
Documentation

Special Show



"climate.proof.build"

Climate adaptation + climate protection with climate-resilient,
recyclable and sustainable windows, doors and facades

**FENSTERBAU
FRONTALE**

19 – 22 March 2024, Nuremberg



Special Show

climate.proof.build

Climate adaptation + climate protection with climate-resilient, recyclable and sustainable windows, doors and facades

The special show at Fensterbau Frontale by NürnbergMesse and ift Rosenheim shows how sustainable, climate-resilient and thus future-proof building products look and are labelled. The focus is on reducing CO₂ emissions during production and use, sustainable production, easy reparability and maintenance as well as protection against climate extremes. This applies in particular to protection against flooding and overheating, which is often neglected, even though heat waves cause up to 10,000 heat-related deaths in Germany according to an RKI study from 2022.

For the special show we are looking for innovative companies as co-exhibitors to present their products and services at the booth.

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About ift Rosenheim

You need skills, technology and experience for good structures, and this is especially applicable to windows, facades and doors. Since 1996, ift Rosenheim has been supporting the industry as a neutral scientific institute with technical services and more than 230 employees. These include conducting tests and research, certification and quality management as well as standardisation, advanced education and technical information. In this manner, ift Rosenheim is promoting the development of quality products that are suitable for use, environment-friendly and efficient, and which make life more comfortable, more secure and safer, and healthier.

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Climate-proof building

Climate adaptation + climate protection with climate-resilient, recyclable and sustainable windows, doors and facades

Heatwaves in summer and the risk of localised heavy rain-fall almost all year round - that is the current situation. This is why more and more municipalities are drawing up heat protection plans and "flash flood maps" that show the risk of flooding at a local level for each residential area and each street. Similarly property owners, builders and investors are looking for ways to protect their own four walls from the climate extremes that now occur regularly. With this in mind, the construction industry should not wait and see, but prepare professionally for the sustainable and "climate-proof" remodelling of existing buildings.

Better protection for your own four walls against heat and flooding is a strong motive for investing in high-quality building elements. The purchasing power is widely available and can be utilised. This is an opportunity for competent and sales-orientated specialist companies to become active themselves, win customers and thus defy the construction crisis. More and more people are also attaching great importance to the sustainability of products

when making purchasing decisions, especially the affluent group of "silveragers", who often own a property and now want to make it fit for old age.

There are good opportunities for active and forward-looking manufacturers, installation companies and traders of building elements to convince potential building owners and renovators with climate-resilient building elements. Climate-proofed building products must be efficient, sustainably produced, free from harmful substances, resilient to climate extremes and recyclable. However, transparent assessment systems for these criteria do not yet exist. With the "climate.proof.build" initiative, ift Rosenheim has developed an assessment methodology that provides a transparent statement on the "climate safety" of building components based on recognised rules and standards. The assessment includes criteria of the product and the company (production). Manufacturers with a claim to sustainable business practices can use the "climate.proof.build" label for effective advertising and with legal certainty in accordance with the EU's "Green Claim Directive".

In addition to reducing energy consumption and CO₂ emissions during the use phase, greater attention must also be paid to the consumption of resources during production ("grey energy") and the recyclability of building materials in order to accelerate the transition to a circular economy. The requirements and assessment criteria must be adapted so that planners, manufacturers and building owners can make a reliable decision in favour of suitable building products. This requires simple and reliable classification and labelling at



Fig. 1 Buildings and cities must be energy-optimised and climate-resilient in order to slow down climate change and withstand the consequences of extreme weather conditions.

product level in order to be able to make an informed decision on construction products when planning and tendering.

The Special Show

The special show "climate.proof.build" by NürnbergMesse and ift Rosenheim in Hall 1 (Stand 1-515) from 19 – 22 March 2024, together with competent co-exhibitors, will show how sustainable, climate-adapted and thus future-proof building products can look and be labelled. The focus will be on sustainable production with a reduction in CO₂ emissions during manufacture and use, easy reparability and maintenance as well as protection against climate extremes. Sustainable and climate-resilient exhibits will be presented:

- Facade system with integrated shading systems, ventilation flap and intelligent control (Heral)l)
- Watertight PVC tilt and turn window for installation in shell opening (MEA)
- Energy-efficient and sustainably produced wood-aluminium window with flush-mounted sash 50 mm wide (Lokve)
- Climate-resistant PVC window with vacuum glass, heat-reflecting film, Smart Control solar shading and ventilation including heat recovery (Oknoplast)
- Innovative pre-wall installation with safe load-bearing and sealing of building elements (Meesenburg)
- 100 % recycled material for sealing systems (Semperit) and aluminium profile systems (Wicona)
- Aluminium window that meets the increased requirements for extreme weather conditions, including innovative sun protection as a combination of external roller

shutters and vertical awning with high savings potential for heating and cooling (Aluprof).

In addition, ift Rosenheim and its partners offer information on recycling (Rewindo), quality (BF, ift ConTec), international markets (UL, BSI, NFRC) and hurricane testing (ift MessTec).

The following aspects and technologies are advantageous in the construction and energy modernisation of buildings:

1. Energy-efficient building envelope with high thermal insulation so that energy-efficient heating technology based on renewable energies can be optimally utilised.
2. Building products must be easily replaceable and the materials used (frames, glazing, seals, fittings, etc.) must be fully recyclable and easy to separate (circular economy).
3. Lowest CO₂ emissions during the production, utilisation and dismantling of building materials.
4. The composition and properties of the materials should be easily available for the entire period of use (databases, QR code, transponder, etc.).
5. Large proportion of transparent surfaces in northern and central Europe for good daylight quality and optimum utilisation of free solar energy.
6. Effective and adaptive solar shading (roller shutters, external venetian blinds, switchable glazing, etc.) to optimise the use of solar gains during the heating period and protect against overheating.
7. Easy-to-use ventilation systems (openable windows) to provide occupants with fresh air and prevent rooms from overheating by cooling them down at night. In addition, sensors and actuators are useful for windows to protect/warn against rain and wind.

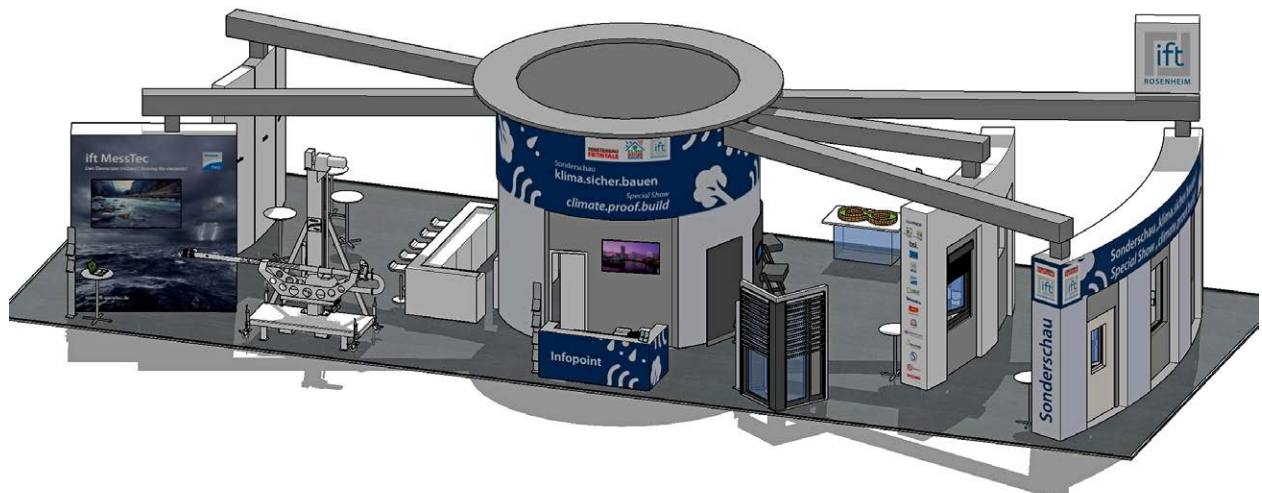


Fig. 2 The special show "climate.proof.build" shows what sustainable, climate-adapted and therefore future-proof building products can look like and how they can be labelled. (Source: ift Rosenheim)

8. Intelligent (smart) connection to the heating and building technology (i.e. windows open – heating off)
9. Windows and doors in the basement and ground floor must provide adequate protection against flooding caused by localised heavy rainfall and pressing water in critical installation positions (flood resistance).
10. The structures and materials must become more resistant to higher wind loads (storms) and surface temperatures (up to 70 °C in intense sunlight and heat periods especially with dark surfaces).

