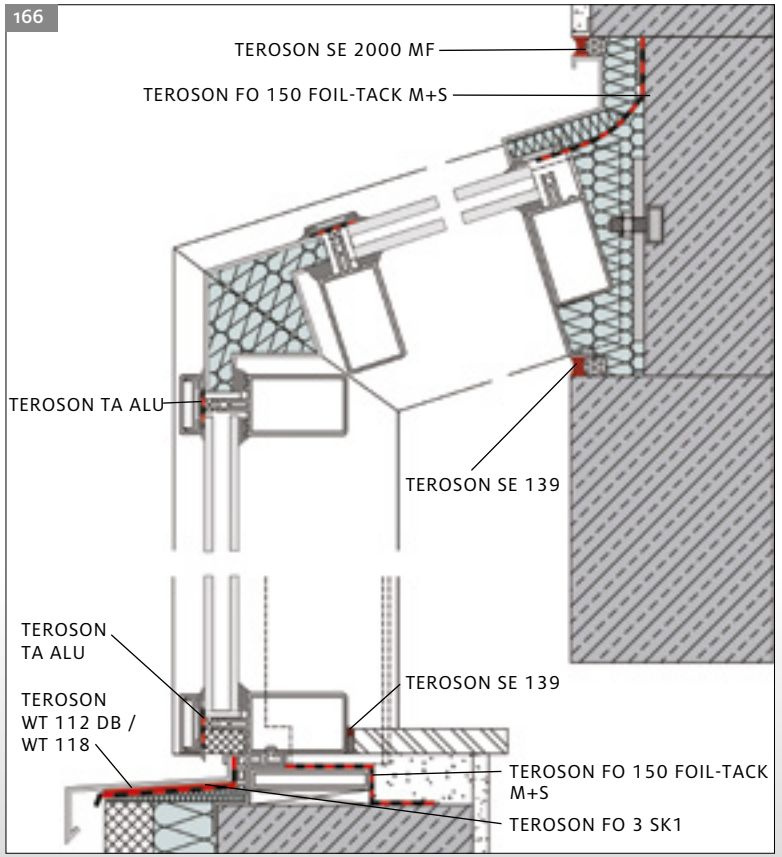
The two figures show examples of how to seal the connections between a conservatory and the main building. This structural detail must be carefully planned and often differs – depending on the connection and type of building.

165



Upper connection between conservatory and building

166



Lower connection between conservatory and foundation

TEROSON SE 2000 MF

Adhesive and sealant for use in metal construction

MS polymer-based all-in-one solution for maximum adhesion without primer

- Excellent weather and UV resistance
- Compatible with paints
- Can be used down to -5 °C
- EMICODE® EC1PLUS certified
- Complies with EN 15651: sealant type F-EXT-INT

Henkel

Powerful adhesion as ever, versatile use as never before.

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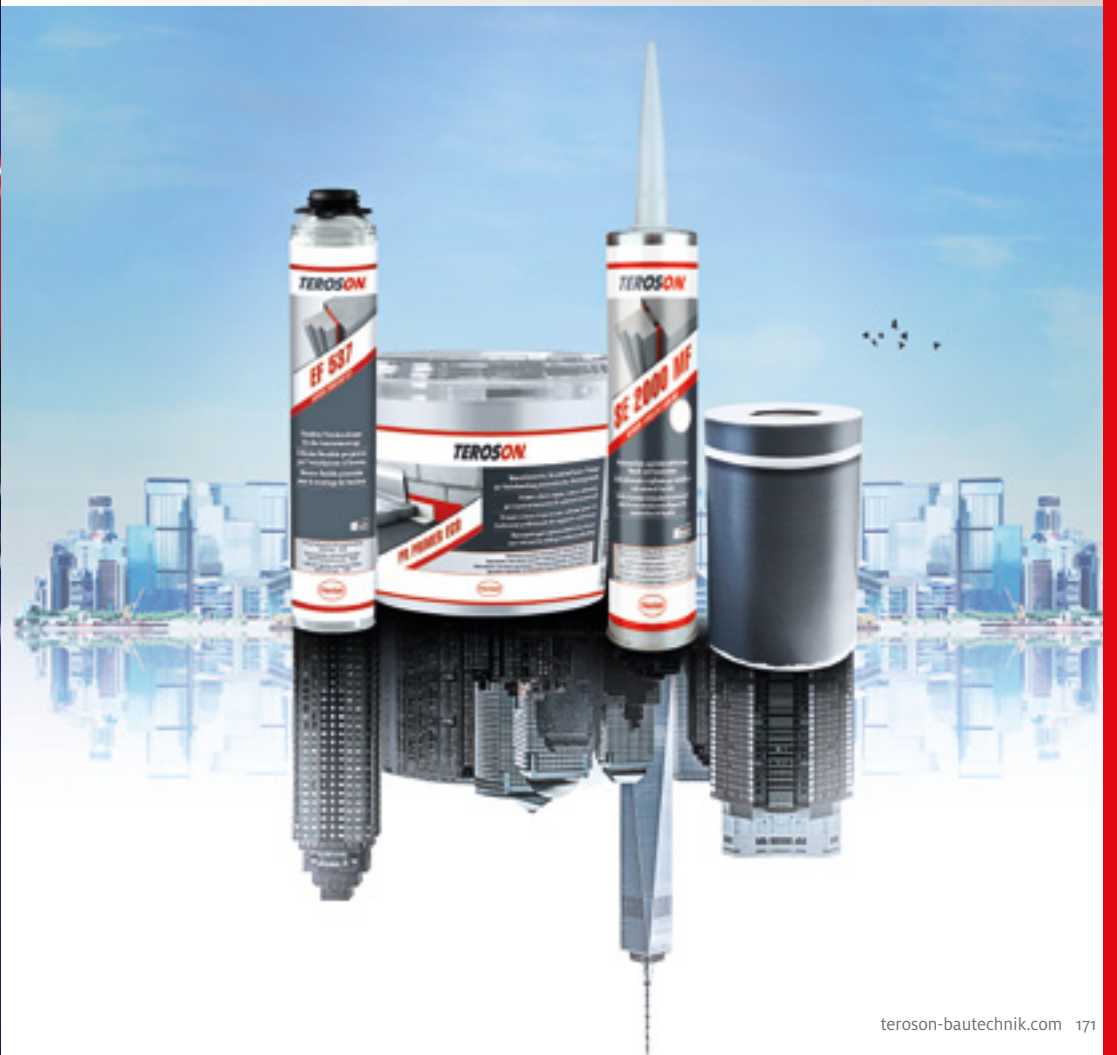
Products and system solutions



Window and facade sealing: Sealing strips that can be faced

TEROSON FO 2 FR
TEROSON FO 3

TEROSON FO 150 FOIL-TACK M+S
TEROSON FO KSK M+S

Besides rigid rubber profiles, flexible sealing strips have always been the product of choice for sealing facades and windows. These days, however, extreme climatic and structural conditions are increasingly challenging the laws of building physics. These challenges can only be tackled by customized solutions.

NOVE München – Art-Invest Real Estate – München Arnulfpark, Dobler Metallbau

Products and systems Window and facade sealing: Sealing strips that can be faced

TEROSON FO 2 FR

Flame-retardant, watertight but vapor-permeable sealing strip for **outdoor use** (cold side of the building)

Properties

- Vapor-permeable, i.e. capable of diffusion (s_d value < 1 m)
- Hardly flammable – complies with DIN EN 13501, class B-s2, d0
- Water-impermeable, resistant to driving rain, airtight
- UV- and bitumen-resistant
- No need for additional mechanical fastening
- Easy and conventional application with adhesive paste AD KDS FR
- Can be used down to -5 °C

Applications

- Facade elements
- Windows
- Parapets
- Lower windowsill connection (used as a protective strip under the windowsill)

Certificates

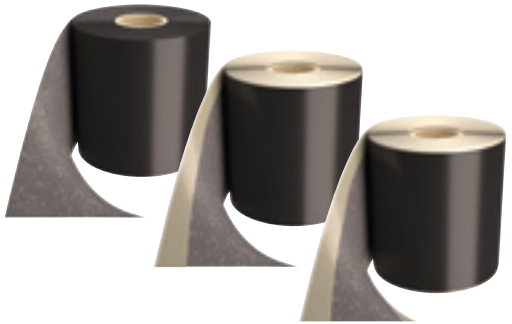
- EMICODE® EC 1^{PLUS} certified

Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Fire performance according to DIN 13501

Packaging

- Roll length: 25 m
- Roll widths: 150 mm, 250 mm, 350 mm, 500 mm, 1000 mm
- Color: anthracite

TEROSON FO 3, SK1, SK 2



Water-impermeable but vapor-permeable sealing strip for **outdoor use** (cold side of the building)

Properties

- Vapor-permeable, i.e. capable of diffusion (s_d value 3 m)
- Water-impermeable, resistant to driving rain, airtight
- UV- and bitumen-resistant
- No need for additional mechanical fastening
- Also available with a self-adhesive strip – either on one side (SK1) or on both sides (SK2)

Applications

- Facade elements
- Windows, parapets
- Can be used with adhesive paste TEROSON AD KDS
- Used as a protective strip in the water-draining layer under the windowsill

Certificates

- EMICODE® EC 1PLUS certified

Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, water tightness and component testing

Packaging

- Roll length: 25 m
- Roll widths: 150, 200, 250, 300, 350, 400, 500, 600, 800, 950 mm
- Color: anthracite

Products and systems Window and facade sealing: Sealing strips that can be faced

TEROSON FO 150 FOIL-TACK M+S

Full-surface self-adhesive special sealing strip, water-, air- and diffusion-tight, equipped with hotmelt adhesive technology, for **indoor use** (warm side of the building)

Properties

- Diffusion-, water-, rain- and airtight (s_d value > 100 m)
- Self-adhesive over its entire surface – instant tack
- Asymmetrically divided release paper
- No need for additional mechanical fastening
- Can be used down to -5 °C
- Meets the requirements of DIN 18533 for floor connections areas

Applications

- Facade sealing
- Window sealing
- Sealing of house door connections
- Butt-joint bonding of anchor seals

Certificates

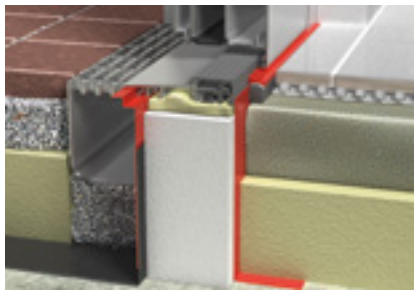
- EMICODE® EC 1PLUS certified

Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, water tightness and component testing
- CE certified

Packaging

- Roll length: 30 m, material thickness: 1.1 mm
  Roll widths: 80, 100, 150, 200, 240, 300, 350, 400, 500, 700 mm
- Color: black

TEROSON FO KSK M+S



Full-surface self-adhesive strip system for sealing against moisture (capillary and retained water) and non-accumulating seepage water in compliance with DIN 18533, parts 1 and 2

Properties

- Self-adhesive over its entire surface, immediately watertight
- Bitumen-resistant
- No need for additional mechanical fastening
- Asymmetrically divided release paper
- Sealing in compliance with DIN 18533, parts 1 and 2
- Material thickness 1.5 mm
- Radon-tight
- Can be used down to -5 °C

Applications

- Window and facade connections in the wall/foundation area
- Bottom sealing of floor-to-ceiling elements
- Connections to balconies, terraces, roofs, parapets etc

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

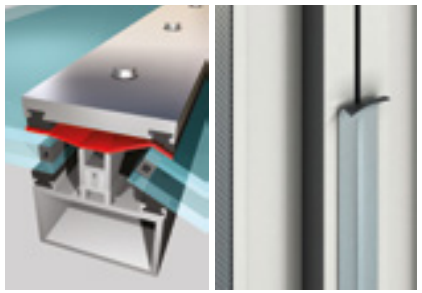
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, water tightness and component testing
- CE certified

Packaging

- Rolls of 15 m × 1 m, material thickness 1.5 mm
- Color: black

Products and systems Window and facade sealing: Sealing strips that can be faced

TEROSON TA ALU



Self-adhesive, vapor-impermeable aluminum sealing and repair tape (based on butyl rubber) for producing air- and vapor-tight seals

Properties

- Absolutely resistant to screw penetration
- Very high tear propagation resistance
- Weather- and ageing-resistant (UV-stable)
- Acts as a vapor barrier
- Equipped on one side with a plastic-aluminum composite strip
- s_d value > 1500 m

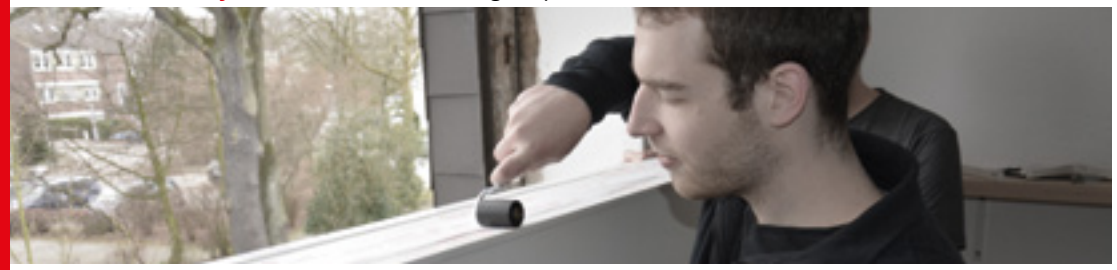
Applications

- As a sealing tape in
  - airconditioning and ventilation systems
  - construction of conservatories
  - aluminum and metal construction (parapet copings, window connections, post-and-beam constructions)
- As a multi-purpose sealing and repair tape
- As a vapor barrier due to its high diffusion resistance
- Indoor and outdoor use

- Color: Silver top layer
  Black adhesive

Packaging

- Roll length 28 m:
  40 × 0.9 mm
  45 × 0.9 mm
  50 × 0.9 mm
  60 × 0.9 mm
- Roll length 25 m:
  100 × 1.1 mm
  120 × 1.1 mm
  150 × 1.1 mm
  180 × 1.1 mm



Plasterable sealing strips for facades and windows

TEROSON FO 1 SK
TEROSON FO 1 FOIL-TACK
TEROSON FO 50 SK
TEROSON FO 50 FOIL-TACK
TEROSON FO 50 FOIL-TACK DUO

In the last few decades, sealing strips and membranes have become the standard in window sealing. There is a good reason for that. Plasterable sealing strips are used especially in the area of windows, when the facade is equipped with an external thermal insulation composite system (ETICS).

TEROSON FO 1 SK

Vapor-permeable and plasterable universal sealing strip for the air- and windtight sealing of connections – **outdoor use** (cold side of the building)

Properties

- Vapor-permeable and extremely robust fleece sealing strip (s_d value approx. 1 m)
- Can be plastered and painted over on both sides
- Self-adhesive on one side to allow time-saving preinstallation on windows
- Resistant to driving rain
- Recommended by leading ETICS manufacturers such as Brillux, Caparol, ispo, Keimfarben etc.
- Adhesion even on wet window frames

Applications

- For sealing facade, window and door elements – outdoor use (cold side of the building)
- For renovation projects and new-builds (uneven and even substrates) in combination with TEROSON AD SP or AD KDS
- Can also be used with external thermal insulation composite systems (ETICS)

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, water tightness and component testing

Lieferform

- Roll length: 30 m
  Roll widths: 75, 100, 150, 200, 250, 300, 400, 500 mm
- Color: grey

TEROSON FO 1 FOIL-TACK

Full-surface self-adhesive, vapor-permeable and plasterable sealing strip for the air- and windtight sealing of connections – **outdoor use** (cold side of the building)

Properties

- Full-surface self-adhesive and plasterable sealing strip equipped with premium fleece
- Vapor-permeable (extremely tearproof sealing strip, s_d value approx. 1 m)
- Can be repositioned thanks to innovative Henkel hotmelt technology
- Easy preinstallation on the window due to the split self-adhesive strip
- Overhead installation without need for additional mechanical fastening
- Adhesion even on wet window frames
- Resistant to driving rain

Applications

- For sealing facade, window and door elements – outdoor use (cold side of the building)
- Preferably used for new-builds (level, smooth substrates)
- Can also be used with external thermal insulation composite systems (ETICS)

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, airtightness and resistance to driving rain

Packaging

Length x width

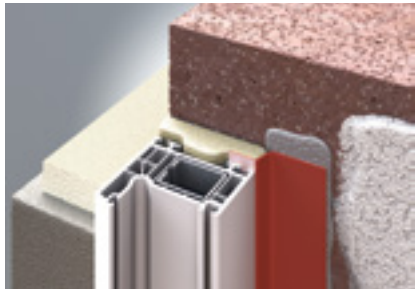
- 60 m × 75 mm
- 60 m × 100 mm
- 60 m × 150 mm
- 30 m × 200 mm
- 30 m × 250 mm
- 60 m × 350 mm

- Color: grey

Products and systems Plasterable sealing strips for facades and windows

Post am Rochusmarkt, Wien, Metallica

TEROSON FO 50 SK



Vapor-retarding and plasterable universal sealing strip for the air- and windtight sealing of connections – **indoor use** (warm side of the building)

Properties

- Vapor-retarding and extremely tearproof fleece sealing strip (s_d value approx. 50 m)
- Can be plastered and painted over on both sides
- Self-adhesive on one side to allow time-saving preinstallation on windows
- Absolutely airtight
- Overhead installation: no need for additional mechanical fastening, no primer required
- Repositioning and adhesion even on wet window frames

Applications

- For sealing window, facade and door elements – indoor use (warm side of the building)
- For renovation projects and new-builds (uneven and even substrates)
- Can be used in combination with TEROSON AD SP or AD KDS

Certificates

- EMICODE® EC 1^{PLUS} certified

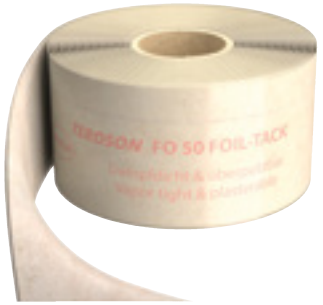
Available on request:

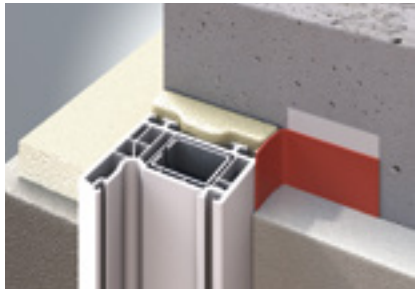
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, airtightness and resistance to driving rain

Packaging

- Roll length: 30 m
  Roll widths: 75, 100, 150, 200, 250, 300, 400, 500 mm
- Color: white

TEROSON FO 50 FOIL-TACK





Full-surface self-adhesive, vapor-retarding and plasterable sealing strip for the air- and windtight sealing of connections – **indoor use** (warm side of the building)

Properties

- Full-surface self-adhesive and plasterable sealing strip equipped with premium fleece
- Vapor-retarding and extremely tearproof sealing strip (s_d value approx. 50 m)
- Can be repositioned thanks to innovative Henkel hotmelt technology
- Easy preinstallation on the window due to split self-adhesive strip
- Overhead installation without need for additional mechanical fastening
- Adhesion even on wet window frames

Applications

- For sealing window, facade and exterior door elements – indoor use (warm side of the building)
- Preferably used for new-builds (level, smooth substrates)
- For wall-mounted frame systems

Certificates

- EMICODE® EC 1^{PLUS} certified

Available on request:

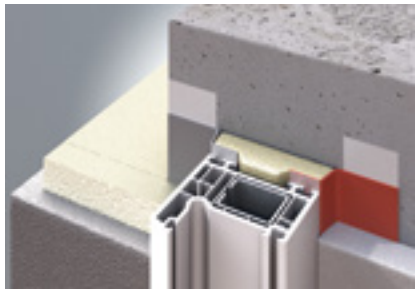
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, airtightness and resistance to driving rain

Packaging

Length x width

- 60 m × 75 mm
- 60 m × 100 mm
- 60 m × 150 mm
- 30 m × 200 mm
- 30 m × 250 mm
- Color: white

TEROSON FO 50 FOIL-TACK DUO



Double-sided self-adhesive, vapor-retarding and plasterable sealing strip for the air- and wind-tight sealing of connections – **indoor use** (warm side of the building)

Properties

- Double-sided self-adhesive and plasterable sealing strip equipped with premium fleece
- Vapor-retarding and extremely tearproof special sealing strip (s_d value approx. 50 m)
- Can be repositioned thanks to innovative Henkel hotmelt technology
- Easy preinstallation on the window due to split release paper
- Overhead installation without need for additional mechanical fastening
- Adhesion even on wet window frames