1 Market trends in sustainability and CO₂ efficiency

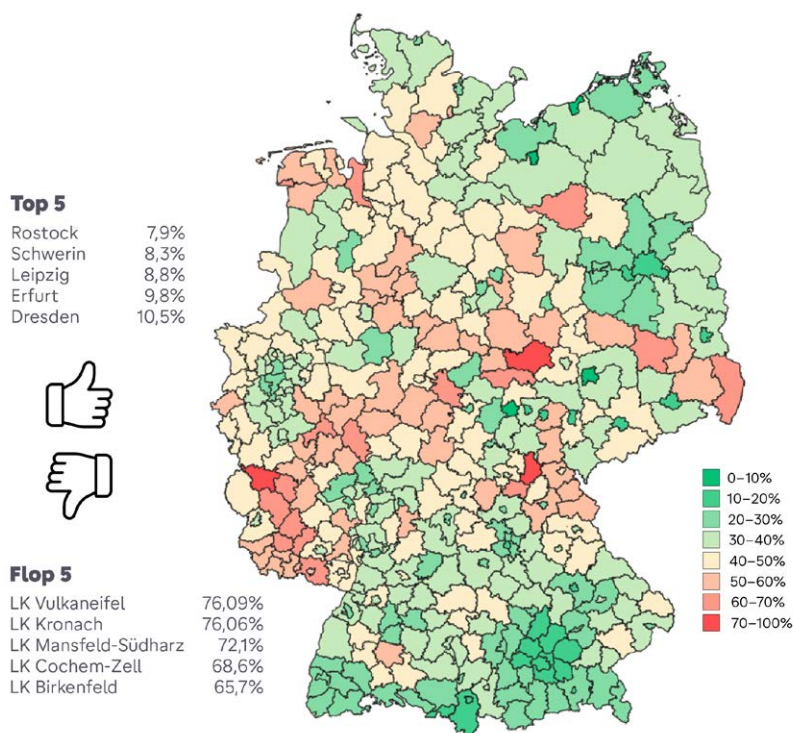
The necessary reduction in CO₂ emissions in the building sector can only be achieved through radical savings in energy consumption and the increased use of renewable energies for heating (and in some cases for cooling). The necessary measures must focus much more on existing buildings than has been the case to date. This is because

the majority of CO₂ emissions are caused by a large stock of older buildings in energy efficiency classes E to H, which at 250 kWh/m² consume 800 % more energy than a modern class A building with 30 to 50 kWh/m² (equivalent to German level "KfW Efficiency House 55"). The big lever is therefore to increase the energy modernisation rate with energy-efficient building elements that make the use of regenerative heat sources such as heat pumps suitable in the first place. Modern windows, facades and glazing have already reached a level where the solar gains on the east, west and south sides during the heating period exceed the energy losses via these surfaces to allow to heat the building. This means that modern thermal insulation windows are a regenerative heat source without any system technical supplying technical devices.

Installation has a major influence on the thermal insulation, function and usability of building elements, particularly in the case of building renovation, and must therefore be planned professionally. A lot of detailed information can be found in the installation guide [21]. The following aspects must be taken into account for the refurbishment market:

immowelt

All residential buildings for sale with energy efficiency classes F, G & H



- Reassessment of the building physics equilibrium, as new windows change the airtightness and surface temperatures on the building component and the reveal.
- Identify and optimise critical thermal bridges by insulating the reveals if the U-value of the external wall is $U_{AW} > 1.0 \text{ W}/(\text{m}^2\text{K})$.
- Consideration of possible changes to the structural conditions (window sills, reveals, shutters etc.), taking into account monument protection, effort/costs, avoidance of dirt, etc.
- If more than 1/3 of the windows in a building or residential unit are replaced, a ventilation concept must be drawn up in Germany in accordance with DIN 1946-6.

Fig. 3 Distribution of residential properties in Germany offered for sale in 2023 (Source: Immowelt, https://content.cdn.immowelt.com/iw_group2/import/Redaktion/Pressemitteilungen/2024/2024_01_25_PM_Energieeffizienz_Angebot.pdf)

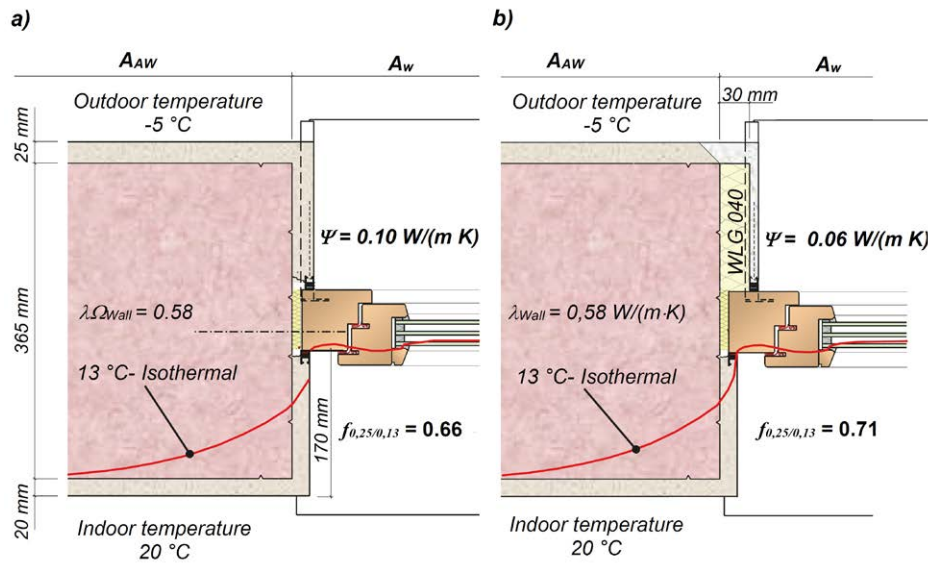


Figure 4.16 Window connection to monolithic masonry (old building: $U_{AW} = 1.14 \text{ W/(m}^2\text{K)}$)

- a) Unchanged reveal design,
b) thermally improved design (external soffit insulation)

Fig. 4
Optimisation options for window refurbishment (Source: [21])

1.1 National and European requirements

In order to achieve the national and European climate targets, the requirements for the building sector would actually have to be adapted. The minimum energy requirements should be based on the EPBD (European Performance of Buildings Directive), which defines stricter energy requirements for buildings.

Due to increased construction costs, reduced state funding and other political reasons, the originally planned intensify of the thermal insulation standard in the updated German Building Energy Act was completely dropped. All that remained were the stricter requirements for heating systems. Changes are no longer expected in the current legislative period. The technically sensible proposals of a brief report [1] by the Federal Ministry of Economics and Climate Protection (BMWK) will probably have to wait. A new requirement parameter for reducing GHG emissions was proposed, in which the final energy demand and heating demand $q_{h,b,0}$ (useful energy demand for heating before iteration, $Q_{h,b,0}$) was proposed as an efficiency requirement, which would also take into account the use of solar heat input in order to adequately assess the energy performance of transparent building components. In addition, there is the recording of ventilation efficiency, which allows flexibility in the design of the building envelope. For example, the U-values of the building components could be moderately increased by installing a ventilation system with heat recovery. The report also developed proposals for sensible characteristic values for the reference building.

1.2 Effects of the EU taxonomy

A silent but much stronger and lasting change in the property and construction sector results from the consequences of EU Regulation 2020/852 "Establishing a framework to facilitate sustainable investment" [24] (EU Taxonomy Regulation, EU Tax-VO), which is also an essential part of the EU's Sustainable Finance Strategy (Green Deals). The taxonomy rules are intended to channel financial flows on the European capital markets into ecological and sustainable investments. The EU taxonomy is a classification system and requires transparent information in the sustainability report to extent how sales, investments and operating expenses support environmental and sustainable goals. According to the EU Tax Regulation and the Corporate Sustainability Reporting Directive (CSRD), providers of financial products and services, capital market-oriented companies (stock exchange) and large, non-capital market-oriented companies that fulfil two of the following three criteria (balance sheet total of at least 20 million euros, net sales of at least 40 million euros, at least 250 employees) are required to report.

According to Article 3 of the EU Tax Regulation, an investment or economic activity is considered environmentally sustainable if it makes a significant contribution to one or more environmental objectives, does not harm these environmental objectives and fulfils minimum standards. The six environmental objectives are defined in Article 9 as follows:

1. Climate protection (reduction of greenhouse gas emissions)
2. Adaptation to climate change
3. the sustainable use and protection of water and marine resources
4. Transition to a circular economy
5. Prevention and reduction of environmental pollution
6. Protection and restoration of biodiversity and ecosystems

The technical assessment criteria are defined in detail in the Delegated Regulation EU-2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 [25]. This defines specific information in the construction sector on what is considered a "significant contribution to climate protection", for example:

- The primary energy requirement (PER) of new buildings must be at least 10 % below the standard for nearly zero-energy buildings (passive house / KfW 40).
- **Building renovations** must lead to a reduction in primary energy demand of at least 30 % and be confirmed by a detailed building survey or an energy audit. The refurbishment should increase resource efficiency, adaptability, flexibility and dismantling capability and thus improve reuse and recycling. Otherwise, the same requirements apply as for new buildings.
- When **purchasing and owning buildings**, buildings constructed before 31 December 2020 must comply with energy efficiency class A or be among the top 15 % of the national or regional building stock (proof required). For buildings from 1 January 2021, the requirements for new buildings apply.
- Improve **climate resilience**, i.e. better protection against heat stress/heat waves, cyclone/hurricane/typhoon/tornado, storms (including snow, dust and sand storms), changes in precipitation patterns and types (rain, hail, snow/ice) and floods with inundation as specified in Annex A.
- **Replacement of existing windows** and doors with new energy-efficient windows and external doors, but without detailed quantitative requirements.
- Building materials with which residents may come into contact may emit a maximum of 0.06 mg **formaldehyde** per m³ and a maximum of 0.001 mg other carcinogenic volatile organic compounds.
- Buildings must be tested for airtightness and thermal integrity after completion and the **life cycle greenhouse potential** must be calculated
- **New buildings** may no longer be built on arable and cultivated land with medium to high soil fertility, uncultivated land with high biodiversity and habitat for endangered species or "forest areas" listed in the national greenhouse gas inventory.
- **The water** flow must be limited in the **water installation** (taps max. 6 litres/min, showers max. 8 litres/min, etc.).
- 70 % of the non-hazardous construction and **demolition waste** generated on the construction site must be recycled or sent for material recovery (incl. backfilling work)
- During construction or maintenance work, measures must be taken to reduce **noise, dust and pollutant emissions**.
- If an existing building envelope is fitted with thermal insulation, a building survey must be carried out by a specialist trained in **asbestos detection**.
- Installation, maintenance and repair of **building automation** and control systems, building energy management systems, lighting control and energy management systems

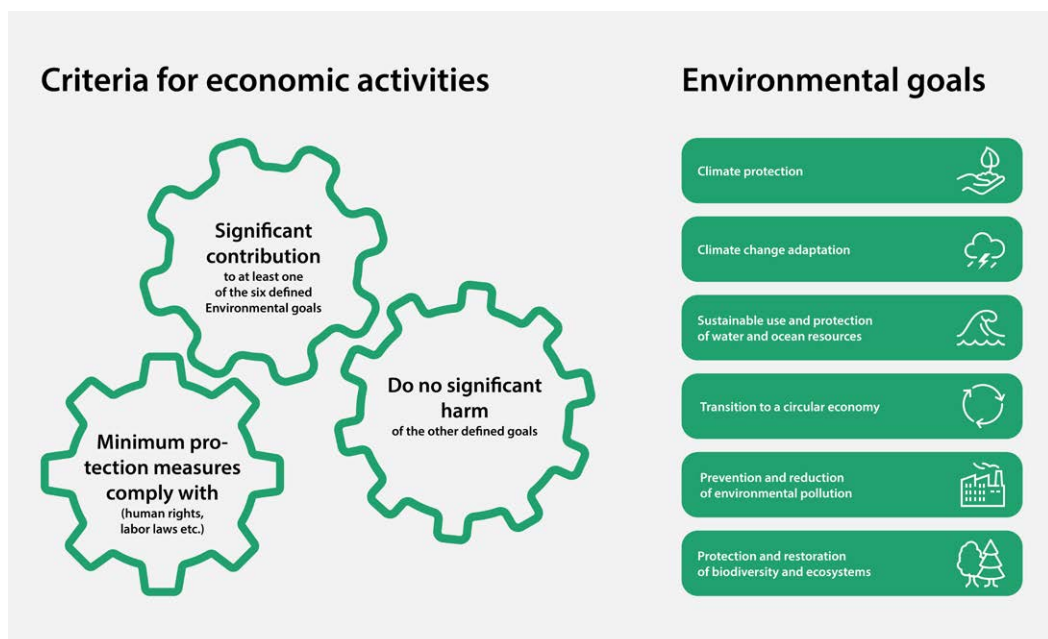
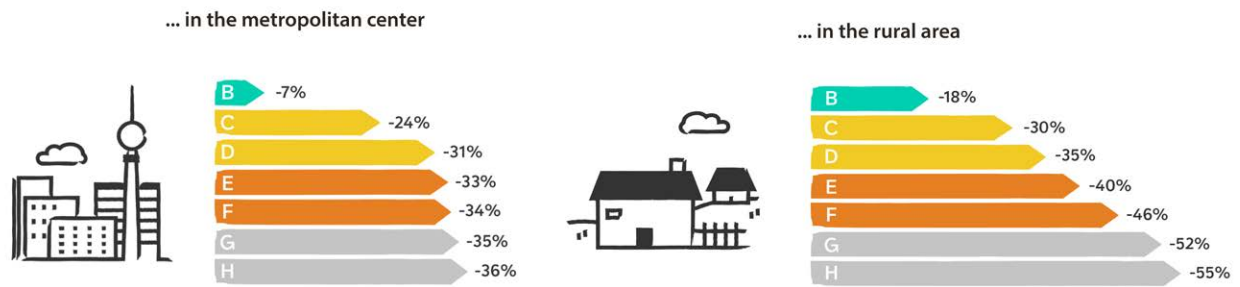


Fig. 5
Overview of EU objectives and criteria
(Source: ift Rosenheim)

- Installation, maintenance and repair of photovoltaic systems, solar-powered hot water panels, heat pumps, solar collectors, heat or electrical energy storage systems, heat exchanger/recovery systems (ventilation) including the associated technical equipment
- Prevention of the manufacture, placing on the market or use of designated hazardous substances, chemicals and environmental pollution
- Installation, maintenance and repair of photovoltaic systems, solar-powered hot water panels, heat pumps, solar collectors, heat or electrical energy storage systems, heat exchanger/recovery systems (ventilation) including the associated technical equipment
- Prevention of the manufacture, placing on the market or use of designated hazardous substances, chemicals and environmental pollution
- Installation, maintenance and repair of **photovoltaic systems**, solar-powered hot water panels, heat pumps, solar collectors, heat or electrical energy storage systems, **heat exchanger/recovery systems** (ventilation) including the associated technical equipment
- Prevention of the manufacture, placing on the market or use of designated **hazardous substances**, chemicals and **environmental pollution**

The lower the energy efficiency class of a building, the greater the price reductions (compared to A).

Price reductions by energy efficiency class for real estate ...



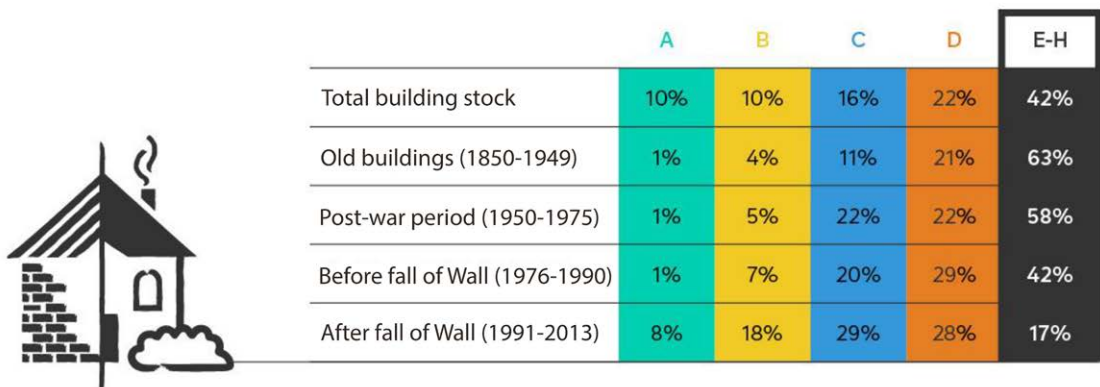
Source: Evaluation of apartments and one-family homes for sale advertised on ImmoScout24 (stock, older than two years) in Q4 2023

Immo Scout24

Fig. 6 Average loss in value by energy efficiency class in urban and rural areas (Image: ImmoScout24)

This is how much refurbishment is needed in Germany

Energy efficiency classes of residential buildings in Germany by age of construction



Source: Evaluation ImmoScout24, Q2 2023

Immo Scout24

Fig. 7 Energy efficiency classes of residential property in Germany by age of construction (Image: ImmoScout24)



Even if most manufacturers of construction elements are not directly affected by this, the group of companies has been significantly expanded since 2017 and therefore includes the majority of investments in the property and construction sector. The consequence for companies is a better ranking and therefore indirectly better financing conditions. In concrete terms, this means that companies must now adapt their investments in and for property to the criteria of the Taxonomy Regulation and sell buildings with poor energy efficiency in good time and prefer to buy or rent buildings in energy efficiency class "A". When financing refurbishment measures, banks must also ensure that the buildings fulfil the taxonomy requirements after refurbishment.