Applications

- For sealing window, facade and exterior door elements – indoor use (warm side of the building)
- Preferably used for new-builds (level, smooth substrates)
- For wall-mounted frame systems

Certificates

- EMICODE® EC 1^{PLUS} certified

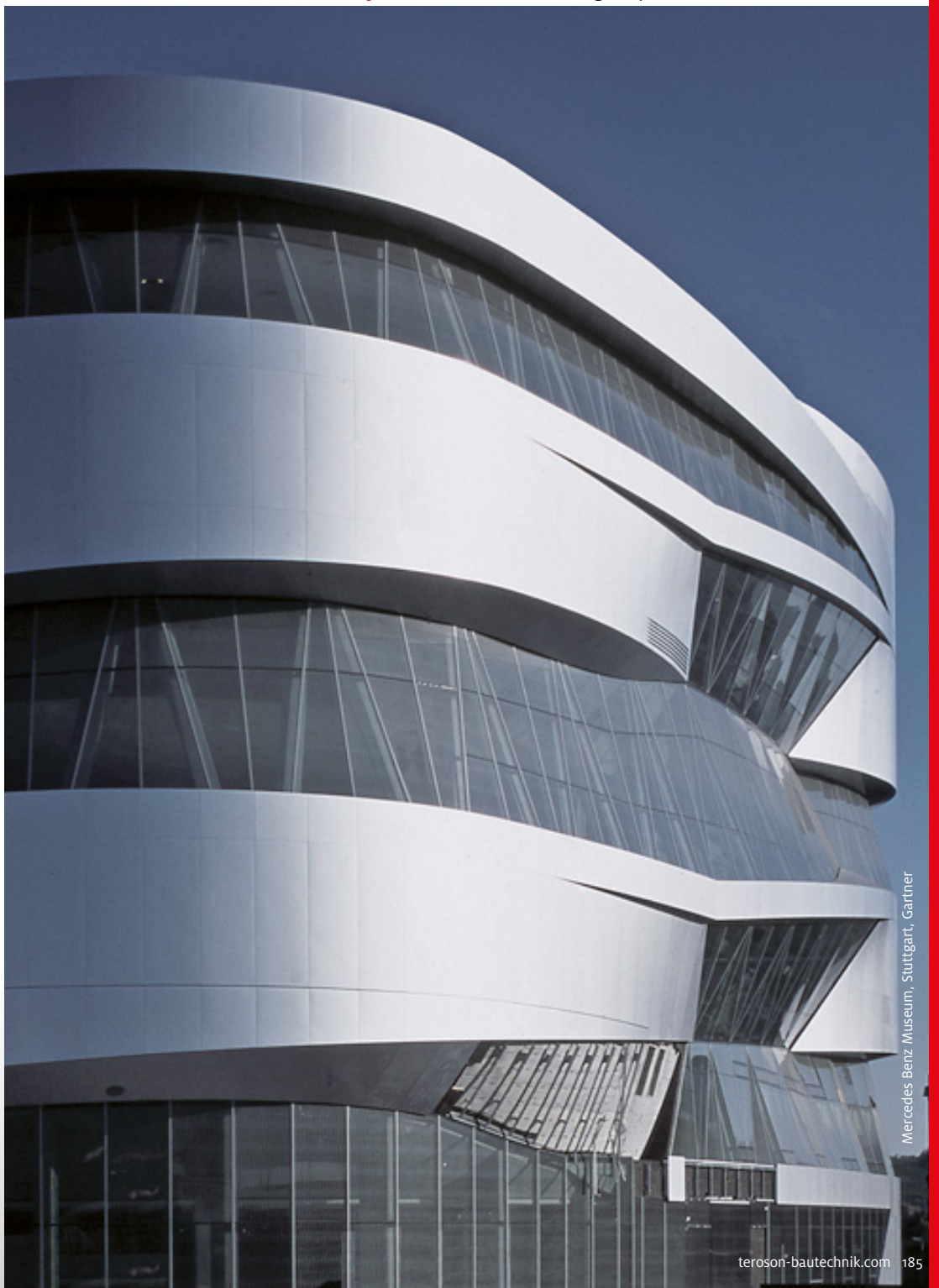
Available on request:

- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, airtightness and resistance to driving rain

Packaging

- Roll length: 60 m
  Roll widths: 75, 100, 150 mm
- Color: white

Products and systems Plasterable sealing strips for facades and windows



Mercedes Benz Museum, Stuttgart, Gartner

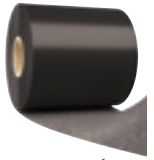
Products and systems Plasterable sealing strips for facades and windows

Sealing of sealing strips with gun-applied adhesives and sealants

✓ Tested and approved

TEROSON sealing strips/membranes ▶

▼ Additional sealing products (e.g. for uneven substrates)

	 FO KSK M+S	 FO 150 FOIL-TACK M+S	 FO 2 FR	 FO 3 SK	 FO 50 FOIL-TACK	 FO 1 FOIL-TACK	 FO 50 SK	 FO 1 SK
	TEROSON FO KSK M+S	TEROSON FO 150 FOIL-TACK M+S	TEROSON FO 2 FR	TEROSON FO 3 SK	TEROSON FO 50 FOIL-TACK	TEROSON FO 1 FOIL-TACK	TEROSON FO 50 SK	TEROSON FO 1 SK
 TEROSON SE 2000 MF	✓	✓	✓	✓	✓	✓	✓	✓
 TEROSON SE 108^{xlt}								
 TEROSON SE 139								
 TEROSON SE 20								
 TEROSON AD KDS	✓	✓	✓	✓	✓	✓	✓	✓
 TEROSON AD KDS FR	✓	✓	✓	✓	✓	✓	✓	✓
 TEROSON AD SP					✓	✓	✓	✓
 TEROSON SB 412								
 TEROSON RB 4006	✓	✓						
 TEROSON AD MS 2100	✓ Can also be used with SB 450 primer for bonding materials on top of the sealing strip	✓ Can also be used with SB 450 primer for bonding materials on top of the sealing strip	✓	✓	✓	✓	✓	✓
For further product details see page:	176	175	173	174	183	180	182	179

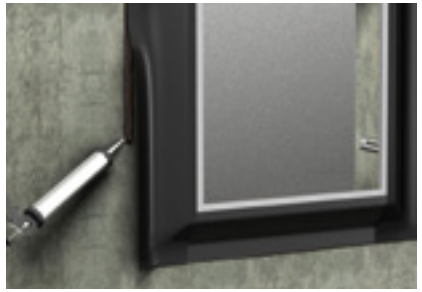
Adhesives

TEROSON AD KDS
TEROSON AD KDS FR
TEROSON AD SP
TEROSON AD MS 2100
TEROSON RB 4006
TEROSON SE 2000 MF
TEROSON AD Adhesive Spray
TEROSON SB 412

Adhesives are used in a wide variety of applications in the area of window and facade installation. Possible applications range from structural bonding in metal construction to special adhesives for bonding sealing strips. Today, there are different adhesive technologies that perfectly meet the requirements of different applications.

ÖAMTC-Zentrale, Wien, MBM Mörtl

TEROSON AD KDS



Special polymer for bonding all kinds of sealing strips in the area of window/facade installation and metal construction
TEROSON AD KDS: Special polymer for bonding plasterable window sealing strips on damp substrates even at low temperatures (down to -5 °C)

Properties

- UV-resistant
- Can bridge gaps up to 20 mm width
- Easy adjustment of the sealing strip when the adhesive is still fresh
- Can be used down to -5 °C
- No primer needed on most common building materials

Applications

- For bonding sealing strips to the building shell and/or frame element, e.g. TEROSON FO 3/3 SK1 and FO 1 SK/FO 50 SK and FO 1 FOIL-TACK/FO 50 FOIL-TACK

TEROSON AD KDS is a moisture-curing, rapidly hardening 1-component adhesive based on MS polymer. By increasing temperature and air humidity, the process of curing and skin formation can be accelerated.

Certificates

- EMICODE® EC 1^{PLUS} certified

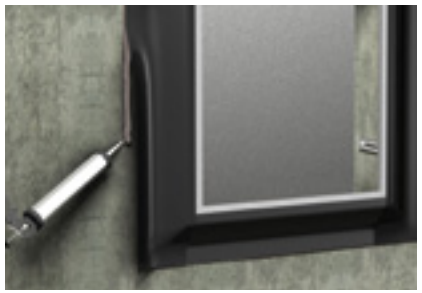
Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Information on fire behavior, water tightness and component testing

Packaging

- Carton with 16 tubular bags of 570 ml each

Color: black

TEROSON AD KDS FR



Special fire protection polymer for bonding sealing strips in the area of window/facade installation and metal construction

Properties

- Hardly flammable – complies with DIN EN 13501, class B-s1, d0
- Can bridge gaps up to 20 mm width
- UV-resistant
- Easy adjustment of the sealing strip when the adhesive is still fresh
- Can be used down to -5 °C
- No primer needed on most common building materials

Applications

- For bonding sealing strips to the building shell, e.g. TEROSON FO 2 FR/FO 3/FO 1/FO 50
- For bonding sealing strips to the window/facade element, e.g. TEROSON FO 2 FR

TEROSON AD KDS FR is a flame-retardant, 1-component hybrid adhesive based on MS polymer that rapidly cures on contact with atmospheric moisture. Thanks to its low calorific value, it forms – in conjunction with sealing strip FO 2 FR – a unique facade sealing system featuring maximum fire protection.

Certificates

- EMICODE® EC 1^{PLUS} certified

Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Fire performance according to DIN 13501

Packaging

- Carton with 16 tubular bags of 600 ml each

Color: grey

TEROSON AD SP

Water-based special polymer for bonding plasterable window sealing strips on dry substrates (down to +5 °C)

Properties

TEROSON AD SP and KDS:
- Stress-free bonding of TEROSON FO 1 / 50 sealing strips to the building shell
- Easy application with TEROSON tubular bag gun
- Good adhesion, good compatibility with paints
- Strip position easily adjustable in the fresh adhesive
- Can be used down to +5 °C (AD SP) resp. -5 °C (AD KDS)

Applications

For bonding plasterable TEROSON sealing strips to the building shell:
- TEROSON FO 1 SK
- TEROSON FO 50 SK

Certificates

- EMICODE® EC 1^{PLUS} certified

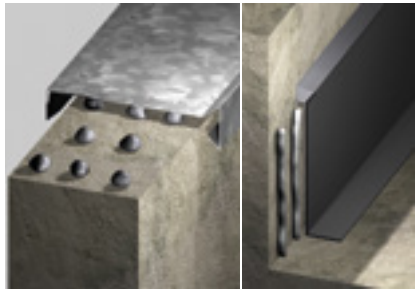
Available on request:
- Product and manufacturer's declarations according to DGNB, LEED

Packaging

- Carton with 12 tubular bags of 600 ml each

Color: white

TEROSON AD MS 2100



Gun-applied, 1-component assembly adhesive for use in metal construction

Properties

- High initial tack
- Very rapid curing
- Suitable for indoor and outdoor use
- Good gap-bridging ability
- Can be painted over and sanded

Applications

- Special adhesive for use in window/facade installation and metal construction
- For bonding building materials to wood, metal and mineral substrates – indoor and outdoor use
- For bonding textured paint surfaces after pretreatment with adhesion-promoting cleaner TEROSON SB 450

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

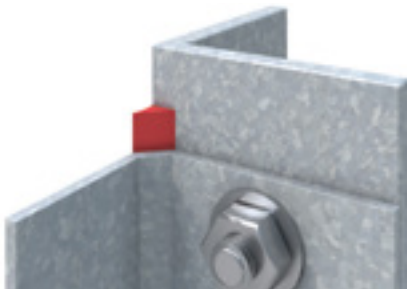
- Product and manufacturer's declarations according to DGNB, LEED

Packaging

- Carton with 12 cartridges of 310 ml each

Colors: white, grey

TEROSON RB 4006



Low-solvent butyl-rubber sealant for bonding and sealing applications in the building and industrial sector

Properties

- Easily smoothable
- Non-slump consistency
- Viscoelastic
- Extremely vapor-tight

Applications

- For bonding mechanically fastened metal overlaps, e.g. in airconditioning and ventilation systems, silos, tank construction, metal and sheet metal processing
- For sealing joints in frame constructions, curtain walls and sheet metal flashings (if subject to low mechanical stress)

Packaging

- Carton with 16 tubular bags of 570 ml each

Color: grey

TEROSON SE 2000 MF

Soft-elastic multi-purpose sealant and adhesive (MS polymer®) for use in metal construction

Properties

- Excellent UV and weather resistance
- Bonds to a wide range of materials – even without primer
- Low stringiness, good compatibility with paints
- Can be used down to -5 °C
- Joint sealant for facade elements – indoor and outdoor use (EN 15651-1: F-EXT-INT)

Applications

- For sealing structural and connection joints as well as window joints – inside and outside the building
- For sealing seams and joints in metal and apparatus construction, sheet metal processing and plastics engineering
- For use in airconditioning and ventilation systems
- Soft-elastic bonding of sandwich elements for absorbing thermal movement
- Adhesion on most rubber grades – also on EPDM (preliminary tests required)

Certificates

- EMICODE® EC 1^{PLUS} certified

Available on request:

- Product and manufacturer's declarations according to DGNB, LEED
- Information on component testing

Packaging

- Carton with 12 cartridges of 310 ml each
- Carton with 16 tubular bags of 600 ml each

Colors: white, grey, black

TEROSON AD Adhesive Spray

Highly efficient spray adhesive and ideal assembly aid – can be used as contact and pressure-sensitive adhesive

Properties

- High instant adhesion
- Fast and clean bonding
- Adjustable spray pattern
- Suitable for porous and non-porous materials
- Can be used down to -5 °C

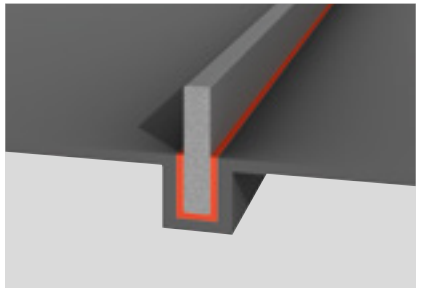
Applications

- For preparing the bonding of self-adhesive sealing strips, e.g. TEROSON FO 1 FOIL-TACK and TEROSON FO 50 FOIL-TACK, on loose or difficult surfaces
- For surface strengthening and adhesion improvement on weak or damp substrates before bonding TEROSON FO 1/50 FOIL-TACK
- For bonding plastic (PVC, EVA, PIB, FPO) and rubber (EPDM) strips/membranes as well as vapor barrier membranes (PE) around penetrations and on rising components

Packaging

- Carton with 6 spray cans of 750 ml each
- Color: yellowish, transparent

TEROSON SB 412



Black-pigmented, viscous, rubber-based adhesive and sealant (solvent-based) – self-levelling

Properties

- Excellent adhesion to many substrates
- Paste-like consistency, therefore good filling power
- Good flow properties (particularly useful for sealing difficult-to-access joints and seams)
- Able to bridge joint tolerances
- Can be easily painted over after complete drying

Applications

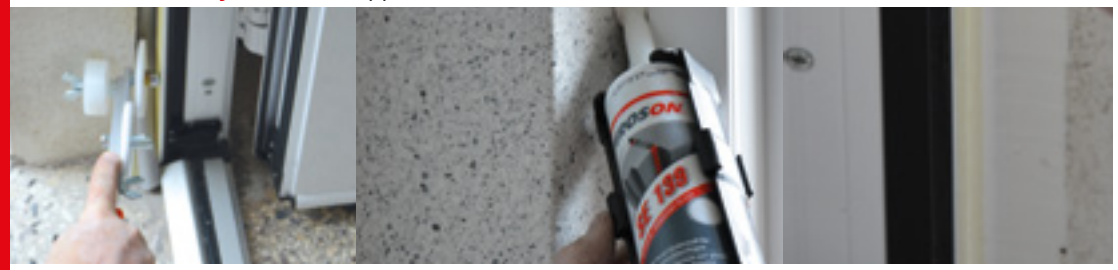
- For bonding rubber, glass, steel, aluminum, felt, wooden materials
- For sealing joints, seams, penetrations, butt joints and overlaps; especially useful for overlapping and butt joints where the sealant needs to flow into the gap

Packaging

- Carton with 12 x 310 ml cartridges

Color: black

Clara und Robert, Düsseldorf, Sommer



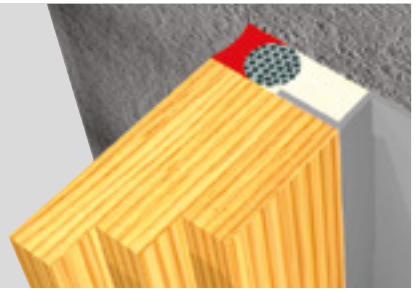
Gun-applied sealants

TEROSON SE 2000 MF (SMP)
TEROSON SE 139 (acrylate)
TEROSON SE 20 (acrylate)
TEROSON SE 108^{xlt} (silicone)

The application range of sealing compounds in window and facade installation is very diverse. As the requirements for sealants differ depending on the type of joint (e.g. exterior wall joints, interior joints, glazing joints), it is only natural that different products should be used to ensure optimum results. For this reason, TEROSON offers different technologies (including silicones, acrylates, hybrid and MS polymers) to optimally meet the requirements of a great variety of applications.

NORD/LB, Hannover, MBM

TEROSON SE 2000 MF



Soft-elastic multi-purpose sealant and adhesive (MS polymer®) for use in metal construction

Properties

- Excellent UV and weather resistance
- Bonds to a wide range of materials – even without primer
- Low stringiness, good compatibility with paints
- Can be used down to -5 °C
- Joint sealant for facade elements – indoor and outdoor use (EN 15651-1: F-EXT-INT)

Applications

- For sealing structural and connection joints as well as window joints – inside and outside the building
- For sealing seams and joints in metal and apparatus construction, sheet metal processing and plastics engineering
- For use in airconditioning and ventilation systems
- Soft-elastic bonding of sandwich elements for absorbing thermal movement
- Adhesion on most rubber grades – also on EPDM (preliminary tests required)

Certificates

- EMICODE® EC 1^{PLUS} certified

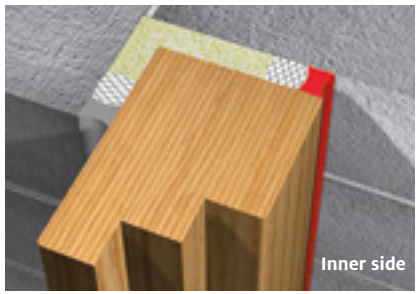
Available on request:
- Product and manufacturer's declarations according to DGNB, LEED
- Information on component testing

Packaging

- Carton with 12 cartridges of 310 ml each
- Carton with 16 tubular bags of 600 ml each

Colors: white, grey, black

TEROSON SE 139



Elastic acrylic sealant for indoor and outdoor use

Properties

- Permanently elastic (25 % movement absorption)
- Complies with IVD Information Sheet No. 9
- Generally compatible with paints
- Hardly flammable – complies with DIN EN 13501, class B-s1, d0
- Quickly rainproof and frost-resistant
- Phthalate-free
- Adheres also on damp, absorbent substrates without primer
- Joint sealant for facade elements – indoor and outdoor use (EN 15651-1: F-EXT-INT)

Applications

- For sealing structural and connection joints on windows, facade elements and house doors
- For sealing sheet metal butts and sheet metal ducts (corrosion-protected) in heating, ventilation and airconditioning systems and for sealing the resulting wall penetrations

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

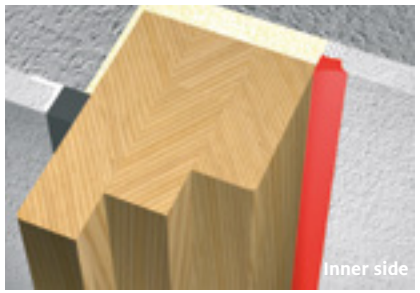
- Product and manufacturer's declarations according to DGNB, LEED
- Information on component testing
- Fire performance according to DIN 13501

Packaging

- Carton with 12 cartridges of 300 ml each
- Carton with 12 tubular bags of 400 ml each
- Carton with 12 tubular bags of 600 ml each

Color: white

TEROSON SE 20



Acrylic sealant for joints subject to low stresses – indoor use

Properties

- Elastoplastic (10 % movement absorption)
- Generally compatible with paints
- Easy to apply by gun, virtually odorless
- Self-adhesive on most common building substrates
- Resistant to ageing
- Joint sealant for facade elements – indoor and outdoor use (EN 15651-1: F-EXT-INT)

Applications

For sealing indoor connection joints subject to low stresses, e.g.