This means that buildings with a poor energy standard are under enormous pressure to be renovated, as very few existing buildings will fulfil the criteria and demolishing everything is not a desirable solution either. An important criterion in the building assessment is the year of construction, as buildings constructed before 31 December 2020 must at least meet the energy efficiency class A or be among the 15 percent most energy-efficient buildings in a national or regional comparison in order to meet the requirements of the EU Tax Regulation. If the building was constructed after 1 January 2021, it must meet the criteria for new buildings. In addition, it must be checked whether the other five environmental objectives are affected and the minimum standards are met.

Even if a company is not directly subject to reporting obligations, it is advisable to be familiar with the structure and criteria of the taxonomy and to identify and continuously improve potential economic activities within the company. Indirect reporting obligations may also arise because banks, clients and business partners must fulfil their statutory reporting obligations as reporting companies and must record information along their supply chain.

1.3 Reasons for renovating older buildings

The situation becomes quite dramatic for property owners or heirs if they want to sell a property with a poor energy efficiency rating (E – H). According to the latest refurbishment barometer from the sales portal ImmoScout24, houses with an energy efficiency rating of "E" can be expected to attract discounts of 33 % – 40 %. A simple example calculation shows that six-figure sums are quickly incurred:

Former market value for EFH energy class "E" = 400.000 EUR
 Loss of value due to poor energy efficiency class = 0.33 x 400 = 132,000 EUR

This loss in value is virtually the potential renovation budget and a very strong motivation to invest in the existing or inherited property. Replacing windows and insulating an attic are often the easiest and quickest way to improve the energy standard and thus the property value.

2 Protection against climate extremes (resilience)

Even the realisation of ambitious CO₂ avoidance targets can no longer prevent the massive impact of climate change on the weather. The increase in climate extremes is already in full swing. A tornado in Kiel, the flood in the Ahr valley, heatwaves in the south-west of Germany, drought and forest fires in the east, hailstorms and snow chaos in Upper Bavaria - it is frightening how frequently we are now being hit by such events. Floods and heatwaves are the biggest threats to life, limb and buildings. The requirements for windows, doors and facades are therefore becoming more "extreme" and constructions must become more "robust" in order to remain fit for purpose in the future. This requires materials with sufficient temperature resistance as well as suitable constructions with greater resistance to heavy rainfall events with flooding, hail and storms. There are many ways to make the components and the building fit for climate change. However, architects also need to rethink when it comes to sizes, window divisions, opening types, window arrangements and sun protection.

2.1 Flood protection

For years now, flooding has not only occurred in the immediate vicinity of rivers and streams. This is because surface water during localised heavy rainfall events (flash floods) is also increasingly leading to flooding – this can affect almost any building in Germany; all it takes is an unfavourable gradient to the house. This is why local authorities in Germany are now being asked to identify and mark existing risk areas and draw up suitable measures and emergency plans. In Bavaria, for example, the digital information map "Surface runoff and flash flooding" has been developed, which shows the risk areas for possible flooding due to heavy rainfall in great detail (down to the level of parcel maps). Terrain depressions and accumulation areas are particularly at risk. The map was created on the basis of a digital terrain model and validated in collaboration with the municipalities.

The stresses during a flood are manifold. Moderate mechanical loads occur due to the water pressure when the water rises slowly (cellar shaft). In the case of flowing water or floating debris (building materials, vehicles, floating debris, etc.), the loads are significantly higher and require the use of massive protective devices.

"Normal" windows in the house can prevent or limit the ingress of water into the house in the event of driving rain. However, flood-resistant windows are necessary in the

event of backwater [1]. Flood events not only lead to water ingress, but also cause a wide range of damage. Even moisture-resistant building materials show signs of damage. In particular, moisture penetrating into the cavities of the window constructions and contamination of the water by faeces or heating oil lead to impairments caused by odours, mould and other emissions into the room air. Windows can quickly become unusable as a result. Despite drying, cleaning and repairing building elements, renovation is often no longer possible. This applies equally to the building structure connection. Expert planning is required for building renovation and retrofitting with flood-resistant constructions, which often also necessitates adjustments to the building.

In addition to special glazing for aquariums and ship glazing, there are also highly water-resistant windows. These are special constructions that take on extended protective functions in addition to the usual functional or thermal/sound insulation requirements and are primarily available as small-format basement windows. The development of large-format constructions for flood-resistant windows or French windows that can be used like "normal" windows on the ground floor is only just beginning. Effective combination systems consisting of windows and temporary pro-

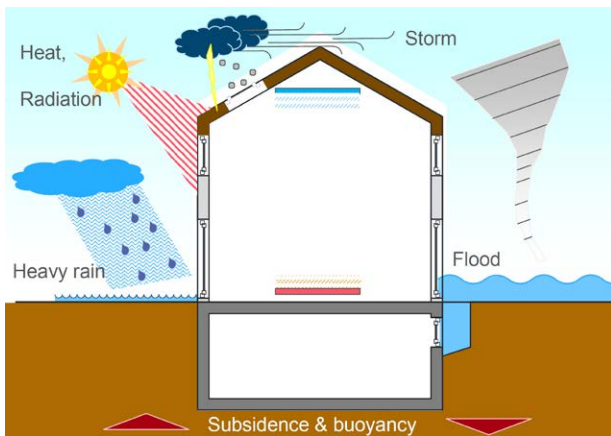


Fig. 8 Times are getting "rougher" for buildings and residents (Source: ift Rosenheim)

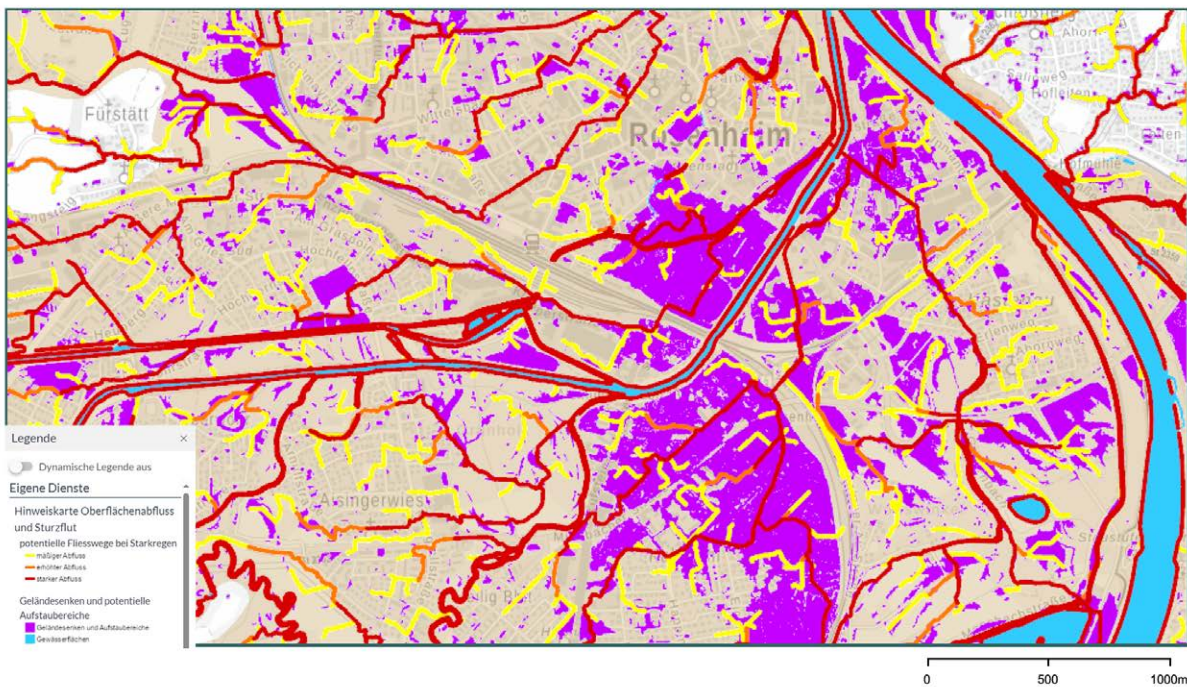


Fig. 9 Flash flood maps show the risk of flooding during heavy rainfall at the level of parcel maps. This applies in particular to terrain depressions and accumulation areas, here the purple/cyan areas in the urban area of Rosenheim (Image: Digitaler Umwelt-Atlas Bayern, <https://s.bayern.de/hios>)

protective elements that are activated in the event of danger are also conceivable. Due to the increasing demand from people who want to protect their buildings against a flood disaster, a dynamic development can be expected. Insurers and their non-willingness to insure buildings without protective elements against natural hazards will have a major influence on market developments.

2.2 Heat protection

Current forecasts show a significant increase in heatwaves with temperatures of 30 °C and above. The situation becomes critical when buildings heat up quickly due to inadequate sun protection and a lack of night-time ventilation

and people can no longer recover sufficiently (especially at night) [8]. This applies in particular to groups that are vulnerable to heat (small children, infants, elderly/sick people, people with disabilities and homeless people). Although no official statistics are collected in Germany, the excess mortality rate on the very hot days between 23 July and 9 August 2018 was 8,000 people, according analysis of the German institute RKI. The German Weather Service (DWD) has therefore developed a two-stage warning system (severe heat stress with a perceived temperature above 32 °C for two days in a row and extreme heat stress above 38 °C). Not only the measured air temperature is relevant for the health risk, but also the "perceived temperature" ("Klima-Michel model"), which also takes into account the level of exercise, clothing and humidity (mugginess).

No.	Figure (schematic)	Description of the load	Normal constructed element	Flood-resistant element*)	Protective wall
1		Driving rain	Suitable	(Suitable)	Not required
		Overlay of normal to heavy rain and wind	Driving rain impermeability of element and connections. Regulated classes according to DIN EN 12208	Driving rain tightness of element and connections is given accordingly	The use of a protective wall is not necessary.
2		Heavy rain	(Suitable)	Suitable	Possible
		Storm-like rain, possibly with high wind loads with accumulating surface water.	Depending on the height of the surface water, the tightness may be limited, water penetrating into the structure connection is possible.	Tightness of element and connections is given	Short-term use of protective walls is conceivable.
3		Accumulated water	Unsuitable	Suitable	Suitable
		Slowly rising water level without direct inflow (e.g. full-flowing cellar shaft).	Tightness and damage-free element and connections no longer given.	Low leakage permissible (flood resistant) or watertight.	Watertight shielding possible.
4.1		Inflowing water	Unsuitable	Unsuitable	See 4.2
		Flood flows against the elements.	Tightness and freedom from damage of element and connections no longer given.	Tightness and freedom from damage of element and connections no longer given.	Watertight shielding possible.
4.2		Inflowing water	Suitable	Suitable	Suitable
		Flood flows against the shielding by protective wall.	Flood protection through watertight shielding.	Watertight shielding and/or shielding from flow and flotsam possible.	Watertight shielding possible.

*) Flood resistance is tested and classified according to ift guideline FE-07/1. Such windows are special constructions whose characteristics usually prevent a wide use in architecture.

Fig. 10
Exposure to water and possible protective measures (Source: ift Rosenheim)

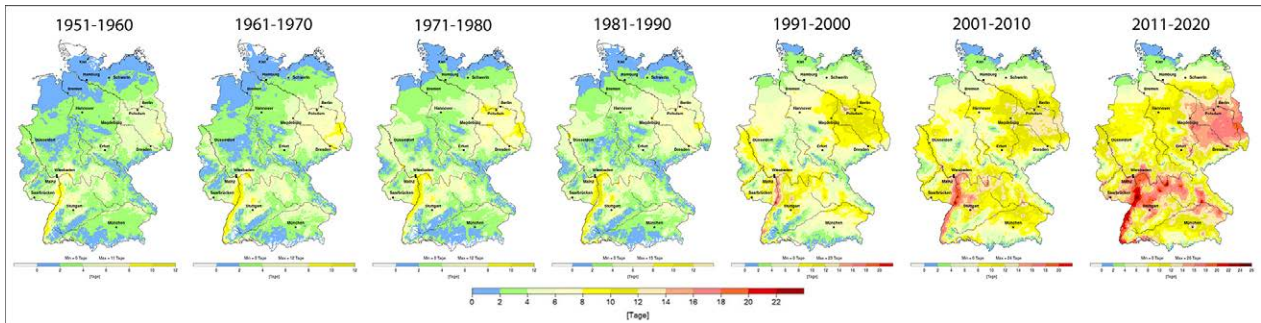


Fig. 11 Increasing average annual number of hot days in Germany (days with a maximum temperature of at least 30 °C). (Source: DWD & EWK 2020)

A suitable combination of good insulation standards, shading and ventilation (night ventilation) can significantly reduce the heat risk. In conjunction with passive cooling (cooling ceiling/floor), it is therefore possible in most cases to dispense with active cooling systems (air conditioning) in temperate climates (Germany) [16].

2.2.1 Sun protection

The relevant parameter for solar shading is the g_{total} value, which reflects the insulating properties of the glazing in combination with the shading and thus realistically describes the physical building relationships. The F_c value often used in practice for solar shading only describes the technical quality to a limited extent. In order to meet the higher future loads, g_{total} should be very low in the summer months. In winter, however, a high g_{total} value is desirable in order to achieve solar gains.

Rigid solar shading is no longer sufficient for the current challenges. Adaptive systems are needed that adjust flexibly to the position of the sun and the solar radiation, such as switchable glazing with a variable g -value or angle-selective shading. However, "classic" shading systems such as exter-

nal venetian blinds or roller shutters can also be optimally adapted to the situation in the building with automation. Sun shading devices must fulfil the following requirements:

- Control of solar radiation to ensure cosy indoor temperatures,
- Good utilisation of daylight to reduce artificial lighting and for health reasons,
- Glare protection and avoidance of direct sunlight, especially at VDU workstations,
- Privacy screen at night,
- Reduction of light pollution,
- Avoidance of high room-side surface temperatures,
- sufficient stability in wind, snow and ice formation.

The selection of sun shading must therefore not be based solely on design aspects, but must also focus on the energy, lighting and mechanical properties, including suitability for use.

Dark shading should be avoided, as this can heat up to over 80 °C. In strong sunlight, complete shading should be possible in order to minimise the energy input through the transparent surfaces.

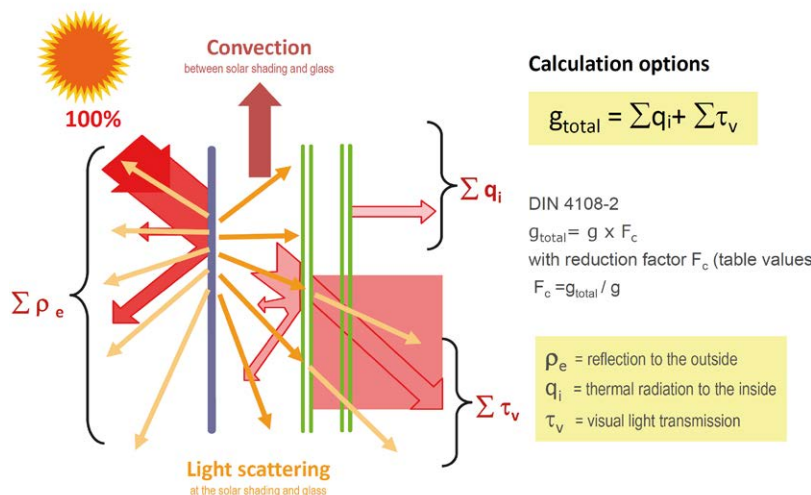


Fig. 12 Total energy transmittance g_{total} as a relevant parameter for calculating solar shading (Source: ift Rosenheim)

For summer heat insulation, a mathematical verification is required by building regulations for new buildings. For residential buildings with a small proportion of windows, the simplified verification of the solar gain value in accordance with DIN 4108-2 is still sufficient. However, for larger glass surfaces, a more precise calculation should be carried out in accordance with EN 13363 [6]. The aim of planning must be to optimise the use of solar gains during the heating period and to avoid overheating in summer. A planner must always pay attention to the interaction between glass and solar shading. The g_{total} in accordance with EN 52022-1 or EN 52022-3 should be used for the calculation.