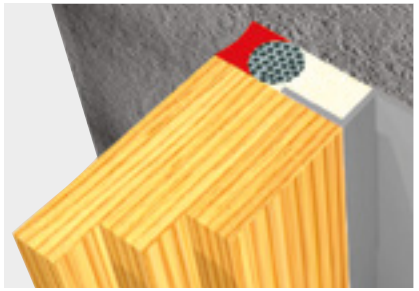
- joints in drywall construction
- joints in prefabricated construction and in heating, ventilation and airconditioning systems

Packaging

- Carton with 12 cartridges of 300 ml each

Color: white

TEROSON SE 108^{xlt}



Multi-purpose, neutrally-curing silicone sealant for windows

Properties

- Excellent workability
- Easily smoothable and moldable
- 100 % oxime- and MEKO-free
- Excellent adhesion – even without primer
- Compatibility with paints tested in compliance with DIN 52452, part 4 (test methods A1, A2)

Applications

TEROSON SE 108^{xlt} is a multi-purpose sealant. Main areas of application include:

- Sealing of structural and connection joints (CE marking according to DIN EN 15651-1: Sealants for facade elements)
- Glass sealing in wooden windows (CE marking according to DIN EN 15651-2: Sealants for glazing)
- Sealing of joints in building construction (DIN EN ISO 11600: Jointing products in building construction, types F-25LM and G-25LM)
- Meets the requirements of IVD Instruction Sheet No. 9 (2014)
- For sealing perimeter joints on metal elements

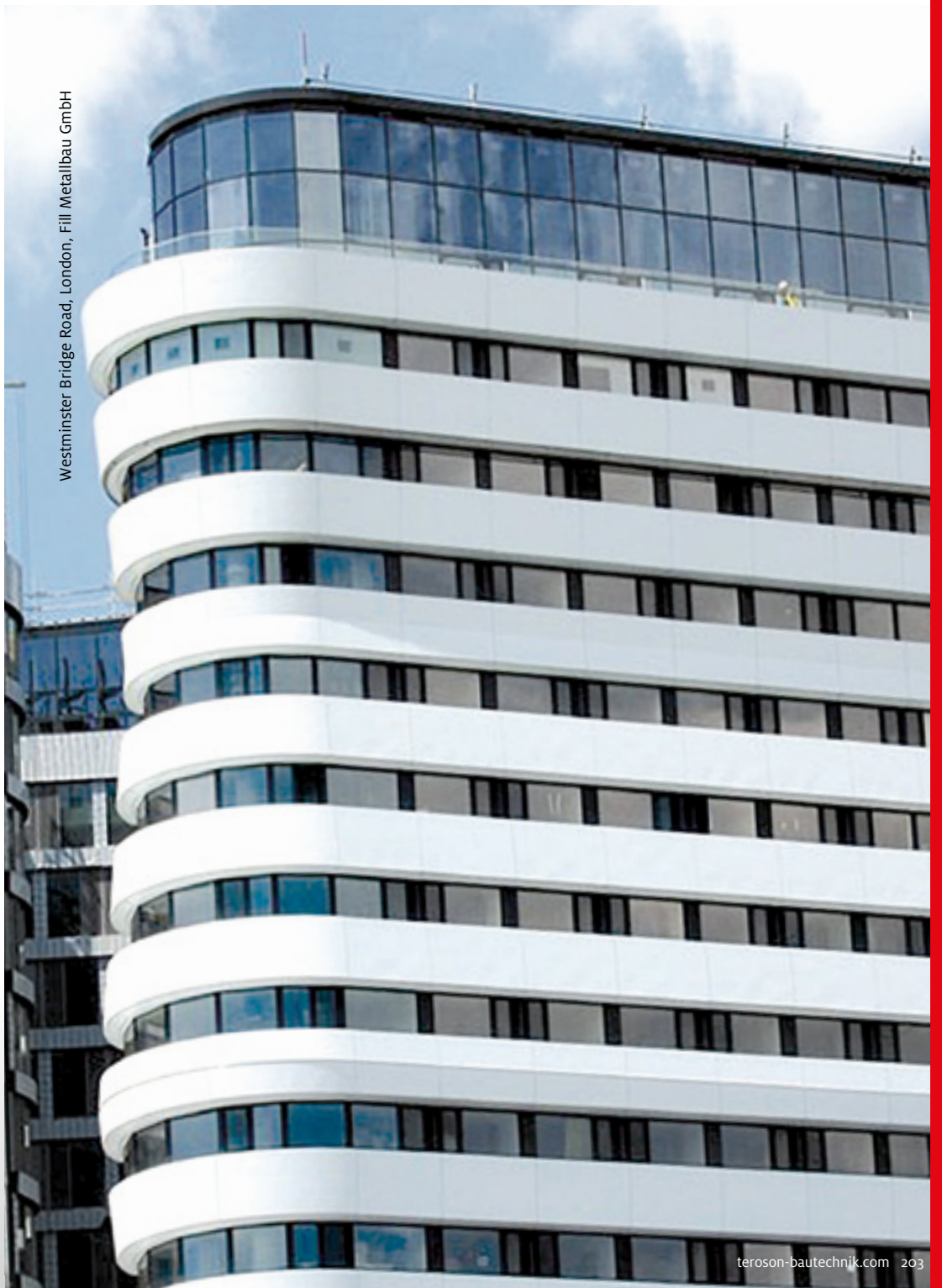
Colors

300 ml: white, transparent

600 ml: white

Packaging

- 300 ml cartridge: carton with 12 cartridges
- 600 ml tubular bag: carton with 12 tubular bags



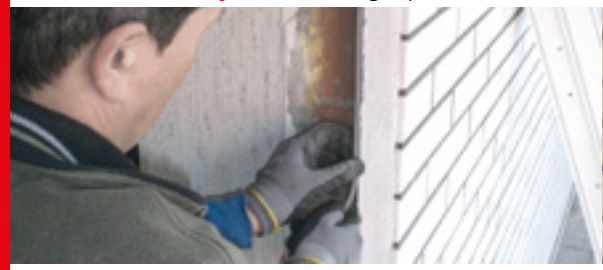
Westminster Bridge Road, London, Fill Metallbau GmbH

Sealing compounds

Technical data

	TEROSON SE 108xlt	TEROSON SE 2000 MF	TEROSON SE 20	TEROSON SE 139
Material base	silicone-rubber	MS polymer	acrylate	acrylate
Material properties	soft-elastic	soft-elastic	elastoplastic	elastic
Curing system	neutral	chemical	physical	physical
Curing/reaction by	moisture absorption	moisture absorption	physical drying	physical drying
Consistency	pasty	pasty	pasty	pasty
Odor after curing	odorless	odorless	odorless	odorless
Density (g/ml) (DIN 53217, part 2)	approx. 1.04	approx. 1.5	approx. 1.55	approx. 1.6
Solids content (%)	100	100	80	82
Application temperature air and substrate (°C)	+5 to +40	−5 to +40	+5 to +40	+5 to +40
Temperature resistance (°C)	−40 to +140 1 h up to +150	−30 to +120	−20 to +80	−20 to +80
Skin formation time (min)	approx. 15	approx. 10-15	approx. 15	approx. 10–20
Curing time (mm/24 h)[1]	approx. 2	approx. 3	approx. 0.5	approx. 0.5
Joint dimensions (mm)	5–35	5–25	5–20	5–30
Tensile modulus at 100 % elongation(N/mm²) (alternating storage)	approx. 0.4	0.4	approx. 0.1	approx. 0.1
Shore A hardness (DIN 53505)	approx. 15-25	approx. 30	approx. 20	approx. 20
Permissible total deformation (ZGV) (%)	25	25	10	25
Volume change (%) (DIN 52451, part 1)	approx. -7	approx. -2.5	approx. -24	approx. -24
Sag resistance (DIN 52454)	good	good	good	good
Paint compatibility	yes	yes	yes	yes
Paintability	no	no	yes	yes
Shelf life (months)	12	18	18	18
For further product details see page:	202	199	201	200

[1] Standard climatic conditions according to DIN 50014: +23 °C, 50 % RH

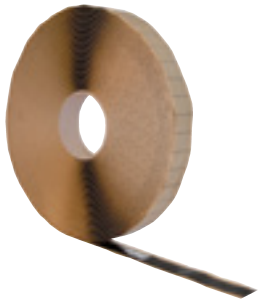


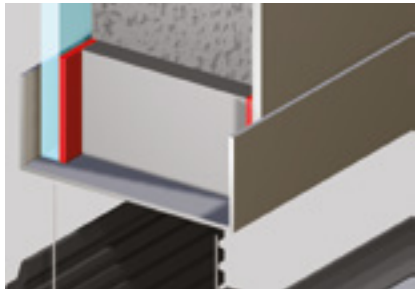
Sealing tapes and extruded butyl sealing products

TEROSON RB 81
TEROSON RB VII

Sealing tapes and extruded butyl sealing products are primarily used in glass and metal construction. They are usually applied manually, before or during the installation process, without need for special tools. We differ between the following types of sealing: overlapping seals, self-adhesive seals and compression seals. Additionally, these sealing products are used as spacers and for corrosion protection.

TEROSON RB 81





High-quality butyl sealing compound with powerful adhesion and elastoplastic properties

Properties

- Self-welding
- Excellent water and ageing resistance
- Self-adhesive on both sides
- Available in different widths and thicknesses

Applications

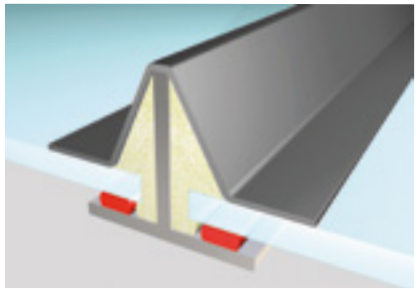
- For sealing, padding or bonding cladding panels, bumper rails or decorative moldings, impact protection panels in container and tank construction
- For sealing overlaps of steel, aluminum, glass and plastic constructions in sheet metal and metal processing, electrical engineering or apparatus and mechanical engineering
- For bonding PE sheeting, plastic sheeting (e.g. EPDM) or components in plastics engineering
- For protecting against contact corrosion between different metals
- For sealing overlaps of cladding panels, external insulation panels, wall claddings, ventilation shafts and airconditioning systems; also for joining prefabricated components (contact bonding method)

- Color: black

Packaging

- Carton with 4 rolls: length 40 m, width 15 mm, thickness 1.5 mm
- Carton with 3 rolls: length 40 m, width 40 mm, thickness 1.5 mm
- Carton with 5 rolls: length 30 m, width 20 mm, thickness 2.0 mm
- Carton with 4 rolls: length 50 m, width 10 mm, thickness 2.0 mm

TEROSON RB VII



Double-sided self-adhesive and permanently plastic sealing compound based on synthetic rubber

Properties

- Self-adhesive on both sides
- Can be painted over
- Excellent water and ageing resistance
- Solvent-free

Applications

- For sealing and as a spacer in sheet metal processing, e.g. for sealing the overlaps of iron, sheet metal, aluminum, glass and plastic constructions
- As protection against contact corrosion between iron and non-ferrous metals; also for use in sanitary facilities
- As a spacer and additional seal when doing glazing work; for sealing overlapping joints with windowsills, stair treads and artificial stone facades
- In automobile, wagon and caravan construction; for sealing metal, wood and plastic components

- Color: white

Packaging

- Carton with 2 rolls (flat profile): length 130 m, width 20 mm, thickness 2.0 mm
- Carton with 2 rolls (round profile): length 120 m, diameter 4.0 mm
- Carton with 2 rolls (round profile): length 96 m, diameter 5.0 mm
- Carton with 2 rolls (round profile): length 78 m, diameter 6.0 mm
- Carton with 2 rolls (round profile): length 60 m, diameter 8.0 mm

Product overview of extruded butyl sealing products

Extruded butyl sealing products / Properties	 TEROSON RB 81	 TEROSON RB VII
Type of product	sealing compound, self-adhesive on both sides	sealing compound, self-adhesive on both sides
Material base	butyl-rubber	polyisobutylene
Color	black	white
Curing / reaction	no reaction, ready for use	no reaction, ready for use
Density (g/cm²)	approx. 1.2	approx. 1.6
Solids content %	100	100
Movement absorption (%)	5	5
Cold flow	medium	none
Bonding strength	very high	lower
Water vapor diffusion resistance	not determined	not determined
UV resistance	limited	not determined
Application temperature air and substrate (°C)	+5 to +40	+5 to +40
Temperature resistance (°C)	−40 to +80	−25 to +75
Paintability	no	yes
Shelf life (months)	24	24
For further product details see page:	207	208

Products and systems Gun-applied sealants, sealing tapes and extruded butyl sealing products

Application table TEROSON sealants

● Under normal circumstances adhesion without primer. Non-absorbent substrates should be cleaned with a suitable solvent before applying the sealant.
■ Adhesion test recommended prior to use.
— Not recommended for this application.

	Areas of application	TEROSON SE 108xlt	TEROSON SE 2000 MF	TEROSON SE 20	TEROSON SE 139	TEROSON TA ALU	TEROSON RB 81	TEROSON RB VII
SPECIAL JOINTS	Stainless steel	●	●	—	●	●	●	●
	Sheet metal overlaps	●	●	—	●	●	●	●
	Zinc sheet connections	●	●	—	—	●	●	●
	Apparatus construction	●	●	—	●	●	●	●
	Heating, ventilation, airconditioning systems	●	●	—	●	●	●	●
WINDOW INSTALLATION	Window glazing	●	—	—	—	—	—	—
	Rigid PVC	●	●	■	●	■	—	—
	Aluminum	●	●	■	●	●	—	—
	Wood	●	●	●	●	●	—	—
	Glass	●	—	—	—	■	■	■
	EPDM profiles	■	●	—	—	—	—	—
METAL CONSTRUCTION	Aluminum facade elements	●	●	■	●	●	—	—
	Brickwork	●	●	●	■	■	—	—
	Structural joints	●	●	—	■	●	—	—
	Connection joints (indoors, outdoors)	●	●	●	●	●	—	—
	Window/building connection joints (mineral)	●	●	●	●	●	—	—
	Cellular concrete	—	■	●	●	● with primer	—	—
	Precast concrete members	●	●	—	●	● with primer	—	—
	In-situ concrete	●	●	—	●	● with primer	—	—
	For further product details see page:	202	199	201	200	177	207	208

Please refer to page 290 for a table of consumption values and joint dimensions when using gun-applied sealants.

Products and systems Gun-applied sealants, sealing tapes and extruded butyl sealing products

Chemical resistance of joint sealants and extruded butyl sealing products

The sealants were not tested as a composite system. During the test, they were directly exposed to the chemicals at a temperature of +23 °C. Standard bars S2 (DIN 53504) were used as specimens or sealant pieces cut to the desired length.

Key to symbols:

+ Resistant: No significant change in the specimen after 6 months of storage in the test medium.
• Limited resistance: The sealant remained fully functional after 4 weeks of direct contact, i.e. shrinkage resp. swelling of the specimen is in the range of 10-15 %. Only after a longer period of exposure the sealant changes to such an extent that the sealing function can be affected.
– Not resistant: Destruction of the specimen within 24 hours.
/ Not tested

TEROSON sealants

Test media / chemicals	TEROSON SE 108[xlt]	TEROSON SE 2000 MF	TEROSON SE 20	TEROSON SE 139	TEROSON TA ALU	TEROSON RB 81	TEROSON RB VII
Acetone	+	–	•	•	•	•	–
Formic acid concentrated	–	–	–	–	•	•	+
Ammonia solution, 10 %	+	+	+	+	•	+	+
ASTM oil	+	+	•	•	–	–	–
Regular petrol	•	–	–	–	–	–	–
Premium petrol	•	–	–	–	–	–	–
Bitumen, aqueous emulsion	/	+	+	+	•	+	/
Bitumen	/	+	–	–	–	–	–
Diesel fuel	–	•	–	–	–	–	–
Glacial acetic acid	+	–	–	–	–	+	–
Acetic acid 5 %	•	–	–	–	–	+	+
Acetic acid 15 %	•	–	–	–	–	+	+
Acetic acid 50 %	+	–	–	–	–	+	–
Ethyl acetate	–	–	–	–	–	•	–
Ethanol denatured	/	–	•	•	–	•	+
Formaldehyde 40 %	–	•	•	•	•	+	+
Antifreeze agent	/	+	•	•	•	+	+
Gear oil +95 °C	•	•	+	+	–	•	–
Glycerin	/	+	•	•	•	+	+
Glycol	/	+	•	•	•	+	+
Heating oil +20 °C	–	•	–	–	–	–	–
Heating oil +100 °C	–	–	–	–	–	–	–
Humic acid	/	+	+	+	•	+	+
Hydraulic oil	/	+	+	+	–	–	–
Lime water saturated	/	+	•	•	•	+	+
Cold cleaner	/	•	–	–	–	–	–
Lacquer thinner	–	–	–	–	–	–	–
Methanol	/	–	•	•	•	+	+
Methanol	–	–	–	–	•	•	–
Methyl ethyl ketone	/	+	+	+	–	–	–
Engine oil +20 °C	/	–	+	+	–	–	–
Engine oil +100 °C	–	–	–	–	•	+	+
Sodium disulfide	/	+	•	•	•	+	+
Sodium hydroxide 10 %	–	•	–	–	•	+	+
Sodium hydroxide 30 %	•	–	–	–	•	+	–
Phenol 5 %, in water	/	+	•	•	•	+	+
Phosphoric acid 5 %	+	–	–	–	–	+	–
Phosphoric acid 15 %	+	–	–	–	–	+	–
Phosphoric acid concentrated	–	–	–	–	–	+	–
2-propanol (isopropyl alcohol)	+	–	–	–	•	•	+
Nitric acid 5 %	•	–	–	–	–	+	+
Nitric acid 20 %	•	–	–	–	–	•	–
Nitric acid concentrated	–	–	–	–	–	–	–
Hydrochloric acid 5 %	•	–	–	–	•	+	•
Hydrochloric acid 15 %	•	–	–	–	–	+	•
Hydrochloric acid concentrated	–	–	–	–	–	+	–
Salt water 3 % (NaCl)	+	+	+	+	+	+	+
Salt water 10 % (NaCl)	+	+	+	+	•	+	+
Sulfuric acid 5 %	•	–	–	–	–	+	–
Sulfuric acid 30 %	•	–	–	–	–	+	–
Sulfuric acid concentrated	–	–	–	–	–	–	–
Silicone oil	•	+	+	+	•	+	+
Toluene	+	–	–	–	–	–	–
Vacuum pump oil	/	•	+	+	•	–	–
Vegetable oil	/	•	+	+	•	+	+
Water +20 °C	+	+	+	+	+	+	+
Water +90 °C	•	–	+	+	•	+	/
Hydrogen peroxide 3 %	/	+	•	•	•	+	+
White oil	/	–	+	+	–	–	–
Xylene	•	–	–	–	–	–	–
Cement slurry	/	+	+	+	+	+	+
Citric acid 10 %	+	•	–	–	–	/	+

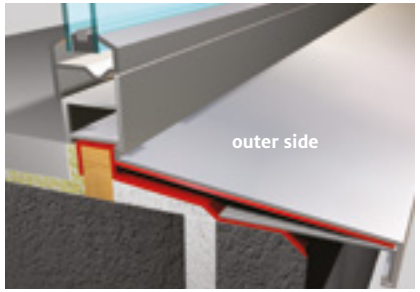
Sound insulation and noise control

TEROSON BT 2002
TEROSON WT 112 DB

In general, we differ between two product categories: “sprayable and trowelable antidrumming compounds” and “self-adhesive strips and sound-damping felt boards”. Antidrumming compounds are primarily used for absorbing structure-borne sound (e.g. by coating facade elements) or for sound insulation on thin-walled sheet metal structures (e.g. ventilation ducts). Self-adhesive strips and bitumen felts are mainly used with small sheet metal structures such as windowsills or parapet copings.

La Tête, Düsseldorf, ALU-SOMMER

TEROSON BT 2002



Self-adhesive bitumen felt board for damping structure-borne sound

Properties

- Self-adhesive
- Efficient and weight-saving sounddamping of thin-walled sheet metals
- Excellent adhesion to stainless steel, sheet steel and plastic materials
- Provides additional reinforcement (stiffening effect)

Applications

- For damping structure-borne sound on garage doors, facade elements, windowsills, bathtubs, shower trays and sinks, radiator covers, garbage chutes, ventilation and airconditioning systems, elevator cabins

Certificates

- EC1 certified
- Fire performance according to DIN 13501

Packaging

TEROSON BT 2002:
- Thickness 2.3 mm, 1000 mm x 500 mm

- Color: anthracite

Properties ▼	Product ▶ TEROSON BT 2002
Type of product	self-adhesive bitumen felt board
Thickness	2.3 mm (± 0.2 mm)
Total weight	approx. 2.0 kg/m²
Color	anthracite
Thermal resistance: Short time, 1 hour, PM: B-030 Long time, 336 hrs, PM: B-031X	max. +150 °C max. +80 °C
Low-temperature stability: PM: B-014X	–30 °C (no delamination)
Damping layer: material base	acrylate copolymers
Damping layer: weight	approx. 0.34 kg/m²
Material base	bitumen-impregnated wool-felt board
Specific weight of the board	approx. 1.55 kg/m²
Acoustic data: Loss factor acc. to DIN EN 12354, +20 °C, 200 Hz, 1 mm steel	> 0.15
Resistance to liquids: acc. to DIN 53521, one-sided exposure for 4 hrs at room temp; weight increase per dm² (reference values): water	approx. 3.0 g surface not visibly damaged
Storage/shelf life (+10 to +25 °C)	approx. 12 months

TEROSON WT 112 DB

High-quality, non-flammable, sprayable and trowelable antidrumming compound based on an aqueous synthetic resin dispersion

Properties

- Hardly flammable according to DIN 4102 (class B1)
- Solvent-free
- 20 % more efficient, 30 % faster, 40 % less weight
- Non-combustible (class A2-s1, d0 in compliance with DIN EN 13501-1)
- Sprayable and trowelable
- Economical use (coating/sheet metal ratio 2:1), reduced weight (1.2 kg required for 1 mm dry layer)
- Effective antidrumming effect
- High acoustic loss factor, low consumption
- Can be mechanically processed or painted after drying

Applications

- As antidrumming agent or for damping structure-borne sound on thin-walled sheet metal structures in plant and machine engineering (ventilation ducts, fan housings, elevators, trapezoidal sheet metal undersides)
- For the rear coating of facade elements made of steel or aluminum

Packaging

- 250 kg drum
- 40 kg hobbock

- Color: beige

Properties ▼	Product ▶ TEROSON WT 112 DB
	
Type of product	trowelable and sprayable antidrumming compound
Odor	faint alcoholic
Color	beige
Consistency	paste-like
Density (g/cm²) dry wet	approx. 1.40 approx. 1.20
Temperature resistance (°C)	up to 1 hour 180 °C up to 336 hrs 120 °C
Solids content	approx. 65 %
Drying time (4 mm, wet) under standard climatic conditions 23 °C, 50 % RH (DIN 50014) +40 °C circulating air +80 °C circulating air	 approx. 24 hrs approx. 8 hrs approx. 3 hrs
Volume shrinkage	approx. 18 %
Consumption for 1 mm of dry film (kg/m²), spray application	approx. 1.2
Dilutable	with water
Thermal conductivity acc. to DIN 52612 in W/mK	approx. 0.21
Danger of frost damage	yes
Application temperature	+10 °C to +40 °C
Acoustic loss factor (DIN 53440, +20 °C, 200 Hz, 3 mm layer on 1 mm steel sheet)	≥ 0.22
Thickness ratio coating/sheet steel	2:1
Storage temperature	+5 °C to +25 °C
Shelf life	9 months

Polyurethane foams

TEROSON EF 537

PU foams are used for providing thermal and acoustic insulation of window connection joints. There simply is no better and easier technology for this area of application. Window installers make high demands on this product and expect properties like long-term flexibility, suitability for all weathers and excellent workability.

Sternenhimmel, München, Dobler Metallbau GmbH

TEROSON EF 537

High-quality, hardly flammable precision foam for window installation

Properties

- Building material class B1 according to DIN 4102
- Can be applied down to -10 °C
- Low post-expansion (max. 20 %)
- Very low curing pressure
- ift-tested window foam featuring long-term flexibility and dimensional stability
- Soundproofing (63 dB)

Applications

- For foam-filling and sealing joints around windows and front doors
- For insulating structural components against heat, cold, sound and draughts
- For filling cavities and wall penetrations
- For bonding windowsills indoors and outdoors as well as perimeter insulation boards
- For sealing manhole rings and well casings up to 0.5 bar water pressure

Certificates

- EMICODE® EC 1PLUS certified

Available on request:

- Product and manufacturer's declarations according to DGNB, LEED
- Information on airtightness and resistance to driving rain
- Fire performance according to DIN 4102

Packaging

- Carton with 12 cans of 750 ml each
- Color: beige

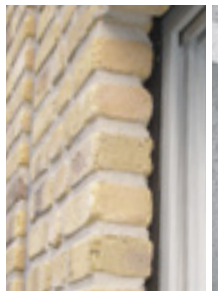
Precompressed foam tapes

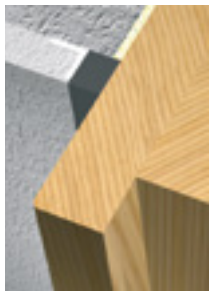
TEROSON PT ecoMAX 600

Precompressed foam tapes impress users by their quick and easy application. They are preferably used in outdoor areas on exposed masonry (clinker/facing bricks).

TEROSON PT ecoMAX 600

EC 1





Foam sealing tape resistant to driving rain but diffusion-capable for sealing connections in the window/facade area

Properties

- Impervious to driving rain, permits vapor diffusion
- Easy and economical use
- Sound- and heat-insulating
- Hardly flammable according to DIN 4102 (class B1)
- Can be painted over

Applications

- Window perimeter joints, connection joints in ETIC systems, drywall construction, window jamb extensions, couplings

TEROSON PT ecoMAX 600 is open to vapor diffusion and meets the requirements for driving rain tightness in the weather protection level. With this type of sealing, however, it must always be ensured that the specified joint tolerances are observed. The precompressed acrylate-impregnated PUR sealing tape expands shortly after being placed into the window joint, quickly closing the joint between window and building shell. The tape is able to accommodate slight unevenness of the substrate within the specified joint tolerance range.

Certificates

- EMICODE® EC 1PLUS certified
- Information on air- and watertightness is available on request.

- Color: black

Packaging

Roll length	Tape depth / joint width	Pieces per packaging unit
12 m	15/2–6	8
5.6 m	15/5–12	8
3.3 m	20/9–20	6

Other widths are available on request.

System components: primers and cleaners

TEROSON PR Primer M+S
TEROSON PR Primer Spray M+S
TEROSON PR PRIMER ECO
TEROSON SB 450
TEROSON PR PRIMER P 800

Primers are specially developed adhesion promoters which, on the one hand, form a tight bond with the substrate and, on the other hand, ensure reliable adhesion of the sealing product used. Furthermore, adhesion promoters are used to obtain surfaces ready to be covered with adhesive, to bind unavoidable dust and, if necessary, to achieve a slight surface-strengthening effect. TEROSON products come in a carefully matched system that has been developed, tested and approved with this complete functionality in mind.

TEROSON PR PRIMER M+S, PRIMER SPRAY M+S

Bonding course and surface strengthener for mineral and bituminous substrates

Properties

- Surface-strengthening effect
- Can be applied down to -10 °C and on damp substrates
- Liquid but with a very high tack (only TEROSON PR PRIMER M+S)
- Enormous time savings thanks to spray application (TEROSON PR PRIMER SPRAY M+S)

Applications

- Surface preparation before installing TEROSON sealing strips (TEROSON FO 3, TEROSON FO FOIL-TACK, TEROSON FO KSK and TEROSON TA ALU), sealing membranes and extruded butyl sealing products

Packaging

TEROSON PRIMER M+S:
- 5 l canister

TEROSON PRIMER SPRAY M+S:
- 750 ml can

TEROSON PR PRIMER ECO

Water-based, solvent-free primer used for preparing mineral substrates for sealing strips

Properties

- Low emissions
- Rapid drying
- High yield, pasty consistency, economical in use
- Can be used on damp substrates
- For application temperatures above 0 °C

Applications

Adhesion promoter for sealing products

- on porous and mineral substrates
- for self-adhesive TEROSON sealing strips/membranes
- for LEED- and DGNB-certified buildings

Certificates

- EMICODE® EC 1^{PLUS} certified

Available on request:

- Product and manufacturer's declarations according to DGNB, LEED

Packaging

- 5 l bucket

Products and systems System components: primers and cleaners

BP-Zentrale, Bochum, Lanco Lange

TEROSON SB 450

Cleaner and adhesion promoter for use on non-absorbent substrates

Properties

- Special solution for cleaning non-absorbent substrates
- Improves the adhesion of TEROSON AD MS 2100 on difficult substrates
- Very high yield

Applications

- For cleaning and, if necessary, improving the adhesion of elastic adhesives and sealants to metal, plastic materials and painted/varnished surfaces

- Color: transparent

Packaging

- Carton with 8 bottles of 1000 ml each

TEROSON PR PRIMER P 800

Adhesion promoter for sealing products on many absorbent and non-absorbent substrates

Properties

- One-component formulation
- Film-forming adhesion promoter
- Very high yield

Applications

For improving the adhesion of sealing products to

- porous, absorbent and mineral substrates (concrete, cement, clinker, brickwork)
- non-absorbent substrates (metals, plastics, coated wood)

- Color: transparent

Packaging

- Carton with 6 cans of 250 ml each

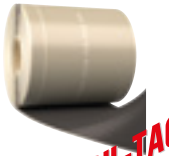
Products and systems

Primer table for sealing strips

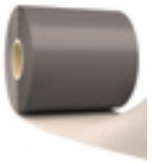
TEROSON sealing strips ▶

▼ **Substrates**

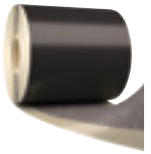
FO KSK M+S



FO 150 FOIL-TACK M+S



FO 2 FR



FO 3 SK2

FO 50 FOIL-TACK

FO 1 FOIL-TACK

FO 50 SK

FO 1 SK

	TEROSON FO KSK M+S	TEROSON FO 150 FOIL-TACK M+S	TEROSON FO 2 FR	TEROSON FO 3 SK2	TEROSON FO 50 FOIL-TACK	TEROSON FO 1 FOIL-TACK	TEROSON FO 50 SK	TEROSON FO 1 SK
Bituminous thick coatings, new	PR PRIMER M+S AD ADHESIVE SPRAY	PR PRIMER M+S AD ADHESIVE SPRAY	Without primer	PR PRIMER M+S AD ADHESIVE SPRAY	PR PRIMER M+S AD ADHESIVE SPRAY	PR PRIMER M+S AD ADHESIVE SPRAY	Without primer	Without primer
Bituminous roofing membranes (sanded), new	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	Without primer	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S	PR PRIMER M+S
Bituminous roofing membranes (sanded), weathered	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	Without primer	PR PRIMER M+S	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY	PR PRIMER M+S PR PRIMER ECO AD ADHESIVE SPRAY
PVC roofing membranes (e.g. Wolfin)	AD ADHESIVE SPRAY	AD ADHESIVE SPRAY	Without primer	AD ADHESIVE SPRAY	AD ADHESIVE SPRAY	PR PRIMER M+S AD ADHESIVE SPRAY	Request advice	Request advice
EPDM roofing membranes (e.g. Duraproof)	PR PRIMER M+S	PR PRIMER M+S	Request advice	Request advice	PR PRIMER M+S	PR PRIMER M+S	Request advice	Request advice
EVA roofing membranes (e.g. Evalon, Alwitra)	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
PIB roofing membranes (e.g. Rhepanol)	Without primer	Without primer	Request advice	Request advice	Without primer	Without primer	Request advice	Request advice
ECB waterproofing membranes (e.g. O.C.-PLAN)	Without primer	Without primer	Request advice	Request advice	Without primer	Without primer	Request advice	Request advice
PE sheeting	Without primer	Without primer	Request advice	Request advice	Without primer	Without primer	Request advice	Request advice
For further product details see page:	176	175	173	174	183	180	182	179

Products and systems

Primer table for sealants, adhesives and extruded butyl sealing products

× Product not recommended or suitable for this substrate.
● Normally adheres without primer, but non-absorbent substrates should previously be cleaned with a suitable solvent.
● Prewet absorbent substrates with water.
■ Adhesion test recommended before use.
P 800 Before applying the product, use TEROSON PR PRIMER P 800 (film-forming), e.g. on absorbent substrates.
SB 450 Before applying the product, use TEROSON SB 450 to improve adhesion (not film-forming).

TEROSON sealants / adhesives / extruded butyl sealing products

	Applications	TEROSON SE 108xlt	TEROSON SE 2000 MF	TEROSON SE 20	TEROSON SE 139	TEROSON SB 412	TEROSON RB 4006	TEROSON AD KDS	TEROSON AD KDS FR	TEROSON AD MS 2100	TEROSON TA ALU	TEROSON RB 81	TEROSON RB VII
Mineral substrates	Concrete	P 800	P 800	●	●	●	●	●	●	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Artificial stone	×	●	●	●	●	×	●	●	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Fiber cement (Eternit)	P 800	P 800	●	●	●	P 800	●	●	■	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Glasal	●		×	×	■	■	■	■	■	●	●	●
	Clinker bricks (glazed)	●	●	●	●	■	●	●	●	●	●	●	●
	Clinker bricks (unglazed)	P 800	P 800	●	●	■	■	■	■	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Natural stone: marble	×	×	×	×	■	×	×	×	■	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Natural stone: basalt	×	×	●	●	■	×	×	×	■	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Natural stone: quartzite	×	×	×	×	■	×	×	×	■	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Natural stone: sandstone	×	×	●	●	■	×	×	×	SB 450	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Cellular concrete	×	×	●	●	■	■	■	■	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Plaster	P 800	P 800	●	●	■	■	■	■	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Stoneware (unglazed)	P 800	P 800	●	●	■	■	■	■	■	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Brickwork	P 800	●	●	●	■	■	●	●	●	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
Metals	Bright aluminum	●	●	●	●	●	×	●	●	SB 450	●	●	●
	Anodized aluminum	●	●	●	●	●	●	●	●	SB 450	●	●	●
	Powder-coated aluminum	■	■	■	■	●	■	●	●	SB 450	●	●	●
	Structural steel (galvanized)	P 800	●	●	●	●	●	●	●	SB 450	●	●	●
	Structural steel (primed)	●	●	●	●	●	●	●	●	SB 450	●	●	●
	Lead	P 800	●	×	×	■	●	●	●	SB 450	●	●	●
	Stainless steel	P 800	●	×	×	●	●	●	●	SB 450	●	●	●
	Copper	P 800	●	×	×	●	●	●	●	SB 450	●	●	●
	Brass	P 800	●	×	×	●	●	●	●	SB 450	●	●	●
	Zinc	P 800	●	●	●	●	●	●	●	■	●	●	●
Plastic materials	EPDM	×	●	×	×	●	×	●	●	■	P 800	P 800	P 800
	GFRP (polyester, epoxy resin)	●	×	×	×	●	●	×	×	SB 450	●	●	●
	EPS (expanded polystyrene)	×	●	×	×	■	×	■	■	■	●	●	●
	PVC, rigid	●	■	●	●	●	●	■	■	●	●	●	●
	PVC, flexible (polymer)	×	■	×	×	×	●	■	■	×	×	×	×
	PUR, rigid	■	×	■	■	●	■	■	■	■	●	●	●
	PUR, flexible	■	×	■	■	●	■	■	■	■	●	●	●
	HPL	●	P 800	●	●	●	■	■	■	■	●	●	●
Glass, glazed surfaces	Glass	●	×	×	×	●	●	×	×	SB 450	●	●	●
	Ceramics/porcelain	●	●	×	×	●	●	●	●	SB 450	●	●	●
	Enamel	●	●	×	×	●	●	●	●	■	●	●	●
	Tiles (glazed)	●	×	×	×	●	×	×	×	●	●	●	●
Wood	Wood (glazed)	●	×	●	●	●	×	×	×	●	●	●	●
	Wood (varnished/lacquered)	●	×	●	●	●	●	×	×	●	●	●	●
	Wood (untreated)	■	×	■	■	■	×	×	×	●	■	■	■
Others	Bitumen	×	●	×	×	×	●	●	●	×	PR PRIMER M+S	PR PRIMER M+S	PR PRIMER M+S
	Silicone (hardened)	■	×	×	×	■	×	×	×	×	×	×	×
	For further product details see page:	202	199	201	200	196	193	189	190	192	177	207	208

P 800 = TEROSON PR PRIMER P 800 **PR PRIMER M+S** = TEROSON PRIMER M+S; TEROSON PR PRIMER SPRAY M+S **SB 450** = TEROSON SB 450