2.2.1 Night cooling

The second option for reducing indoor temperatures is night-time cooling, for example by ventilating through windows without any technical devices. This is possible in moderate climate (such as Germany), especially in rural areas, because the night temperatures are low enough due to a green habitat (forest, trees, meadows, lakes, etc.). Night ventilation requires high air exchange rates (n approx. 2-5) by means of cross ventilation through open windows or mechanical fans. In multi-storey flats, the air exchange is additionally supported by the "chimney effect". To improve comfort and safety, the windows can be fitted with warning sensors or an automatic system that closes the windows when storms and rain occur. Structural measures are also useful in cities to improve the microclimate and reduce night-time temperatures. The city of Mannheim is one of the pioneers here and has developed specific measures in a "climate impact adaptation concept" and heat action plan [7].

The third, naturally effective cooling method is based on the principle of evaporative cooling, which was already used in "pre-electric" times in the Orient, Africa and Asia. Here, larger surfaces are moistened (walls, textile fabrics, floors, wells, etc.). The evaporation of water removes heat from the surrounding air and the moist surfaces cool down. However, this also requires an increased exchange of air in order to dissipate the humidity. The greening of roof surfaces and interior and exterior walls has a similar effect, demonstrably contributing to cooling and improving the microclimate. Even if the use of electric cooling units cannot always be avoided with these measures, the high energy consumption associated with their use can be significantly reduced.

2.3 Protection against storms, tornadoes and strong winds

In Germany and Europe, wind loads are calculated according to Eurocode 1 [18] which essentially takes into account the wind loads, the shape of the building, the position of the building and the topography of the surroundings. When determining the wind loads, characteristic base wind speeds with an annual exceedance probability of 2 % are used, which corresponds to an average return period of 50 years. Due to climate change, however, we must assume more frequent and more severe storms in the future. The risk of locally occurring tornadoes due to strong temperature differences is also increasing.

Die größte Gefahr geht bei starken Stürmen von hohen und schnell wechselnden Luftdrücken (Druck-/Soglasten) und herumfliegenden Gegenständen aus (Dachziegel, In strong storms (hurricanes), the greatest

danger comes from high and rapidly changing air pressures (pressure/suction loads) and flying objects (roof tiles, panelling sheets, stones, small parts, etc.), which quickly destroy the standard float glass when they hit windows and facades. As a result, excess pressure quickly builds up in the building/room, leading to explosive destruction of the building envelope. Roofs are lifted off, glass or windows are pushed out of their fixings, causing considerable damage or destruction to the structure of the building. In the USA, there is therefore also a "hurricane test" [20] in which wooden components (roof battens and structural timbers with small cross-sections) are "shot" at a window/glass to check whether the windows and facades can withstand. Unlike in the USA, however, there are no requirements for this potential hazard in current standards and building laws in Europe or Germany. The standardisation committees have now recognised the problem and have initiated the development of an ISO standard [19] in which ift Rosenheim is also involved. In contrast to the USA, the new standard also covers windows and facades with steel parts. The background to this is the difference between the American lightweight construction method and the European solid construction method, in which the majority of solid building materials (roof tiles, bricks, brick panelling, etc.) are used and then also "fly around" in storms.

The aim of the standard is to develop suitable requirements, test methods and classifications in order to subsequently evaluate constructions that can withstand the



Fig. 13 Testing of hurricane-compatible components at ift Rosenheim according to [20] (Source: ift Rosenheim)

stresses of storms in order to better protect life and limb than previous windows and facades. The test procedure initially involves subjecting the construction elements to a continuous load (up to 3,500 load cycles) with high compressive/suction loads corresponding to a wind speed of up to 230 km/h (wind force 12). Subsequently, defined metal parts and wooden profiles are "shot" onto the component at different speeds and then subsequently loaded again with compressive/suction loads. A construction is only suitable if windows/facades (including the glass surface) are not destroyed during this test in order to prevent the feared overpressure in the building. For this purpose, windows and facades require suitable glazing (laminated safety glass), sufficiently stable profiles, a reinforced glass connection by means of bonding or reinforced hardware technology and careful fastening.

The ift Rosenheim can already carry out tests in accordance with the American hurricane standard [20] and the future ISO standard and thus evaluate windows and facades that also offer protection in the event of hurricanes, strong storms or tornadoes.

3 Circular economy

The construction and property sector has a major impact on the environment due to the large amount of energy and raw materials required for the production, use and demolition of buildings. Sustainable buildings must be energy-efficient, but should also make living and working more social, healthier and comfortable. It is therefore important to minimise the consumption of resources across all phases of the life cycle, i.e. for the manufacture of building products, the construction stage, use and dismantling. The building envelope has

a major influence on the entire building, as the indoor climate, daylight supply and natural ventilation are largely determined by windows, facades and glass. With the amendment of the Construction Products Regulation (BauPVO) [14] logically defined the sustainable use of natural resources as an "essential requirement". "[...] The construction work, its building materials and parts must be recyclable after demolition [...]. Environmentally friendly raw materials and secondary building materials must be used for the construction work."

Up to now, the focus for windows and facades has mainly been on reducing building energy consumption during use through better insulation (U-value) and utilisation of solar energy (g-value). However, emissions from the production and transport of building materials, the construction of buildings and subsequent utilisation (demolition or replacement of building components) are often still "ignored". The new German government is now rightly calling for a holistic assessment of emissions over the entire life cycle. Simple, resource-saving installation and removal, low maintenance and care costs, a long service life, for example through easy reparability, as well as the possibility of separating the materials used according to type or the reusability of entire building products or individual components at the end of their life cycle should become more of a focus in future.

In the new CPR (in consultation), sustainability is expected to be assessed by means of a life cycle assessment (LCA) and environmental product declaration (EPD). Manufacturers of construction elements must provide the necessary data and product information so that planners can take this into account when planning buildings. This information is particularly important if sustainability certification of the building is planned (BNB, DGNB, BREEAM, LEED etc.).

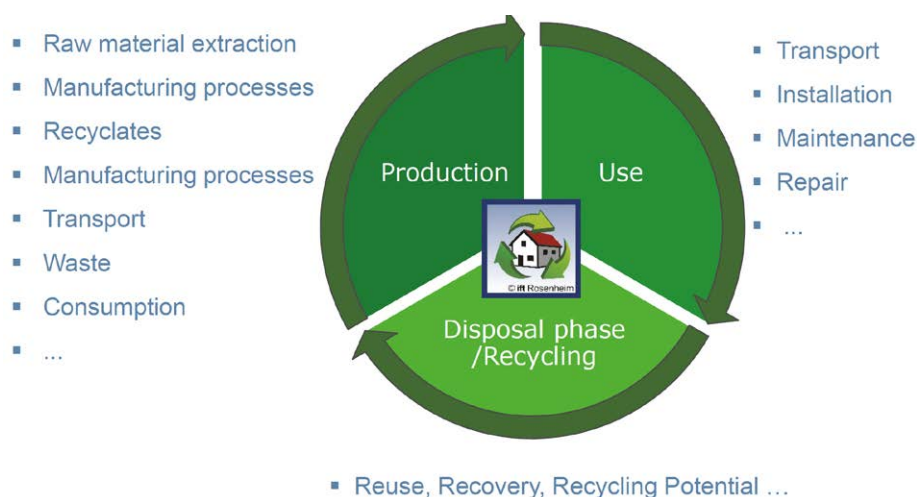


Fig. 14 A holistic analysis of the entire product life cycle reveals all environmental influences and CO₂ emissions. (Source: ift Rosenheim)

The many parameters of a life cycle assessment make it difficult to compare products, and the CO₂ footprint is therefore increasingly in demand as a simple measure of a product's climate friendliness. The ift Rosenheim is therefore developing an assessment procedure that enables the environmental impact of windows and doors to be compared and provides recommendations for sustainable and climate-resilient building elements.