PASTE FOIL SYSTEMS | STRIP SYSTEMS | HYBRID SYSTEMS

CURTAIN WALL

Weather protection
3rd level
Exterior

Thermal insulation
2nd level
Middle

Moisture protection
1st level
Interior

WINDOW

UNIVERSAL | NEW CONSTRUCTION | OTHER

PASTE FOIL SYSTEMS

CURTAIN WALL

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

FO 3 SK1 + AD KDS + Pressure roller

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

FO 50 SK + AD KDS + Pressure roller

WINDOW

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

FO 1 SK + AD KDS + Pressure roller

WINDOW CONNECTION
JOINT PU-FOAM

EF 537 + Foam gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

FO 50 SK + AD KDS + Pressure roller

UNIVERSAL

SELF-ADHESIVE FOIL SYSTEMS

CURTAIN WALL

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

FO 1 FOIL-TACK + PR PRIMER M+S + Pressure roller

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

FO 150 FOIL-TACK + PR PRIMER M+S + Pressure roller

WINDOW

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

FO 1 FOIL-TACK + Pressure roller

WINDOW CONNECTION
JOINT PU-FOAM

EF 537 + Foam gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

FO 50 FOIL-TACK + Pressure roller

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

FO 1 FOIL-TACK + PR PRIMER, SPRAY M+S + Pressure roller

WINDOW CONNECTION
JOINT PU-FOAM

EF 537 + Foam gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

FO 50 FOIL-TACK + PR PRIMER M+S + Pressure roller

NEW CONSTRUCTION

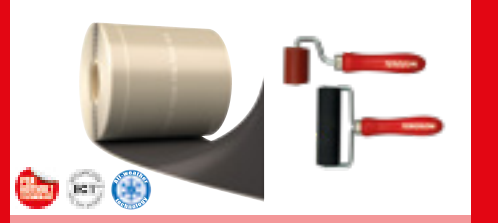
HYBRID SYSTEMS

CURTAIN WALL

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

SE 2000 MF + Cartridge gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF



FO 150 FOIL-TACK M+S + Pressure roller

WINDOW

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR

SE 108[ex] + Cartridge gun

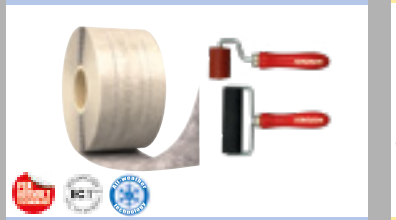
WINDOW CONNECTION
JOINT PU-FOAM

EF 537 + Foam gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

SE 200 MF + Cartridge gun

COLD COMPONENT SIDE (OUTSIDE):
OPEN TO VAPOUR



FO 1 FOIL-TACK + Pressure roller

WINDOW CONNECTION
JOINT PU-FOAM

EF 537 + Foam gun

WARM COMPONENT SIDE (INSIDE):
VAPOR PROOF

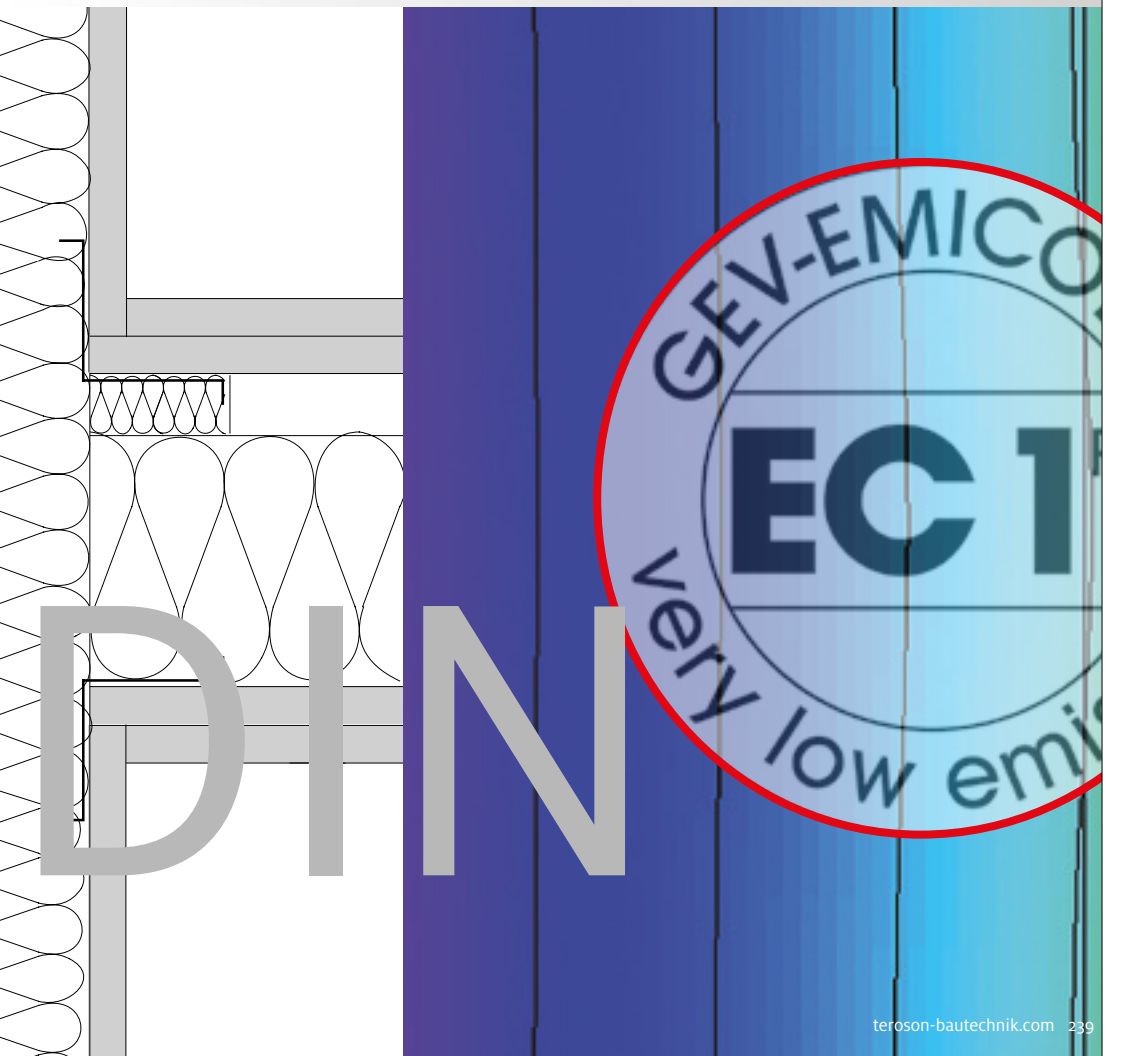
SE 139 + Cartridge gun

OTHER

DC Tower 3, Vienna, The S+B Gruppe

TEROSON®

Standards and regulations



Applicable standards

EnEV	Energieeinsparverordnung (German Energy Saving Ordinance)
DIN 1045-2:2008-08	Concrete, reinforced and prestressed concrete structures
DIN 4102	Fire classification of construction products and building elements
DIN 4108-2	Thermal protection and energy economy in buildings – Part 2
DIN 4108-3	Thermal protection and energy economy in buildings – Part 3: Protection against moisture subject to climate conditions – Requirements and directions for design and construction
DIN 4108-7	Thermal insulation and energy economy in buildings – Part 7: Airtightness of buildings – Requirements, recommendations and examples for planning and performance
DIN 4108, Supplement 2	Thermal insulation and energy economy in buildings. Thermal bridges – Examples of planning and performance
DIN 4109	Sound insulation in buildings; requirements and verifications
DIN 18195	Waterproofing of buildings
DIN 18533-1/ -2 and DIN 18531-4	Waterproofing of buildings – Part 4: Waterproofing against ground moisture (capillary water, retained water) and non-accumulating seepage water under floor slabs on walls; design and execution Waterproofing against non-pressing water on floors and in wet areas; design and execution Penetrations, transitions, connections and endings
DIN 18355	German construction contract procedures (VOB) – Part C: General technical specifications in construction contracts (ATV) – Joinery
DIN 18360	German construction contract procedures (VOB) – Part C: General technical specifications in construction contracts (ATV) – Metalwork
DIN 18361	German construction contract procedures (VOB) – Part C: General technical specifications in construction contracts (ATV) – Glazing works
DIN 18540	Sealing of exterior wall joints in buildings using joint sealants
DIN 18542	Sealing of outside wall joints with impregnated sealing tapes made of cellular plastics – Impregnated sealing tapes – Requirements and testing
DIN 18545	Sealing of glazing with sealants – Requirements for rebates and glazing systems
DIN 18599	Energy efficiency of buildings
DIN 52452-4	Testing of sealing compounds in building constructions; compatibility of sealing products – Part 4: Compatibility with other protection coatings
DIN EN 1027	Windows and doors – Water tightness – Test method
DIN EN 1191	Windows and doors – Resistance to repeated opening and closing – Test method
DIN EN ISO 6946	Building components and building elements – Thermal resistance and thermal transmittance – Calculation method
DIN EN ISO 10211	Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations
DIN EN ISO 11600	Building construction – Jointing products – Classification and requirements for sealants
DIN EN 12114	Thermal performance of buildings – Air permeability of building components and building elements – Laboratory test method
DIN EN 12211	Windows and doors – Resistance to wind load – Test method
EN ISO 12631	Thermal performance of curtain walling – Calculation of thermal transmittance

DIN EN 12354-1	Building acoustics – Estimation of acoustic performance of buildings from the performance of products – Part 1: Airborne sound insulation between rooms
DIN EN ISO 12572	Hygrothermal performance of building materials and products – Determination of water vapour transmission properties
DIN EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
DIN EN ISO 13788	Hygrothermal performance of building components and building elements – Internal surface temperature to avoid critical surface humidity and interstitial condensation – Calculation methods
DIN EN 15651-1	Sealants for non-structural use in joints in buildings and pedestrian walkways – Part 1: Sealants for facade elements
DIN EN 15651-2	Sealants for non-structural use in joints in buildings and pedestrian walkways – Part 2: Sealants for glazing
DIN EN 15651-3	Sealants for non-structural use in joints in buildings and pedestrian walkways – Part 3: Sealants for sanitary joints

Additional relevant standards for **Austria**

ÖNORM B 5320	Installation of windows and doors in walls – Design and execution of the building connection as well as of the joint for windows and/or doors
ÖNORM B 5321	Connection of windows, French doors, doors and external doors with walls – Test method

Additional relevant standards for **Switzerland**

Norm SIA 274	Sealing of joints in buildings – Planning and execution

Additional relevant standards for **France**

DIN EN 13859-2	Flexible sheets for waterproofing – Definitions and characteristics of underlays – Part 2: Underlays for walls
DIN EN ISO 9047:2016-02	Building construction – Jointing products – Determination of adhesion/cohesion properties of sealants at variable temperatures
NF DTU 36.5	Building works – Installation of windows and exteriors doors
NF DTU 34.1	Building works – Installation of industrial, commercial and garage doors and gates
RT 2012	French Thermal Regulation

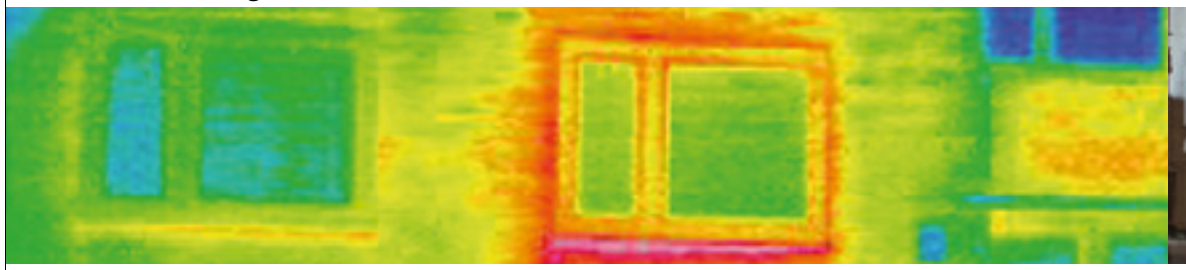
Additional relevant standards for **Belgium**

DIN EN 13859-2	Flexible sheets for waterproofing – Definitions and characteristics of underlays – Part 2: Underlays for walls

Additional relevant fire protection standards **(global)**

ASTM E84	Standard Method of Test for Surface Burning Characteristics of Building Materials
BS 476: Part 6 & 7	British standard for fire tests on building materials and structures
BS 8414-1	British standard for testing the fire performance of external cladding systems
EN DIN 13501	European standard for the fire classification of construction products and building elements
NFPA 285	Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components

Source of supply for German and Austrian standards:
Beuth-Verlag, 10787 Berlin; www.beuth.de



Key statements of important technical regulations

The above overview of standards shows that a large number of technical regulations and guidelines must be observed – not only for the planning and execution of window and facade sealing but also with respect to the work of previous trades. In this chapter, extracts are quoted from those regulations that are of particular importance for the development of TEROSON facade and window sealing systems.

EnEV

The new German Energy Saving Act EnEG has been valid since 4 July 2013 while the new German Energy Saving Ordinance EnEV came into effect on 1 January 2016. In passing these laws, the Federal Government of Germany has implemented the EU Directive on the Energy Performance of Buildings (2010/31/EU) while also taking the objectives of the energy transition ("Energiewende") into account.

§ 3, § 4

§§ 3 and 4 of the EnEV lay down the requirements to be met by residential and non-residential buildings in order to ensure that the annual primary energy demand for heating, hot water preparation and ventilation as well as the transmission heat loss of the heat-transmitting surface areas does not exceed the maximum values stipulated by the law.

§ 6

§ 6 of the EnEV deals with the airtightness and minimum air exchange of buildings. It stipulates that buildings must be designed in such a way that the heat-transmitting envelope surfaces, including the joints, are sealed permanently airtight according to the recognized rules of technology. In addition, buildings must be designed in such a way that the minimum air exchange required for health and heating purposes is ensured.

§ 7

§ 7 of the EnEV deals with minimum thermal insulation and thermal bridges. Section 2 stipulates that buildings are to be designed in such a way that the impact of structural thermal bridges is kept as low as possible in keeping with the recognized rules of technology and the economically justifiable measures in each individual case.

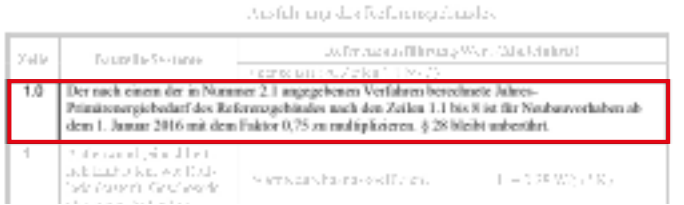
The EnEV 2016 notifies of any changes, not only concerning the requirements for new-builds but also for extensions and conversions of existing housing stock. It also informs about which new calculation and verification methods are valid for the Energy Performance Certificate. For further information and useful tips refer to www.enev-online.com.

Leaky joints are weak spots in the building envelope. They allow the penetration of air and thus cause unwanted heat loss among other things. This heat loss can be made visible by means of thermography. For illustration see the thermal image above.

EnEV 2016
New-builds 2016 and the more stringent requirements for non-residential buildings

As of 1 January 2016, newly built residential and non-residential buildings have to meet more stringent requirements under the new Energy Saving Ordinance:

Reduction of the maximum permissible primary energy demand of the reference building by 25 %



Zeile		
1.0	Der nach einem der in Nummer 2.1 angegebenen Verfahren berechnete Jahres-Primärenergiebedarf des Referenzgebäudes nach den Zeilen 1.1 bis 8 ist für Neubauvorhaben ab dem 1. Januar 2016 mit dem Faktor 0,75 zu multiplizieren. § 28 bleibt unberührt.	

This reduction means in concrete terms that, as of 1 January 2016, the thermal insulation of new-builds must be improved by approx. 20 %. The maximum permissible primary energy demand is calculated based on a "reference building". This means that the structural components and the HVAC system of the house to be built must meet the U-values (coefficients of heat transmission) predefined for this reference building. The energy demand $Q_{p,\ Referenz}$ determined in this way is the maximum permissible value.

The calculation for determining the energy demand $Q_{p,\ Real}$ of a building is based on the U-values of the actually planned building and checked against those of the reference building and the planned HVAC concept. In general, these more stringent requirements apply to building projects where

- the building application was submitted to the building authority on 01.01.2016 or later
- the building notification was submitted to the office on 01.01.2016 or later
- neither a permit nor a notification is required, but construction was started on 01.01.2016 or later.

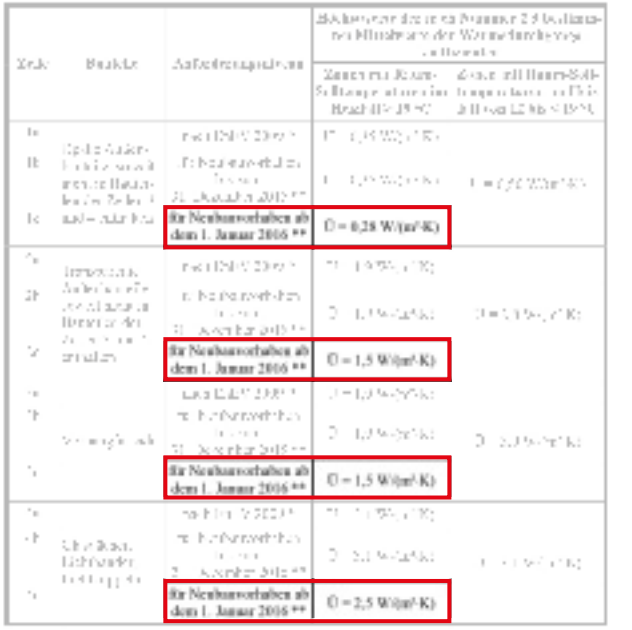
In order to meet the requirements of Energy Saving Directive 2016, the following formula applies:

$$Q_{p,\ Real} < 0.75 \times Q_{P,\ Reference}$$

With non-residential buildings, this would mean for example that the U-value of an opaque exterior wall of previously 0.28 W/(m²K) must de facto be 0.21 W/(m²K) from 01.01.2016. This corresponds to 75% of the U-value of 0.28 W/(m²K), i.e. the thermal insulation must be increased from previously 140 mm (WLD 040) to 180 mm (WLG 040).

For windows, this means that either highly insulating glazing 2-MIG -Ug ~ 1.0 W/(m²K) – in combination with a highly insulating window frame U f < 1.0 W/(m²K) – or 3-MIG -Ug ~ 0.7 W/(m²K) – in combination with a highly insulating window frame U f < 1.6 W/(m²K) – is used.

Maximum heat transmission coefficients of the heat-transmitting surface areas of non-residential buildings



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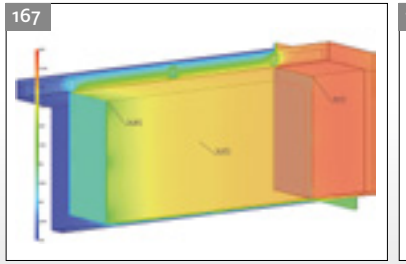

3D thermal bridge calculation: entrance portal with airlock – aluminum/steel supporting structure

3D FEM analysis – Special construction

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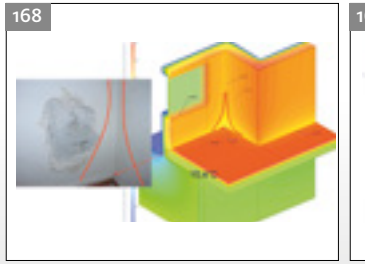
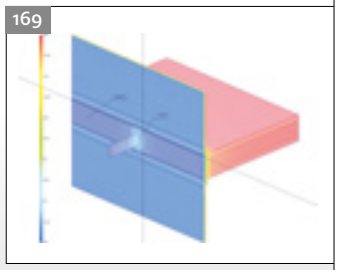


Isothermal line in a corner area. The picture shows the mold-infested area.

3D FEM analysis – Causes of mold growth

169



Penetration of the facade caused by a facade brace

3D FEM analysis – Facade brace

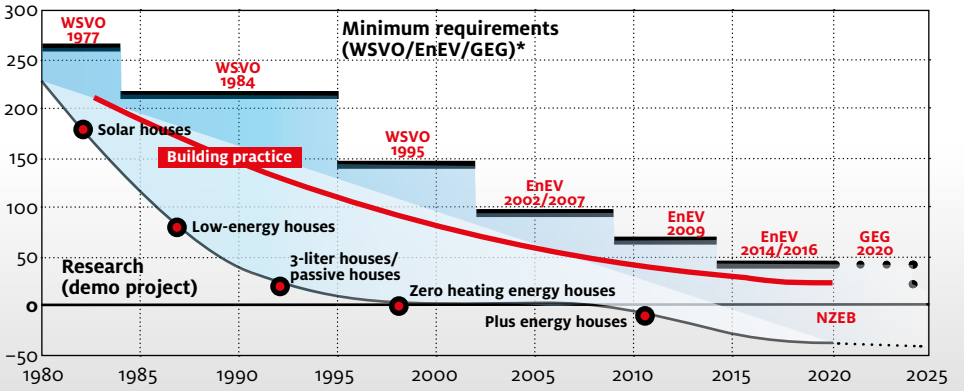
EU Building Directive and German Energy Act for Buildings

The EU Building Directive

In May 2010, the European Parliament adopted the "Energy Performance of Buildings Directive (EPBD)", also known as EU Building Directive. At the end of May 2018, an amendment to the directive with some additions came into force. The directive's aim is to make a significant contribution to decreasing the energy demand of EU member countries, to lowering the CO_2 emissions and to reducing the dependence on energy imports.

The directive requires all buildings in the EU to be built to nearly zero-energy building standards from 2021. New buildings in the public sector have already had to meet this requirement since 2019. Germany had to transpose the majority of the new regulations into national law. This was accomplished on 01.11.2020 through the new German Energy Act for Buildings (GEG).

170 **Primary energy demand of a semi-detached house – heating energy (kWh/m²a)**



*WSVO = German Thermal Insulation Ordinance / EnEV = German Energy Saving Ordinance / GEG = German Energy Act for Buildings

Source: Fraunhofer IBP

The German Energy Act for Buildings (GEG)

The GEG came into force on November 1, 2020. The previous Energy Saving Act (EnEG), the previous Energy Saving Ordinance (EnEV) and the previous Renewable Energies Heat Act (EEWärmeG) ceased to apply when the GEG came into force.

		Maximum mean values of the heat transmission coefficients	
Zeile	Bauteil	Zonen mit Soll-Raum-temperaturen im Heizfall ≥ 19 °C	Zonen mit Soll-Raum-temperaturen im Heizfall > 12 bis < 19 °C
1	Opake Außenbauteile, soweit nicht in Bauteilen der Zeilen 3 und 4 enthalten	U = 0.28 W/(m²•K)	U = 0.50 W/(m²•K)
2	Transparente Außenbauteile, soweit nicht in Bauteilen der Zeilen 3 und 4 enthalten	U = 1.5 W/(m²•K)	U = 2.8 W/(m²•K)
3	Vorhangfassaden	U = 1.5 W/(m²•K)	U = 3.0 W/(m²•K)
4	Glasdächer, Lichtbänder, Lichtkuppeln	U = 2.5 W/(m²•K)	U = 3.1 W/(m²•K)

RAL Guideline on the planning and installation of windows and front doors in new-builds and refurbishment projects

RAL (German Institute for Quality Assurance and Certification)

The latest version of the RAL Guideline, dated March 2020, describes in great detail the basic principles and execution of work for the structural connection of windows and front doors. It reflects the recognized rules of technology and is therefore a practical and indispensable tool for architects, planners, site managers and installers.
Section 2.5 of the Guideline says: In order to create the necessary preconditions for the serviceability of windows and front doors, structural connections need to fulfill the following requirements: clear separation of the functional levels and functional areas as well as protection of the connection joints against stresses from inside and outside.

Inner sealing level

On the room-facing side, window and door connections to the building envelope must be sealed airtight all around the perimeter (level 1). Any air flow between inside and outside through the connection joints must be virtually eliminated.

Middle sealing level

In the functional area (level 2), measures must be taken to meet the requirements for load transfer (absorption of movement), thermal insulation and, if required, sound insulation. Levels 1 and 3 must ensure that the functional area remains permanently dry so that the aforementioned requirements can be reliably fulfilled in the long term.

Outer sealing level

The weather protection (level 3) must be designed in such a way to ensure resistance to driving rain. Any moisture that has penetrated inside must be drained directly to the outside in a controlled manner. To avoid moisture damage in the connection area, it is essential to treat building component, joint and wall as an overall system. In terms of vapor diffusion, this system must be designed according to the principle “Tighter on the inside than on the outside”.

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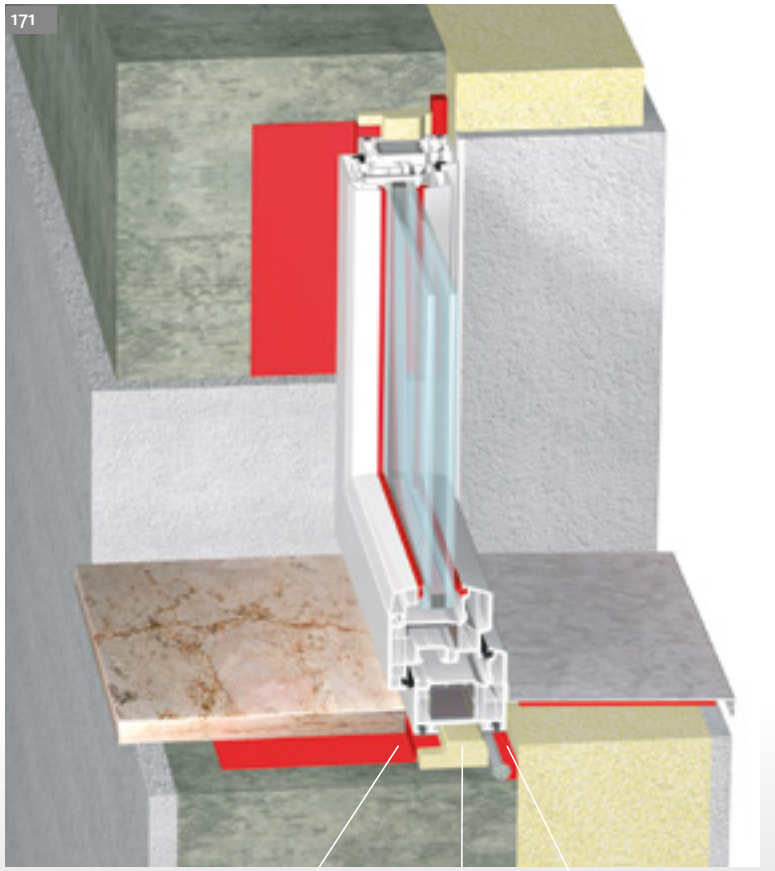
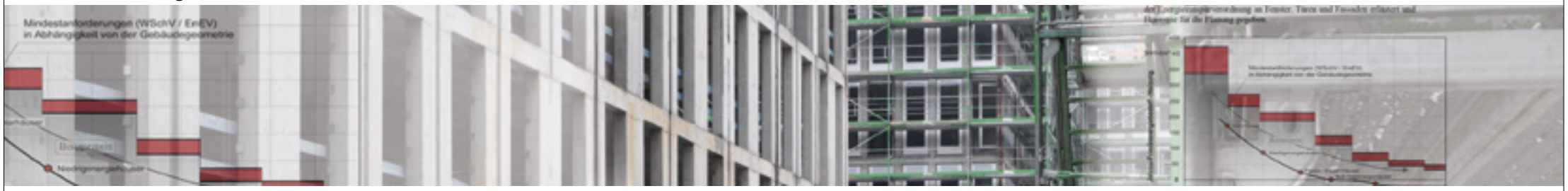


3-level sealing model



DIN 4108

Every planner needs to take the requirements of DIN 4108, supplement 2:2019-06 “Thermal bridges”, into account to ensure thermal insulation and energy economy of the building. Since 01.01.2016, the required value calculated for the reference building (value $\Delta U_{WB,\ reference\ building}$) is now 0.0375 W/(m²K).

Testing for airtightness – Blower Door Test

The new requirements have consequences for the actual construction process. It is necessary to work out a plan for minimizing thermal bridges (thermal bridge concept according to DIN 4108, part 2, supplement 2) and for ensuring the building‘s airtightness (airtightness concept according to DIN 4108, part 7). This is also a prerequisite for receiving KfW subsidies (KfW = Kreditanstalt für den Wiederaufbau).

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Before starting and completing the necessary plastering or facing work, at least one site inspection should be carried out, including at least one visual inspection of the connections in order to check the successful implementation of the plan.

In addition, it is useful to carry out a differential pressure test (blower door test) for individual rooms to check the airtightness of the building envelope. In this way, air leaks can be detected and remedied more quickly.

VFF-Richtlinien

Guidelines issued by the VFF Verband Fenster + Fassade (German Association of Windows and Facades)

Guideline HM.01	Guideline for wood-metal windows and exterior doors
Guideline HM.02	Guideline for wood-metal facade constructions

ift-Richtlinien

Guidelines issued by ift Rosenheim (German Institute for Window Technology)

Guideline MO-01/1	Wall connection of windows – Part 1
Guideline MO-02/1	Wall connection of windows – Part 2
Comment on DIN EN 14351-1	Windows and doors
Guideline WA-15/2	Passive house suitability of windows, exterior doors and facades
Guideline WA-13/1	Ψ-values for curtain walls
Guideline DI-01/1	Usability of sealants – Part 1
Guideline DI-02/1	Usability of sealants – Part 2
Guideline AB-01/1	Application guideline for external shutters
Guideline VE-06/01	Classification of loads for the glazing of windows
Guideline SC-01/2	Determination of the sound reduction index of joints
Guideline	Testing and evaluation of striation and abrasion

Available from: ift Rosenheim GmbH, www.ift-rosenheim.de

TEROSON®

Glossary of technical terms

A

Acetone

Acetone is commonly used as a solvent and extracting agent, among others for resins, fats and oils. With wood and other materials, especially metals, acetone is used for cleaning the surface before applying the adhesive. Skin contact and inhalation of larger amounts of acetone vapor should be avoided.

Adhesion

Adhesion is the force that attracts different liquid or solid materials to each other. Adhesion is most easily produced between liquids and solid surfaces, e.g. adhesion of adhesive to wood.

Adhesion promoter (primer)

The task of an adhesion promoter or primer is to enhance the adhesion of sealants on material surfaces. The primer to be chosen depends both on the type of material and type of sealant. Please refer to the table of TEROSON sealants on page 230/231 for recommendations concerning the use of primers for certain sealant/material combinations.

Adhesive

DIN 16920

An adhesive is a non-metal substance or binder that connects the parts to be joined via surface bonding (adhesion) and internal strength (cohesion).

Adhesive failure

Adhesive failure is the rupture of the adhesive bond, e.g. the undesired detachment of the sealant from one or both joint edges. Generally, this is indicative of an unsuitable substrate, insufficient substrate preparation, too much movement in the joint and/or excessive stress acting on the sealant. Here is a list of possible causes:

- Substrate of insufficient load-bearing strength
- Loose paint residues
- Crumbling plaster coats
- Release agents
- Excessive substrate moisture
- Required adhesion promoter/primer was not used
- Incompatibilities (old sealant residues, chemical incompatibilities e.g. caused by acetic silicone applied on alkaline concrete)
- Bituminous substrates
- Too much movement in the joint
- Wrong joint dimensioning
- Three-sided joint adhesion of the sealant

Adhesive layer

This is the layer between two workpieces that is completely or partly filled with adhesive.

Airborne sound

Airborne sound propagates through the air in the form of spherical waves. It is transmitted through building components, facades, windows and doors. In everyday language, airborne sound is mostly referred to as “noise”.

Air permeability

The exchange of air through a closed window, an exterior door or through structural joints is defined as air permeability. The requirements to be met by structural joints have been laid down in **DIN EN 12207**.

Airtightness

Airtightness prevents the flow of warm indoor air from the inside to the outside and the penetration of cold outdoor air into indoor space. Airtightness must be achieved for every building in compliance with the requirements of **EnEV** and **DIN 4108-7**.

Antifungal formulation

IVD Instruction Sheet no. 14

Fungicides are used as additives in sealants to prevent mold infestation on the surface of fully cured sealants. In the long run, however, mold growth cannot be prevented since there are too many different species of mold. No fungicide is able to effectively cover the whole range of mold species. Moreover, being a soluble substance, every fungicide will be washed out over time and gradually lose its effect. Nevertheless, the use of a sealant with antifungal formulation is mandatory for sealing joints in sanitary facilities and wet rooms. For more information see IVD Instruction Sheet no. 14.

Application temperature

The application or working temperature is the ideal temperature at which a product should be applied. Only then will the advertised properties be achieved. Usually, a temperature range is specified in the technical data sheet which should always be observed.

B Backfill material

DIN 18540

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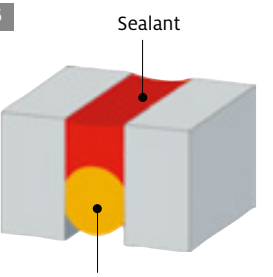

Backfill materials are placed at the bottom of the joint in order to limit the thickness or expansion of the sealant applied on top. Backfill materials can be made of open-cell PUR foam or closed-cell, non-water-absorbent PE foam. For certain joint areas, it is mandatory to use PE materials supplied as round cords (often called backer rods):

- Structural joints according to DIN 18540
- Window connection joints
- Floor joints
- Joints in sanitary facilities and wet rooms

Beveled joint

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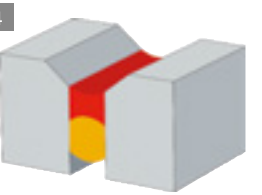

A beveled or chamfered joint has been cut so that there is a transitional edge between the material surface and the sealant surface. This type of joint is mandatory for structural joints to prevent water from penetrating into the edge area of the joint. This applies in particular to components made of washed concrete with a very uneven surface.

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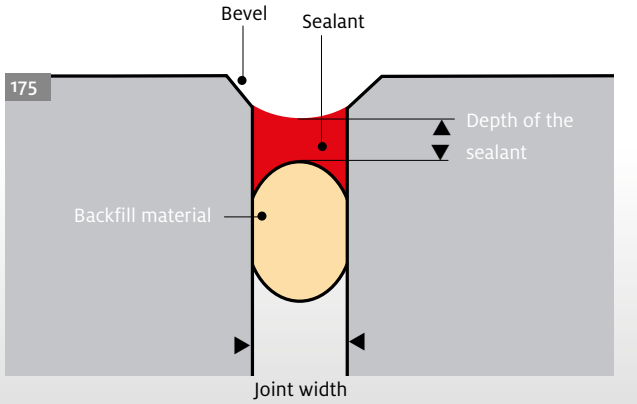
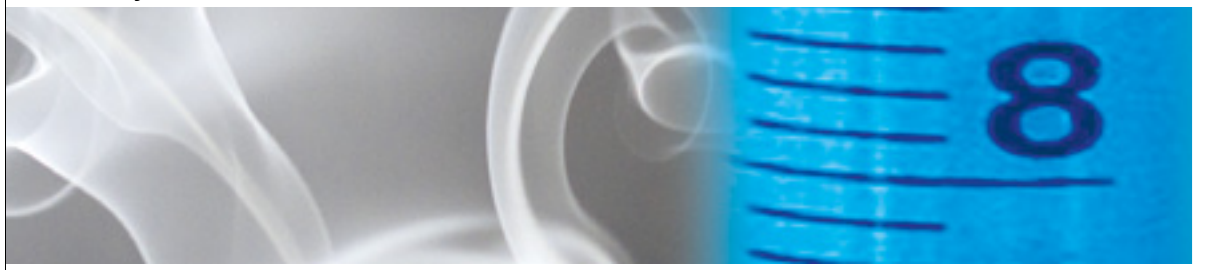




BIM

BIM – Building Information Modeling – is a method for planning work processes using intelligent 3D models. By means of 3D modeling, a database is generated containing all relevant data and information about the building and its components. Ideally, a digital twin of the building to be constructed is created, which is continuously updated during completion and later during operation of the building. This digital twin is meant to provide a 3-dimensional representation of the building for all trades working on the project. In addition, users can obtain further information on deadlines, costs, warranty and maintenance periods from the model.

Binder migration

This term refers to the migration of binders and/or other product ingredients (e.g. plasticizers) into the adjoining building materials. This often leads to staining or greasing of the joint edges. One example is the staining of marble or natural stone caused by plasticizer migration when using an unsuitable sealant.

For filling marble or other natural stone joints, manufacturers now offer a range of suitable sealants. However, in case of doubt, the suitability of a sealing product for the intended use should always be confirmed by the manufacturer.

Bond

A bond is the connection between two workpieces or components resulting from the use of an adhesive.

Bonded joint

A bonded joint is the gap between two bonded areas that is completely or partly filled with adhesive.

Bonding

DIN 8593 Bonding is the joining of surfaces by means of an adhesive.

Bonding area

This is the area between two workpieces or components that is wetted with adhesive.

Bond test

A bond test is a preliminary test for checking if and how the material(s) can be bonded and which adhesive should ideally be used.

Box window double-skin facade

This type of facade is based on the design principle of the box-type window. It is a storey-high facade with horizontal and vertical partitioning. Horizontal partitioning is normally installed on each floor whereas the vertical partitioning runs along the structural axes.

Building moisture

Building (or construction) moisture is the moisture trapped in the masonry and shell of a newly built house. Building materials such as mortar, plaster, screed, concrete and stones as well as exposure to the weather introduce considerable amounts of water into a building. Increased moisture can lead to adhesion problems when applying sealants. Exception: damp, absorbent substrates when applying acrylic dispersions.

C Calculation

A joint sealing job is done in several work steps. The selling price for the total job can be calculated using the following formulas:

Calculation of a joint sealing job

A. Labor costs

Required time in minutes **x** Charge rate in minutes

B. Material costs

Consumption per meter **x** Material purchase price **x** Material overhead rate

C. Overhead costs in %

D. Risk and profit

A + B + C + D = Selling price of the rendered service

Cavity filling

The cavity between the room-facing and the exterior connection joint of a building element can be filled partially or completely with materials such as PUR assembly foam. Cavity filling is mandatory for reasons of thermal and sound insulation, e.g. for window elements.

CE marking of sealing products

EN 15651
DIN EN ISO 11925-2
DIN 4102-1

According to the Europäische Bauproduktenverordnung BauPVO (European Construction Products Regulation CPR), construction products covered by a harmonized standard are required to have a CE mark to signify compliance. This CE mark is mandatory for joint sealants if their application falls within the scope of EN 15651. Since 01.07.2014, CE marking has been mandatory for some types of joint sealants, e.g. facade and glazing sealants, sealants for sanitary joints and sealants for pedestrian walkways. Under the CE marking regulations, all sealants must meet the requirements of fire class E according to DIN EN ISO 11925-2. Testing according to the new EN standard is almost identical with class B2 testing according to the old German standard DIN 4102-1 (now withdrawn).

Chemical resistance

Sealing products are often exposed to attack by chemicals, e.g. cleaning agents, shampoo, oil, petrol and solvents. This happens for example to floor joints in sanitary facilities or car washes. The resistivity of sealants is influenced by three factors:

- Concentration of the chemical
- Exposure time
- Exposure temperature

Chemicals are able to discolor or stain the sealant, cause it to swell or soften, or even destroy the sealant. It is therefore advisable to contact the manufacturer and check the suitability of the sealant for the intended application.

Coefficient of thermal expansion α

The change in length (linear expansion) of building materials is expressed in mm per meter per degree Celsius temperature change. The following table lists the values of some important building materials used for facade and window construction:

Building materials and their coefficient of thermal expansion α

Building material	Coefficient of thermal expansion α in 10^{-6} K^{-1}
Acrylic glass	80.0
Aluminum	23.5
Concrete	11.0
Tiles	6.0
Rigid PVC	80.0
Wood (along the grain)	7.0
Clinker bricks	7.0
Cellular concrete	11.0
Earthenware	2.4
Zinc	36.0

The higher the coefficient of thermal expansion, the more the material expands when exposed to heat (e.g. temperature fluctuations between day and night, summer and winter). This explains why there is much more movement in the connection joint between a rigid PVC window and the brickwork than between a wood window and the brickwork. The sealant must be able to accommodate any movement in the connection joint.

Cohesion (cohesive force)

Cohesion is the internal force or strength that holds molecules of the same substance together (solid = high cohesion, liquid = low cohesion).

Cohesive failure

Cohesive failure is a material rupture or break within the sealant.
It is generally a sign of excessive stress acting on the sealant, e.g. caused by:

- too much movement in the area of the joint
- embrittlement of the sealant
- wrong joint dimensioning (too narrow joint, non-uniform or too low thickness of the sealant)
- three-sided adhesion

Cold facade

Cold facades, which are also called ventilated curtain walls, are multi-skin exterior wall constructions where the individual skins have different structural and physical functions.

The outer skin or curtain wall offers protection against the weather.
The air inside the cavity is cold. Potential condensate can escape via the cavity. The inner skin, by contrast, provides thermal insulation.

Combination bonding

Combination bonding is the joining of different materials with an adhesive.

Compatibility with building materials

A sealant is compatible with other building materials used on site if there is no detrimental interaction between the sealant and the building material, e.g. caused by:

- poor adhesion
- chemical incompatibility, e.g. acid silicone on concrete or on metals susceptible to corrosion
- physical incompatibility, e.g. staining caused by bitumen
- staining around the edges of natural stone slabs, e.g. made of marble

Condensation protection

DIN 4108 specifies how much condensate may be produced in building components. Especially during the winter months, the warm, moist air on the inside of the building can cool down significantly due to diffusion currents near the walls. As a result, condensate is produced which, if everything was properly planned, forms on the insulation layer. From there, the moisture can easily evaporate to the outside.

Construction joints

Construction joints are exterior wall joints between structural elements made of in-situ concrete, precast concrete elements, unrendered masonry and natural stone.

Construction site report

In order to be prepared for questions concerning the execution of sealing work and also in case of later warranty claims, it is advisable for some types of sealing work to write and file a construction site report. The IVD (Industrial Association for Sealants) offers sample reports in some of their instruction sheets.

Consumption

Consumption means the coverage or yield of a sealant when using the defined application quantity. Sealant consumption can be calculated based on the joint dimensions specified in different technical guidelines. The table below lists the consumption values for joints with a rectangular cross-section. The consumption for triangular joints is only half as much.

Sealant consumption

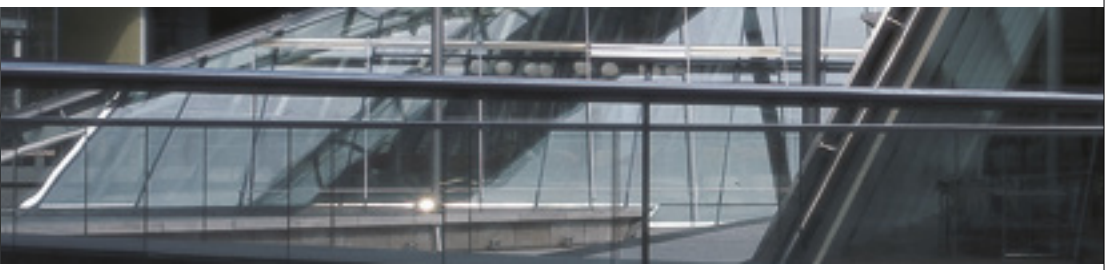
Joint width in mm		Depth of sealant in mm	Consumption in ml/m
6	x	6	36
8	x	8	64
10	x	10	100
15	x	8	120
20	x	10	200
25	x	12	300
30	x	15	450
35	x	18	630

Contact area

This is the part or area of the joint edge that comes into direct contact with the sealant.

Contact pressure

Contact pressure is the pressure that must be applied over the entire bonding area for the full pressing time to achieve maximum final bonding strength. Optimum contact pressure should neither be too high nor too low.



Corridor double-skin facade

With this type of facade, the cavities between the skins are separated from each other for every storey for acoustic, fire protection and other reasons. This construction is recommended when each storey is rented out to one and the same tenant, because there is no need for expensive partitions in the cavity between the skins.

Curing / hardening

Curing is the solidification of an adhesive as a result of physical and/or chemical processes. Physically hardening adhesives dry because the water or solvent contained in the formulation either evaporates or migrates into the bonded materials. By contrast, chemically curing adhesives (also called reactive adhesives) cure by reaction: either the two components (resin and hardener) of the formulation react with each other, or the reaction is triggered by a change in ambient conditions, often reaction with atmospheric moisture.