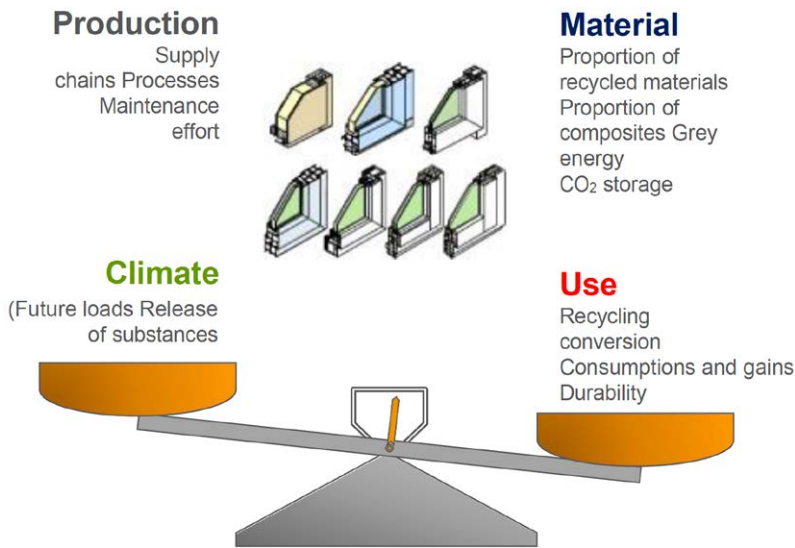


Fig. 15 All product areas play a role in a holistic balance sheet. (Source: ift Rosenheim)

Detailed information can be found in the ift technical information NA-02/4 "Green Envelope – Sustainability for building products" [17].

4 Sustainability

The German dictionary "Duden" describes sustainable action in the ecological sense as "utilisation only to the extent that nature can tolerate". In practice, the aim is to realise environmental, economic and social goals on an equal footing, which are also referred to as the three pillars of sustainabili-

ty. The Construction Products Regulation (CPR) as the EU basis for the trade and assessment of construction products therefore also provides for an assessment of sustainable aspects by means of an EPD. Other legislative influencing factors include the Renewable Energies Act, the Environmental Impact Assessment Act, the Federal Soil Protection Act, the Closed Substance Cycle Waste Management Act, the Building Code and the Directive on the realisation of construction projects.

All of these legal standards require construction projects to be planned and built in the most environmentally friendly and resource-efficient way possible. The importance of certification systems for sustainable construction (LEED, BREEAM and BNB, DGNB) is also increasing. The sustainability certification systems for buildings require manufacturers to provide product information that describes important sustainability criteria over the entire product life cycle.

Therefore, not only planners, auditors and tendering bodies, but also manufacturers of building elements are well advised to know and compile the necessary data and product information and to pass it on to the building user, who needs this data for utilisation, conversion or dismantling. The importance of subsequent utilisation and recycling is demonstrated by the asbestos problem and the intense debate about the final disposal of building materials from nuclear power plants. The utilisation phase is of great importance for transparent building components, as efficient use of solar gains can actively contribute to heating a building and thus reduce heating energy.

The environmental impacts, e.g. for building certification systems, are determined as part of an EPD in accordance with DIN EN ISO 14025 and DIN EN 15804. Both a product category rule (PCR) and a life cycle assessment (LCA) are required in order to be able to create corresponding EPDs. The PCR defines sensible framework conditions and procedures for the product groups, whereas the LCA records and analyses product-related material and energy flows over the entire life cycle and ultimately quantifies the environmental impact. Detailed information can be found in the ift technical information NA-02/4

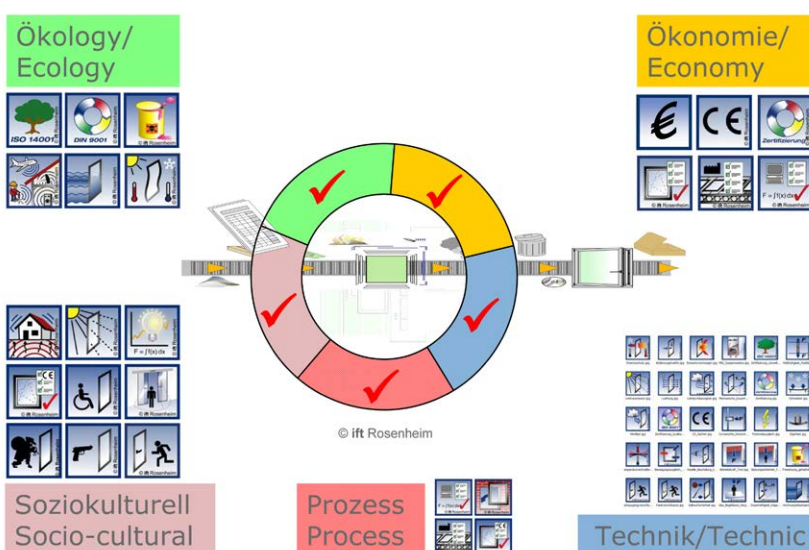


Fig. 16 Criteria and qualities for sustainable building based on the German Assessment System for Sustainable Building – BNB (Source: ift Rosenheim)

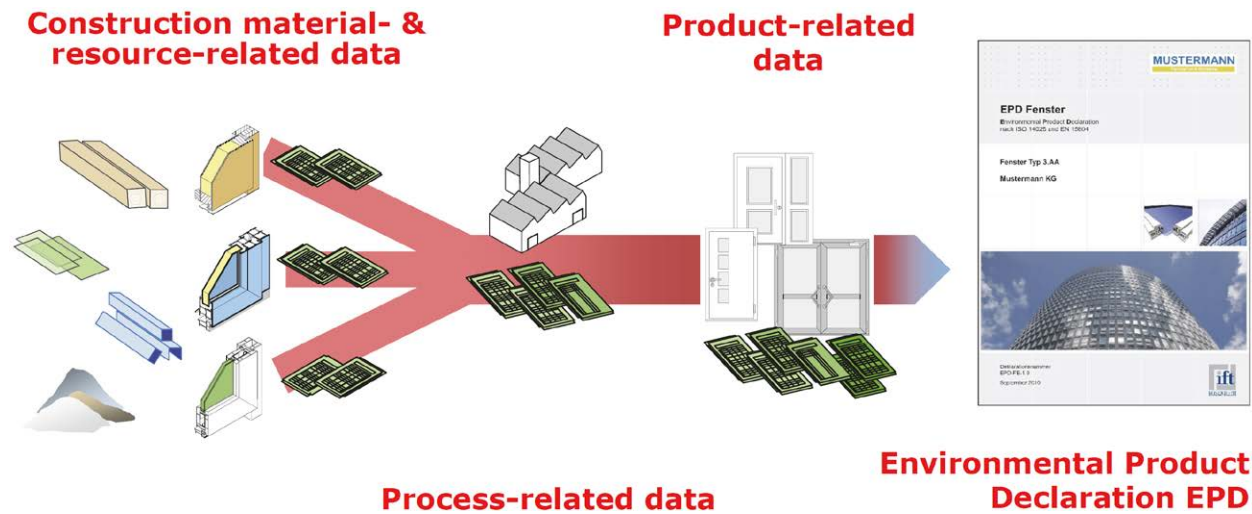


Fig. 17 Data determination for an EPD, optionally with average, company-specific or product-specific data (Source: ift Rosenheim)

"Green Envelope – Sustainability for building products" [17]. All documents published by ift Rosenheim to date are available on the website www.ift-rosenheim.de and <https://shop.ift-rosenheim.de/>.

4.1 Life cycle assessment (LCA)

The LCA (Life Cycle Assessment) in accordance with DIN EN ISO 14040 and DIN EN ISO 14044 is a scientific method for recording and determining the environmental impacts of a product over its entire life cycle ("from cradle to grave") and forms the basis for preparing the EPD. An LCA consists of four interlinked steps: target definition, life cycle inventory, impact assessment and finally evaluation and interpretation.

By analysing the entire life cycle, an LCA can provide information about the actual quality of a product. Accordingly, the LCA can contribute to increasing resource efficiency and be used as a methodological tool in product development and in the decision-making process. In this way, building products can be designed more ecologically and monetary benefits can be realised.

4.2 Environmental Product Declaration (EPD)

An environmental product declaration for building products is based on the standards DIN EN ISO 14025 and DIN EN 15804. In an EPD, the environmental impact of a product must be documented for the manufacturing process and subsequent use. Examples of this are the effects on the ozone layer (ozone depletion potential) and the climate (global warming potential) or the acidification of soil and water. In the case of exterior components such as windows, facades and glazing, the impact of the utilisation phase (30 to 50 years of use) on the environment is significantly greater than that of the manufacturing process – in stark contrast to short-lived building products such as carpets or interiors.