D

Decibel (dB)

Decibel is the unit of sound level. In the human hearing range, this lies between 0 and 120 dB.

DIN

Deutsches Institut für Normung (German Institute for Standardization)

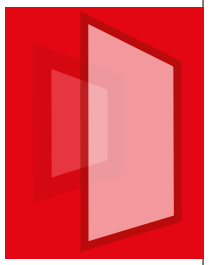
Dispersion

A dispersion is a fine distribution of solids in liquids, mostly in water. The substance is not dissolved.

Dispersion versus solution

A dispersion adhesive typically consists of a solid phase, e.g. polyester particles (mostly thermoplastic polymers) finely dispersed in a liquid phase (water). There is a transition from liquid to solid. By contrast, a solution is a homogeneous mixture where a substance (liquid, solid or gas) is completely dissolved. There is no transition from liquid to solid.

Double-skin facade (multiple-skin facade system)

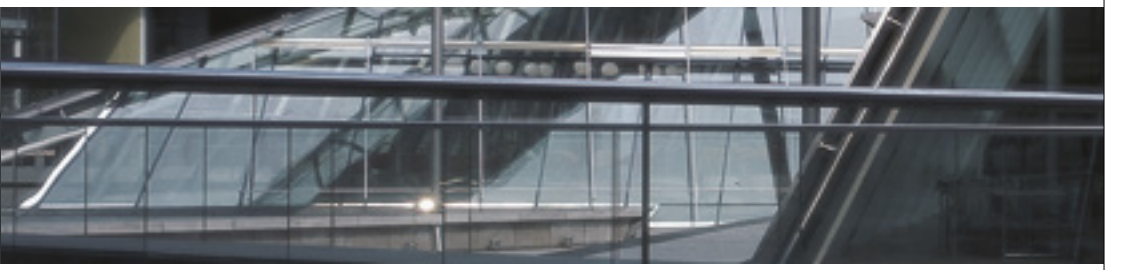


Double-skin facades consist of two skins or facades, placed in such a way that air flows in the intermediate cavity. They are equipped with window elements that sometimes extend from floor to ceiling (storey-high). According to the laws of building physics, the structurally correct design is as follows: Operable window elements (mostly made of insulating glass) are fitted into the room-facing primary facade. The second, outer skin is equipped with fixed glazing (single-pane safety glass, mostly solar control glass). The cavity between the two facades is equipped with solar shading and dazzle protection devices, protected against dirt pick-up and weather influences (especially the impact of wind). At the same time, solar shading can be used to optimize the energy performance of the building.

The challenge in the design of multi-skin facades is the inclusion of openings that provide natural ventilation for the building, e.g. to allow cool night air in summer to lower the building's temperature or to reduce thermal loss in the winter months. Another challenge is the reduction of outside noise which, from a structural point of view, calls for quite different measures.

We distinguish between four types of double-skin facades:

- Box window double-skin facades
- Corridor double-skin facades
- Shaft-box double-skin facades
- Multi-storey double-skin facades



Driving rain resistance

Driving rain is heavy rain propelled by a medium to strong wind. This type of precipitation can also attack the vertical surfaces of a building. Walls and building components must therefore be protected against the penetration of driving rain in order to prevent moisture damage. The requirements to driving rain resistance to be met by the connection joints for windows and exterior doors have been documented in **DIN EN 12208**. With buildings below a total height of 20 m, it is possible to install precompressed foam tapes with a driving rain resistance of up to 300 Pa. With buildings of 20 to 100 m height, precompressed sealing tapes of 600 Pa resistance must be used.

E Elastic recovery

The elastic recovery of a sealant is its ability to regain to a certain percentage its original length after being stretched. In compliance with **DIN EN ISO 7389**, a test specimen is extended by 60 % or 100 % for a period of 24 hours. Measurement of elastic recovery is done one hour after specimen elongation.

Elastomers

Elastomers are rubber-like, elastic plastic materials. They are not meltable, more or less insoluble, but they swell in solvents.

Elongation stress value (tensile modulus)

DIN EN ISO 8339

This value is a measure of the force exerted on the bonding surfaces of the adjacent building materials at a certain elongation of the sealant. The value is often referred to as “tensile modulus” and is measured at an elongation of 100 % according to DIN EN ISO 8339. Sealants with a low elongation stress value exert only low stress on the adjacent building components. This means: the lower the substrate strength (e.g. aerated concrete or crumbling plaster), the lower the elongation stress value of the sealant should be. Sealants with a high elongation stress value therefore require a high substrate strength (e.g. metal, glass).

Examples

Low modulus ≤ 0.4 N/m²
High modulus > 0.4 N/m²
at 100 % elongation in each case

EMICODE®

EMICODE® is a trademark-protected eco label used for the classification of low-emission building and installation products (emission of VOCs).

EN

Europäische Norm (European standard)

Energy Performance Certificate (EPC)

The Energy Performance Certificate, introduced as integral part of the German Energy Saving Ordinance EnEV, indicates the annual space heating requirement and the annual primary energy demand of a building. It provides a document of the building‘s energy balance so that the owner, or in the case of sale the later occupant, knows how much energy the building is expected to consume. Such a certificate is mandatory for all new-builds. For old, existing buildings it is possible to calculate the energy consumption from the consumption data of the heating bill and to report this value in the certificate.

Equilibrium moisture content (EMC)

The term equilibrium moisture content refers to the moisture trapped inside a building material after it has adapted to the ambient climatic conditions. The amount of moisture contained in the building material depends on the relative humidity and temperature of the ambient air. Every building material has a characteristic value, for example:

Concrete:	approx. 2 wt %
Cellular concrete:	approx. 8-12 wt %
Wood:	approx. 8-15 wt %

Extrudability

Extrudability is the power required to squeeze an adhesive from a cartridge or tubular bag.

F Fastening or fixing

Fastening or fixing means securing the workpiece (e.g. by mechanical means) in the desired position during the curing process.

Film formation

With physically drying sealants, film formation is the time when part of the water from the dispersion has already evaporated or been absorbed by the substrate. As a result of this water loss, the concentration of the sealant particles increases: they become closer until they form an unbroken film. At this point, the curing process is not fully completed and final strength has not been reached yet. Exposing the joint to loads or stresses at this stage may result in failure of the sealant.

Final strength

This is the maximum strength of an adhesive bond after the adhesive has fully cured. Usually, 2 to 7 days are needed until final strength is reached – in individual cases even more, depending on the type of adhesive.

Fire behavior

The old German standard **DIN 4102** distinguishes between three flammability classes:
B1 = hardly flammable
B2 = normally flammable
B3 = easily flammable

In Germany, building products need to undergo a fire-resistance test and must at least be rated B2. On a European level, the relevant standard for fire-resistance testing is **EN 13501**. Class E of this standard corresponds to the B2 rating of DIN 4102. The criteria for testing building products for class B1 of the old DIN 4102 standard have currently not been defined by standard EN 13501. This means that no products can currently be tested according to this quality.

Fire resistance rating

DIN 4102

The fire-resistance class indicates how long a tested building component (e.g. wall, ceiling or roof) is able to withstand fire. According to **DIN 4102-2**, the following fire-resistance classes can be distinguished:

F 30 fire-retardant
F 60 highly fire-retardant
F 90 fire-resistant

Flash-off time (adhesion promoters / primers)

The flash-off time, indicated in minutes, is the time before a sealant can be filled into the joint after application of an adhesion promoter/primer. This waiting time must be strictly observed. Otherwise, residual solvent that has not completely evaporated may result in poor adhesion or cause bubble formation in the sealant.

Floor-to-ceiling elements

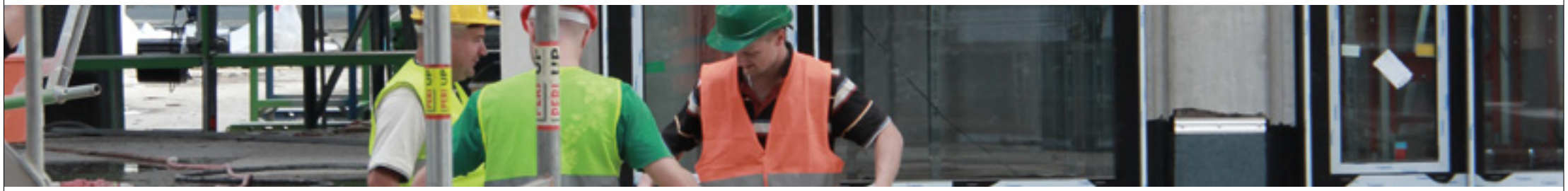
Floor-to-ceiling elements are windows or doors that extend from the ceiling to the floor. The connection joints to the basement or terrace must be tightly sealed.

Frequency

Frequency indicates the pitch of sound and is expressed in hertz (Hz). Humans hear in the frequency range of 20 to 20,000 Hz.

fRsi factor

Compliance with the fRsi factor (temperature factor or temperature difference quotient) is the responsibility of the architect or planner. The factor indicates how great the risk of mold growth is for the building.



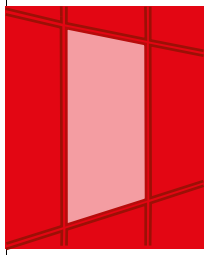
G Gap-filling

Gap- or joint-filling means the property of an adhesive to level out an uneven workpiece or substrate surface. For wide gaps or joints between two workpieces it is necessary to use a gap-filling adhesive.

Generally accepted rules of technology

These are the technical rules for the design and execution of buildings or structures that have been proven to be theoretically correct, are generally accepted and, based on continuing practical experience, are recognized as technically suitable, appropriate and necessary. All sealing work must be carried out in accordance with the generally accepted rules of technology.

Glass facade



Unlike framed glass panels, point-fixed glass facades are kept in place by single supports arranged in a point-like manner. When determining the right dimensions of point-fixed glass facades, it is important to consider the maximum allowable deflection of the individual glass panes. The type of glass must always be chosen to match the support. The proper arrangement of the supports requires a complex calculation since they are expected to transfer the loads acting on them (e.g. tensions in the glass panes) tension-free into a specially designed load-bearing structure. This structure can be installed either directly behind the glass surface or at a clear distance from it. It is essential to choose glazing of appropriate thickness in order to compensate for the bending and transverse forces acting on the glass. Contrary to framed glass panels, there is a clear separation between the fixing devices and the sealing for point-fixed glass facades. In the latter case, the connections between the panes are sealed with a UV-resistant, tension-free sealing compound. In the case of insulating glass, the glazing rebates are additionally ventilated for draining the condensate. Please note that every point-fixed glass facade requires an “Approval for the individual case” by the responsible building supervisory authority as it a non-regulated” building product under the German building law.

H Heated facade

For the construction of a heated facade, hollow-chamber profiles made of aluminum or steel are installed in mullion-transom design on the facade in such a way that hot water can flow through the sections. Evenly distributed over the entire height of the facade (also high facades), they steadily release radiant heat into the room. Heat concentration problems typical of conventional radiators can be excluded. There is also no formation of condensate at very low outdoor temperatures. Warm-water heated facades help reduce cold zones in front of the facade. They produce a pleasant room temperature where even the space near the facade can be used as a workplace.

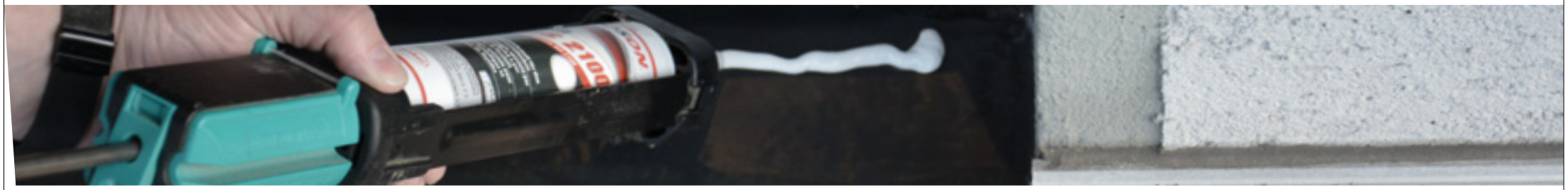
I Impermeability to water vapor diffusion

This term, also known as water vapor diffusion resistance, indicates to which extent a building material is able to prevent diffusion, i.e. the spreading of water vapor from a point of higher concentration to a lower concentration. This resistance is determined as the water vapor diffusion resistance factor (μ-value). Strictly speaking, products with an equivalent air layer thickness or s_d value of ≥ 50 must be described as vapor-retarding.

Nevertheless, these products are normally used without problems on the warm side of the building component. From a structural-physical point of view, an s_d value of > 1500 m would be more favorable (vapor barrier effect). However, this value is not always feasible or close to practical needs. What is important is the correct vapor diffusion gradient (principle: inside tighter than outside).

Initial tack

Initial tack is the force that holds an adhesive to the surface immediately after joining the workpieces, even before the curing process has started. The initial tack of an adhesive is considerably lower than the final strength achieved after curing.



Insulation layer

An insulation layer is a layer installed around a building that provides acoustic and/or thermal insulation.

J Joint

A joint is an intentional or tolerance-related gap between structural components. As nearly all joints are subject to a certain amount of movement, they must be sealed according to the state of the art with sealants able to accommodate movement.

Joint edge

Lateral boundary of the joint width; not to be confused with the bonding area of the sealant. See: Bonding area.

L Lightfastness

This term refers to the property of a product (e.g. sealant) not to change its original color even under strong external influences (e.g. UV radiation, sunlight). Lightfastness is particularly important for joints in sanitary facilities where the color of the sealant or grout was chosen to match the color of the sanitaryware. Lightfastness also means that white and transparent sealants are resistant to greying and yellowing.

Low-emission products

Products are given the label “low-emission” if they emit very low amounts of VOCs and SVOCs into the environment. As a rule, these products have been tested according to the guidelines of the RAL Quality Assurance Association and have been awarded the EMICODE® quality seal. These seals are important for buildings that are to be certified as “sustainable”.

M Maintenance joint

Joints that are exposed to strong chemical or physical stresses require regular maintenance. The sealant must be checked at regular intervals and replaced if necessary to avoid subsequent damage. Sealants have a limited stress resistance which must not be exceeded. Maintenance joints are not covered by warranty.

The following points must be observed for maintenance joints:

- Annual maintenance: check and, if necessary, replace the sealant partially or completely.
- Provide the building client with care and maintenance instructions.

Joints that are exposed to strong chemical or physical stresses must be defined as maintenance joints when awarding the contract. Depending on the type and intensity of stress, the maintenance intervals must be previously agreed in writing, on a case-by-case basis, between the building client and the contractor.

Maximum movement accommodation

This term, also known as movement capability according to **DIN EN ISO 11600**, is used for indicating in percent the maximum movement that a sealant is able to accommodate inside a structural joint. The maximum movement accommodation of gun-applied sealants in building construction (in terms of elongation, compression and shear) is 25 %. The respective movement capability of a sealant is specified by the manufacturer in the Declaration of Performance (DOP).

Micro-mechanical adhesion

This is the adhesion of an adhesive to a rough, uneven surface. The adhesive flows into and mechanically clings to the irregularities of the surface, thus forming a positive fit.

Minimum air exchange rate

The minimum air exchange rate indicates the amount of air needed to ensure a sufficient supply of fresh air in buildings, especially when equipped with furnaces or other firing installations. A too low air exchange rate can promote the formation of mold.

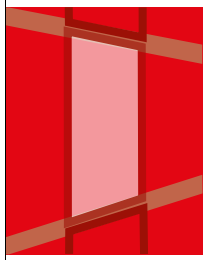
Moisture-curing

An adhesive is called moisture-curing if it needs moisture for the curing process.

Movable facade elements (often special constructions)

Movable facade elements are required in those cases where bulky goods such as aggregates, tanks or HVAC equipment need to be transported and installed inside a building after its completion. They are also used by restaurants wanting to remove the partition between indoor and outdoor space (terrace) during the summer months. Or for protecting passengers waiting at cruise terminals against unfavorable weather conditions. When designing such special solutions, the results of the following pre-tests must be taken into account: tightness of the facade when all elements are closed, impact of dynamic loads acting on the load-bearing structure.

Mullion-transom facade



This type of facade is primarily used for buildings where high installation heights, section widths or roof structures are to be achieved. It is based on the connection of single load-bearing mullion and transom profiles, which can be either prefabricated into large elements at the manufacturer or assembled on site from individual profiles. Mullion-transom facades can be made of different material combinations, e.g. aluminum, steel or wood. Advantage: By using profiles of variable dimensions (especially profile depth), the design can be flexibly adapted to nearly all installation requirements. The transom connections can be screwed, plugged in or welded.

Multi-storey double-skin facade

This type of facade is installed like an outer shield or second skin in front of the interior facade. It is not equipped with horizontal and vertical partitions in the cavity between the skins.

N Notch effect

When small cracks in the adhesive surface become bigger as a result of tensile stress, this may lead to premature failure of the bond.

Not subject to labelling

Products are exempt from mandatory labelling if they do not present a danger to the environment or a health risk for the user.

O Open time (adhesion promoters / primers)

The open time is the maximum permissible time from the application of an adhesion promoter to the application of a sealant. Exceeding the open time may result in adhesive failure of the sealant.

Open waiting time (previously “open time”)

This is the maximum time allowed after applying the adhesive before the workpieces must be joined. If the open time is exceeded, maximum final strength will no longer be achieved.

P Paintability

DIN 52452
DIN 52460
DIN 55945

As defined by DIN 52460 and in keeping with DIN 55945, a sealant is paintable if it can be coated over the entire surface with one or more coats without resulting in harmful interactions.

The following basic rule applies:

Elastic sealants, or sealants whose elasticity is higher than that of the coating system, must not be covered with paint over the entire surface. If the client requests full-surface painting, this must be previously agreed upon with the sealant manufacturer.

The paintability of a sealant can be tested according to DIN 52452-4, test method A3. The painted sealant specimen is subjected to an expansion/compression test cycle. The applied load corresponds to the maximum movement accommodation specified by the sealant manufacturer. The assessment is based on the following test criteria:

- Flowability problems
- Insufficient drying / softening
- Poor adhesion
- Staining
- Formation of cracks
- Formation of wrinkles

Paint compatibility

According to DIN 52460, a sealant is paint-compatible if it can be used for sealing components that have been coated with paints without resulting in harmful interactions between sealant, paint and adjacent building materials. This also applies to a subsequent coating of the components where the paint on the sealant has to be limited to 1 mm of the joint edge.

DIN 52452-4 — Testing is done according to the requirements of DIN 52452-4 “Testing of sealing compounds in building constructions; compatibility of sealing products – Part 4: Compatibility with other protection coatings” (test methods A1 + A2).

Test method A1 — Compatibility between existing coatings and subsequently applied sealing compound

Test method A2 — Compatibility between existing sealant and the coating subsequently applied in the adjacent area (coating limited to max. 1 mm of the joint edge)

Assessment is based on the following criteria:

- Flowability problems
- Insufficient drying
- Tackiness / softening
- Staining
- Adhesion
- Formation of wrinkles

A sealant described as “compatible with all kinds of paints” (universal compatibility) must pass both tests.

Parapet

The parapet is that portion of the exterior wall that extends or continues above the edge of the roof. The parapet connection is the upper connection between the facade and the flat roof of a building. This connection needs to be watertight.

Parts to be joined

Workpieces that are to be joined with each other by bonding.

Permeability to water vapor diffusion

Materials are permeable to water vapor diffusion if they have a very low s_d value. Moisture entrapped during construction or condensate forming on building components can easily evaporate through these products. From a structural-physical point of view, these materials should be installed on the cold side of the building.

Physically hardening

Physically hardening adhesives are most often dispersions where the adhesive has been dissolved in water. During the drying process, the dispersing agent (water) evaporates or is absorbed by the workpiece.

Plasticizer migration

Today, many products contain plasticizers to enhance their flexibility. Under certain conditions, such plasticizers can migrate from the product into the substrate. In addition, they can make a subsequent paint coat sticky and cause staining. Bitumen oil, for example, can migrate into natural stone or into a sealant. This migration may cause the bond to weaken or to become brittle, with the possible result of stress cracking.

Premature drying of the adhesive

This effect takes place when the liquid components of an adhesive are absorbed too quickly by the substrate. This may happen especially with water-based dispersion adhesives applied on highly absorbent and very dry substrates. As a result, the dispersion cannot fully cure.

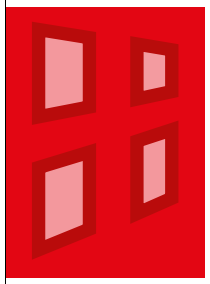
Pressing time

Time from reaching the full contact or bonding pressure until release of pressure.

Primer

See “Adhesion promoter”

Punched-window facade



This type of facade consists of elements made of window profiles (aluminum, steel or wood-aluminum combinations). Normally, punched windows have a mitered frame (wood and aluminum windows) and are single elements used to close holes in the building shell. The installation level depends on the adjoining facade components. More and more often, punched windows are not installed in the rough opening, but in the thermally more favorable insulation layer applied before the wall. To ensure the proper connection between punched windows and building shell, it is important to take factors like load transmission, airtightness, moisture and sound insulation into account when planning and executing this type of facade.

R Relative humidity RH (%)

Percentage of water vapor in the air

Resistance

Resistance means the ability of the fully hardened bond to resist external influences, e.g. moisture, vibrations or chemical attack. Chemically reactive adhesives cure through reaction with moisture or a second component. During this reaction, other products may be released.

Resistance to flow

DIN EN ISO 7390

Resistance to flow is the property of a sealant to remain in place after application, without running or dripping from the joint. The resistance to flow is determined in compliance with DIN EN ISO 7390. In general, sealants used in building construction are flow-resistant up to a joint width of 30 mm. The maximum joint width has been specified as 35 mm.

Reveal

The reveal (also called jamb) is the vertical right and left side of an opening in a masonry wall into which building elements like windows and doors are installed.

S Sag resistance

A non-sag or non-slump adhesive does not drip or run during application because it is thixotropic (which means thick or viscous). This consistency is important when applying the adhesive overhead or to vertical surfaces.

Serum formation

When storing assembly adhesives over a long time, the viscosity of the adhesive may change. As a result of separation (solid from liquid phase), a gel-like, glossy substance called “serum” may form. This should be squeezed out and not used for bonding since its adhesive properties are considerably impaired.

Shaft-box double-skin facade

This facade is based on the design principle of the box window double-skin facade. However, there is an important difference: here, box-type elements alternate with so-called exhaust shafts which are installed next to them.

Shelf life / Use-by date

The shelf life of a sealant or adhesive indicates how long the product can be used without changing its warranted properties if it is stored tightly closed in the original container. End of shelf life should be printed on all packagings in an uncoded way.

Shore A hardness

Shore A hardness is the relative surface hardness of elastic materials such as rubber or soft plastics. It indicates the resistance to indentation of a fully cured sealant. The measured value (e.g. Shore A hardness 25) is dimensionless and typically within a range of 0-100.
The Shore A hardness of soft sealants cannot be measured with sufficient precision. In general, low values stand for soft-elastic, high values for hard-elastic sealants.

Shrinkage

Shrinkage is the volume loss of a sealant during and after the hardening/curing process. The highest shrinkage is caused by the evaporation of water or solvent. A shrink-free sealant is required for stress-free sealing.

Skin formation time

This is the time between squeezing the sealant out and start of skin formation on the sealant surface. It applies only to one-component sealants and depends on factors such as ambient temperature and relative humidity, but also on the crosslinking system and the sealant formulation. In practical work, the skin formation time is determined by carefully touching the sealant surface with a finger. Short times make the application and smoothing of the sealant more difficult, while long times hold the risk that difficult to remove dirt may accumulate on the surface during skin formation.

Smoothing agent

Smoothing agents are liquid agents to facilitate smoothing of the sealant surface. The use of a smoothing agent should always be agreed upon with the sealant manufacturer. Use of an unsuitable smoothing agent may cause washout, staining or crosslinking problems of the sealant.

Solvent

A solvent is a substance which can dissolve gases, other liquids or solids without a chemical reaction taking place between the solute and the solvent. The result will be a homogeneous mixture (solution). As a rule, liquids like water or liquid organic substances are used. Solvents differ with respect to their water-polluting effect, flammability and health hazard. Due to these hazards, solvents are subject to mandatory labelling.

Sound insulation

The sound (or acoustic) insulation of building components such as windows and doors has become increasingly important over the last few years, especially for buildings in the vicinity of major sources of noise pollution like airports, motorways or railway stations. The requirements to airborne sound and impact sound insulation have been laid down in **DIN 4109**.

Sound pressure level

The sound pressure level is a logarithmic measure for describing the intensity of a sound event. Often, the sound pressure level, although then physically ambiguous, is simply called sound level.

Specific weight (density)

The specific weight or density is the ratio between the mass of a substance and its volume, e.g. 1.25 g/ml.

Standard climate

DIN 50014

In compliance with DIN 50014, the following climatic conditions are normally referred to as standard climate:

- +23 °C, 50 % relative humidity
- +20 °C, 65 % relative humidity

This is important to know for product users, because some technical data in the Technical Data Sheet (e.g. skin formation time, curing time) refer to these standard test conditions.

Storage temperature

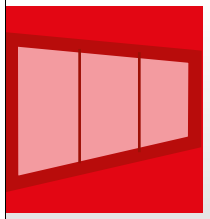
This is the optimum temperature range for storing the product. If stored within this range, the product (sealant, adhesive etc.) will keep its warranted properties.

Striation or streaking (abrasion)

ift Guideline

Striation or streaking is the visible and photometrically evaluable contamination of a glass surface by sealant ingredients that can be caused by mechanical stresses acting on the window in the process of window cleaning. This contamination can be measured according to the requirements of ift Guideline “Testing and evaluation of streaking and abrasion caused by glazing sealants” (publisher: Institut für Fenstertechnik e.V., Rosenheim/Germany).

Strip window facade



Strip window or ribbon facades consist of long rows of windows made of plastic, wood, aluminum or steel. Vertically, the windows are connected with each other by specially designed coupling profiles equipped with EPDM seals based on the tongue-and-groove principle. The strip-window design is used when solid parapets are either optically desired or structurally required while at the same time a flexible room layout needs to be achieved.

Structural glazing (SG) facade

This type of glass facade combines the load-bearing structure of a mullion-transom construction with the profile framing technique used for windows. It can be designed as a curtain wall (cold facade) or, when using thermally insulated building elements, as space enclosure with window elements that can be opened. The insulating glass panes are bonded inside prefabricated frames and must be made of single-pane safety glass. Up to a facade height of 8 m, there is no need for additional mechanical fastening.

The effect of ”frameless“ glazing can be optically achieved by the interplay of the dark joints (approx. 2 cm width) between the inserted elements and the reflection behavior of the outer panes. For every SG facade, a ”National Technical Approval” must be obtained from the responsible building supervisory authority.

Structural joints

Structural joints are connection joints between a building component (e.g. window or exterior door) and the building shell. During the installation of building components, these joints must be properly sealed according to the currently applicable standards and regulations.

Structure-borne sound

Structure-borne sound propagates in a solid body and covers different noise sources. It is caused, for instance, by impacts, earthquakes, the transmission of vibrations in buildings (impact sound, ventilation) as well as by vehicles, machines, etc.

Subject to labelling

Products are subject to labelling if their handling or use requires special precautions with respect to fire, health and environmental protection. This information can be found on the label under hazard warnings.

Substrates

Substrates are the workpieces that are to be bonded. Substrate also means the surface to which the adhesive is applied.

Surface tack

After skin formation, the surface of the sealant should no longer be tacky. The longer the surface tackiness, the higher the risk of dirt accumulating on the sealant surface. Sealants which, due to their formulation, are permanently tacky should be covered with paint over their entire surface.

Sustainability

Due to an amendment to the "Bauproduktenverordnung" (Construction Products Regulation) of 01.07.2013, the requirements to federal buildings have changed in one essential point. In the list of basic requirements for construction works, requirement no. 7 stipulates that the "sustainable use of natural resource" must be taken into account both during the construction and the utilization phase of the building. For this reason, TEROSON's portfolio comprises special products that fulfill the criteria of the Federal Ministry of Construction. An important issue is the replacement of solvent-based products by solvent-free alternatives. Many TEROSON products have already been awarded the GEV-EMICODE® quality seal for their emission behavior.

T

Thermal bridge

Thermal bridges are not carefully planned or executed building connection joints where thermal energy is transferred at an increased rate from the warm to the cold side of the building.

Thermal insulation

The requirements to be met by the thermal insulation of buildings have been laid down in **DIN 4108** and the German Energy Saving Ordinance **EnEV**.

Thermoplastics

Thermoplastics are plastic materials that can be deformed by heat, e.g. polyethylene.

Thermosetting plastics

These are plastic materials that can no longer be deformed after hardening.

Thixotropy

Thixotropy is a technical term for the change in viscosity of a substance when a mechanical force is applied to it. The viscosity tends to increase, and therefore the spreadability decreases, when the applied force declines. A paste, for instance, can be easily spread although it does not readily flow from the can.

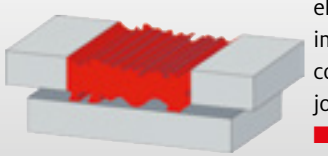
The advantages of thixotropic adhesives:

- No absorption by porous substrates
- No running down vertical surfaces
- Application in thick adhesive layers possible

Three-level sealing strips

These are precompressed sealing strips that are used for sealing the connection joints between windows/doors and the building shell. Their depth has been adapted to the profile depth of the window frame and they are available for different joint dimensions. It is important to observe the joint dimensions indicated on the packaging in order to ensure the product's resistance to driving rain.

Three-sided adhesion



Adhesion of the joint sealant to three contact areas. As a result, the elongation or elasticity of the sealant will be strongly reduced. It is important to avoid three-sided adhesion with joints that are subject to considerable movement. If the sealant adheres to the bottom of the joint, it may be destroyed.

- Also see "Two-sided adhesion".

Two-sided adhesion

In order to ensure optimum accommodation of movement in the joint, the sealant must only adhere to the two sides of the joint. For this reason, a backer rod (round cord used as backfill material) is placed at the bottom of the joint. This reduces the joint depth while at the same time preventing three-sided adhesion. If the joint is not deep enough to insert a backer rod, the bottom of the joint must be covered e.g. with a PE film.

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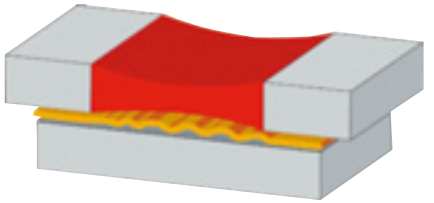


Two-sided adhesion

U Unitized element facade

This type of facade consists of prefabricated, factory-mounted elements of at least storey height. The elements can be designed for single- or double-skin facades. With respect to profile technology and joining technique, this type belongs in the category of window construction and not mullion-transom construction. Through coupling profiles, the elements can be connected with each other – both vertically and horizontally. As a rule, the profiles are designed to match the special requirements of the building (field size, fire and noise protection) and those of element manufacture (design of the coupling profiles). Most often used are thermally separated profiles made of extruded aluminum. They are usually installed in front of the building shell, floor by floor, moving from the bottom to the top (without scaffold). Especially with large facade areas of uniform design (e.g. high rises), they provide a visibly enclosed space. The glazing is mostly installed from the room-facing side to facilitate e.g. repair work.

V Vapor-permeable (diffusion-permeable)

Materials are permeable to water vapor diffusion if they have a very low s_d value. Moisture entrapped during construction or condensate forming on building components can easily evaporate through these products. From a structural-physical point of view, these materials should be installed on the cold side of the building.

Vapor-retarding products

These are products with a defined water vapor diffusion resistance. They delay or prevent the penetration of moisture from indoor air into the thermal insulation layer of the building, thus preventing the formation of harmful condensation inside the insulation.

Vapor-tight (vapor-impermeable)

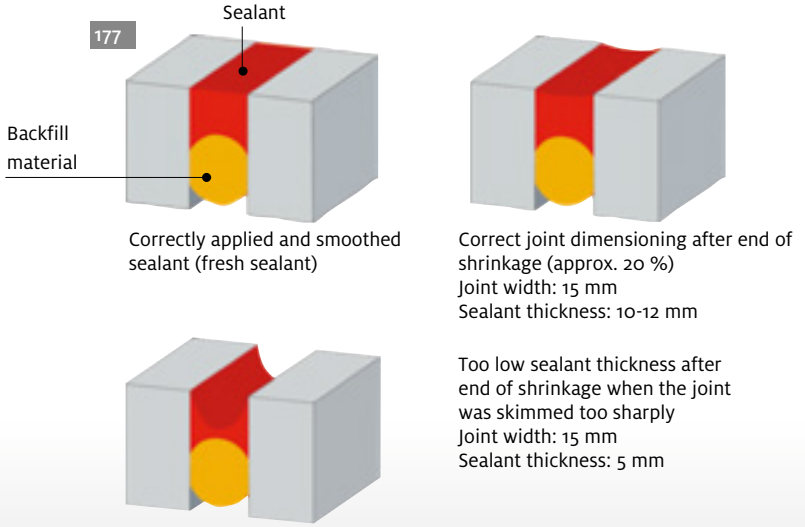
The impermeability to vapor diffusion, also known as water vapor diffusion resistance, indicates to which extent a building material is able to prevent the diffusion, i.e. the spreading, of water vapor. This resistance is determined as the water vapor diffusion resistance factor. Strictly speaking, products with an s_d value of $\geq$ 50 must be described as vapor-retarding. Nevertheless, these products are normally used without problems on the warm side of the building component. From a structural-physical point of view, an s_d value of > 1500 m would be more favorable (vapor barrier effect). However, this value is not always practical. Important is the correct vapor diffusion gradient (principle: tighter on the inside than on the outside).

Viscosity

Viscosity is a measure of the resistance of a liquid to flow or to deformation by compression or shear stress.

Volume change (volume shrinkage)

Sealants undergo a change in volume between application and hardening/curing. This change is noticeable as shrinkage or concave molding on the surface. Shrinkage is primarily caused by the evaporation of solvents, by cleavage products during the chemical crosslinking process or by the migration of components. Depending on the sealant quality, shrinkage can be in the range of approx. 3 % to 50 %. Normally, volume change does not affect the product quality as long as the predefined joint dimensions are observed in the final state. In the case of floor joints and in sanitary facilities/wet rooms, shrinkage should be as low as possible to avoid the deposition of dirt and/or standing water.



Correctly applied and smoothed sealant (fresh sealant)

Correct joint dimensioning after end of shrinkage (approx. 20 %)
Joint width: 15 mm
Sealant thickness: 10-12 mm

Too low sealant thickness after end of shrinkage when the joint was skimmed too sharply
Joint width: 15 mm
Sealant thickness: 5 mm

W

Warm facade

Warm facades are single-skin facades consisting of one or several materials (e.g. sandwich panels or ETICS) that provide both heat insulation and weather protection.

Warranty

§ 634a (1) no. 2 BGB (German Civil Code)

This law stipulates a limitation period of 5 years for warranty claims arising from works or services performed on a building, beginning with the acceptance of work. However, the parties are also free to conclude contracts based on the VOB/B (General conditions of contract for the execution of building works). In these contracts, the warranty periods can be freely agreed.

Wet bonding

Wet bonding is the direct joining of workpieces with the help of a liquid/thixotropic adhesive.

Window frame

The window frame if firmly attached to the building. It is the enclosure that holds the main parts of a window – called window sashes – in place. Window sashes may be fixed or operable.

Window sash

The window sash or casement is that part of the window that is operable, i.e. can be opened and closed. It consists of glass, fitting and sash frame.

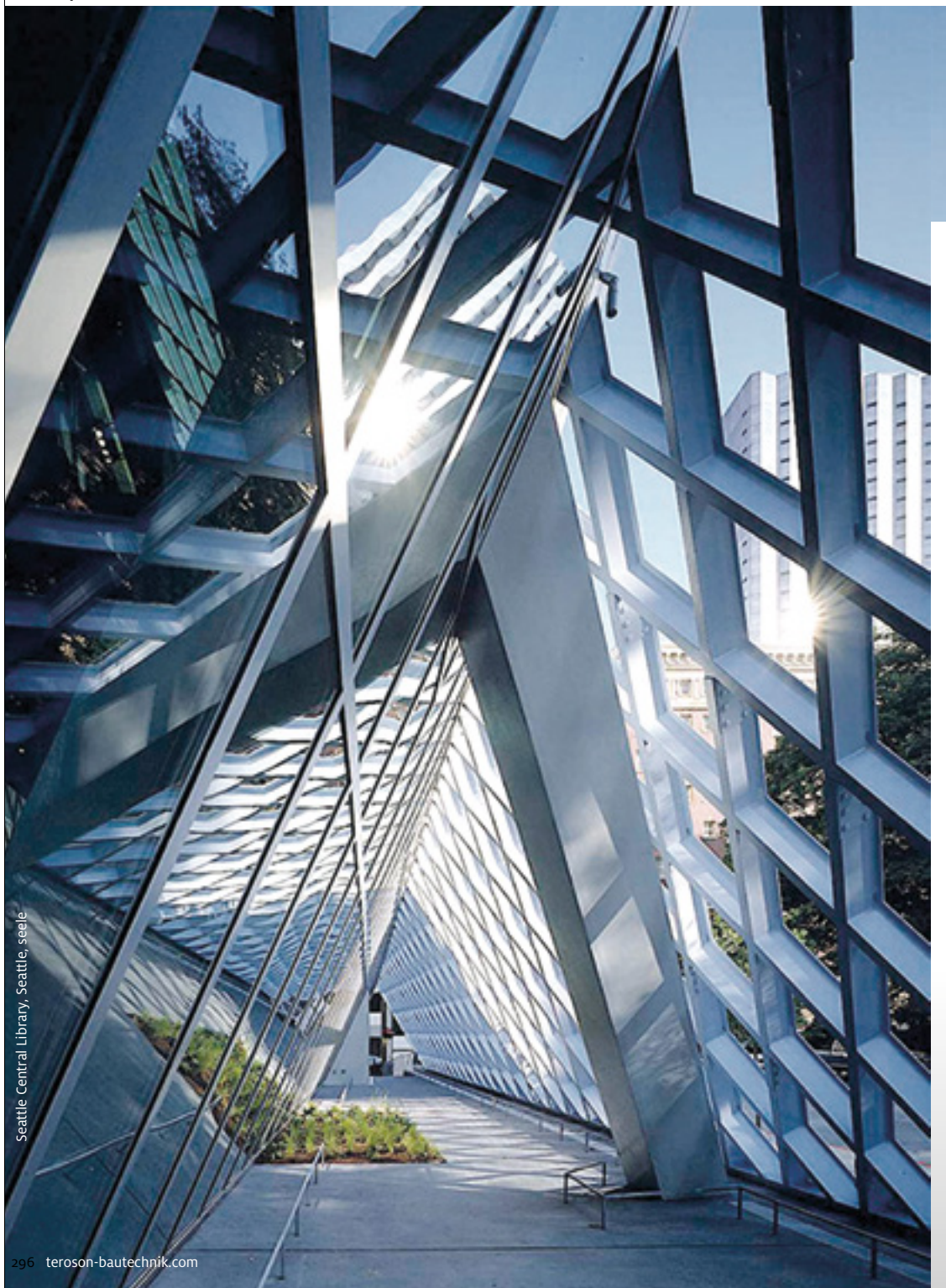
Wind tightness

The requirements to be met by the building envelope with respect to wind and airtightness have been laid down in standard DIN 4108-7.

Y Yield point

The yield point is the resistance to initial flow or the force required to start fluid movement. For a paste-like adhesive, this means the force needed to move the adhesive along the bonded joint, after which it does not return to its original position.

Bugatti Outlet, Herford, Wiko Metalltechnik



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Imprint

TEROSON's "Guide for Professional Users" in its 2022 edition offers facade builders and window installers comprehensive information on sealing and bonding technology in metal and facade construction. It provides useful tips and recommendations from a manufacturer's point of view on a wide range of topics all around the sealing of structural elements. However, this Guide makes no claim to completeness.

The above information, in particular recommendations for the handling and use of our products, is based on our current knowledge, practical experience and application tests. As materials and on-site conditions may vary with each intended application and thus are beyond our control, we recommend that in each case sufficient tests are carried out to ensure the suitability of our products for the intended application method and use.

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Closing words
"Henkel Adhesive Technologies is a leader in today's markets and shaping tomorrow's through its adhesives, sealants and functional coatings.

Being the industry and application experts, we at TEROSON Bautechnik work closely with our customers and partners across Europe to provide everyone with a unique competitive advantage and create sustainable value together. Our "Guide for Professional Users" is the reference handbook for applied sealing and bonding technology in facade and metal construction. The publication is updated, simplified and expanded at regular intervals and has thus become a valued industry standard over the past 20 years."

Vito Henning – Managing Director TEROSON Bautechnik Europe

List of products by category

Alphabetical list of products

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