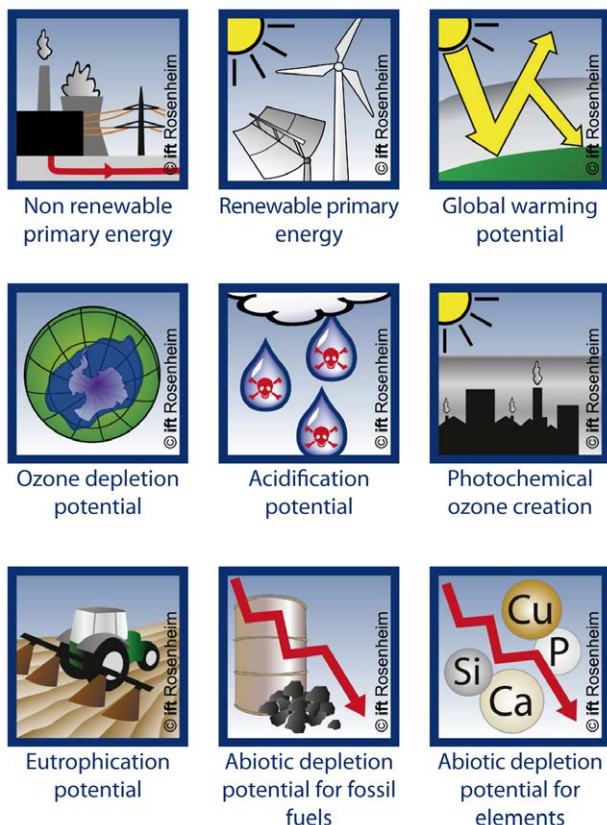


Fig. 18 Core indicators of an EPD (Environmental Product Declaration) (Source: ift Rosenheim)


Tab. 1 Description of the life cycle phases according to DIN EN 15804

Manufacturing phase			Construction phase		Use phase							Disposal phase				Advantages + loads outside system limits
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Production	Transport	Construction/Installation	Use	Maintenance	Repair	Replacement	Conversion/renewal	Operational energy use	Operational water use	Expansion	Transport	Waste management	Landfill	Reuse- Recovery- Recycling Potential

Phase	Exemplary aspects / criteria
Production phase (A1 - A3)	<ul style="list-style-type: none"> ▪ Raw material production (e.g. ore extraction, aluminium production, forestry) ▪ Reuse and recycling of materials for product manufacture ▪ Electricity, heat, steam and energy consumption ▪ Reuse of energy and other processes (e.g. waste heat) ▪ Raw material transports (national and international transport routes) ▪ Production of auxiliary materials and other preliminary products ▪ Production and packaging processes ▪ Production and packaging waste
Construction phase (A4 - A5)	<ul style="list-style-type: none"> ▪ Transport (factory gate to construction site or to intermediary) ▪ Storage of products and the necessary cooling, heating, humidity control, etc. ▪ Installation (incl. auxiliary materials) and waste
Use phase (B1 - B7)	<ul style="list-style-type: none"> ▪ Use of the installed product and emissions to the environment (VOC, ...) ▪ Maintenance - care and repair (cleaning, painting, lubricating, replacing damaged spare parts, ...) ▪ Replacement (glazing, ...) ▪ Conversion / renewal (thermal refurbishment, ...) ▪ Energy / water consumption during use ▪ Waste
Disposal phase (C1 - C4)	<ul style="list-style-type: none"> ▪ Expansion ▪ Transport to collection point / waste incineration plant / landfill site ▪ Reuse / Recover / Recycle ▪ Disposal / final storage (construction waste or hazardous waste)
Advantages + load Outside the system boundaries (D)	<ul style="list-style-type: none"> ▪ Possibilities to recycle the building products / building materials (e.g. melting of glass, metal or PVC or thermal use in a combined heat and power plant). ▪ Consideration as an energetic "credit" on energy consumption (reduction of energy consumption)

The impact over the entire product life cycle should therefore be specified. This offers opportunities for high-quality products with lower energy, maintenance and cleaning costs, which are rewarded with certification and have better chances in future tenders. PCR and LCA serve as the basis for creating an EPD. In an EPD, statements on 13 core indicators must be made as a "mandatory part".

In addition to the mandatory information, voluntary information on the environmental impacts of the other life cycles can be provided in the EPD. This should also be utilised, as this information is required by most certification systems for buildings. Furthermore, a "cradle to grave" approach (from the cradle to the grave) helps to increase the innovative capacity and quality of the product. The data

Tab. 2 Creation of different utilisation scenarios using the example of transport (Source: ift Rosenheim)

No.	Use scenario	Description
	Development of representative usage scenarios with information on the vehicle and average information on utilisation and distance travelled.	
A4.1	Small series Direct marketing	7.5 t truck, 40 % load, 50 km there and back empty
A4.2	Small series via local manufacturers	7.5 t truck, fully loaded, 50 km there and back empty
A4.3	Small series via dealers	40 t truck, fully loaded, 150 km there and back empty and 7.5 t truck, 40 % load, 50 km there and back empty
A4.4	Major project	40 t truck, fully loaded (Germany-wide), 250 km there and back empty

collected also provides important information for the establishment of an environmental management system.

If an EPD has been prepared in accordance with DIN EN 15804 and externally verified, it can be entered in the German "ÖKOBAUDAT" online database which is the exclusive basis for the BNB and DGNB building certification systems.

4.2.1 Sample EPD

In a sample EPD, data from various companies is determined and used as average values in a common "data pool". They reflect an industry average and are therefore representative within the defined reference limits. The manufacturer can define different scenarios for production, utilisation and after-use for his product or company (Table 2). The respective environmental impacts are determined for the various scenarios using suitable software. As a rule, simple input data is sufficient for this. For example, the definition of the means of transport and the distance travelled are sufficient for a transport scenario.

As part of a research project, ift Rosenheim [22] developed EPDs for windows made of wood, aluminium and plastic as well as for flat glass, in which sensible boundary conditions and procedures were defined for all life cycle phases.

Sample EPDs are also available for insulating glass units, flat, toughened and laminated safety glass, electric drives and control centres, steel facades and doors. This means that manufacturers can have an EPD created easily and cost-effectively via www.ift-rosenheim.de/environmental-product-declaration based on just a few pieces of data. EPDs are automatically generated using the sample EPDs by confirming various framework conditions. This system is particularly suitable for small and medium-sized companies.

However, no specific qualities of the building product can be emphasised in a sample EPD that are suitable for differentiation in competition, as the input data is only based on average data.


Fig. 19 Sample EPDs of the ift Rosenheim (Source: ift Rosenheim)



Fig. 20 Product-specific EPDs from ift Rosenheim (Source: ift Rosenheim)

4.2.2 Product-specific EPD

The creation of a product-specific, individual EPD is necessary, for example, if there is no sample EPD for the product in question. A specific EPD is more time-consuming for manufacturers, as extensive data must be collected and analysed. However, the specific EPD enables a detailed and representative description of a company-specific product. Special qualities can be described for the entire life cycle and used as a differentiating feature or to improve chances in tenders. The use of specific data on production, transport or assembly, for example



Fig. 21 ift-EPD-Logo (Source: ift Rosenheim)

an increased proportion of renewable energies in production through an in-house block heating or hydroelectric power plant, PV plant, a particularly economical vehicle fleet or local raw material extraction, can represent increased resource efficiency.

All EPDs created by ift Rosenheim can be viewed at www.ift-epd.de. An individual EPD logo is issued for each EPD. This can be used by the declaration holder for marketing purposes for the product. The validity of the EPDs can be checked by the user at any time using the unique declaration number.

4.3 Product passport sustainability

The ift Rosenheim has developed the "Sustainability Product Passport" to make it easier for planners, builders and investors to assess sustainability-relevant criteria. This contains the necessary parameters for certification systems such as DGNB, BNB, LEED or BREEAM. This includes a life cycle assessment report, an environmental product declaration (EPD), valid REACH manufacturer declarations, health-related evidence (e.g. VOC emission certificates), evidence of sustainability (e.g. PEFC, FSC or cradle-to-cradle), declaration of recycled content, management certification or CSR (corporate social responsibility) reports. As an accredited programme holder for EPDs, ift Rosenheim can provide the necessary evidence. The ift Rosenheim sustainability product passport supports "stakeholders" such as building owners, investors, building users, architects, planners and building certifiers, customers, suppliers or employees with a clear presentation of the ecological, social and economic parameters.

The necessary parameters for different building certification systems (DGNB, BNB, LEED and BREEAM) are clearly compiled and can easily be used as a basis for an environmental management system or the ecological optimisation of products and production.

4.4 CO₂ footprint

The CO₂ footprint (CO₂ balance sheet or carbon footprint) represents the CO₂ emissions for products or services over a specific life cycle. It takes into account the resource and energy consumption that occurs during the manufacture, use and disposal of a product or service. A CO₂ footprint can be calculated at product level (product carbon footprint, PCF) or at company level (corporate carbon footprint, CCF).

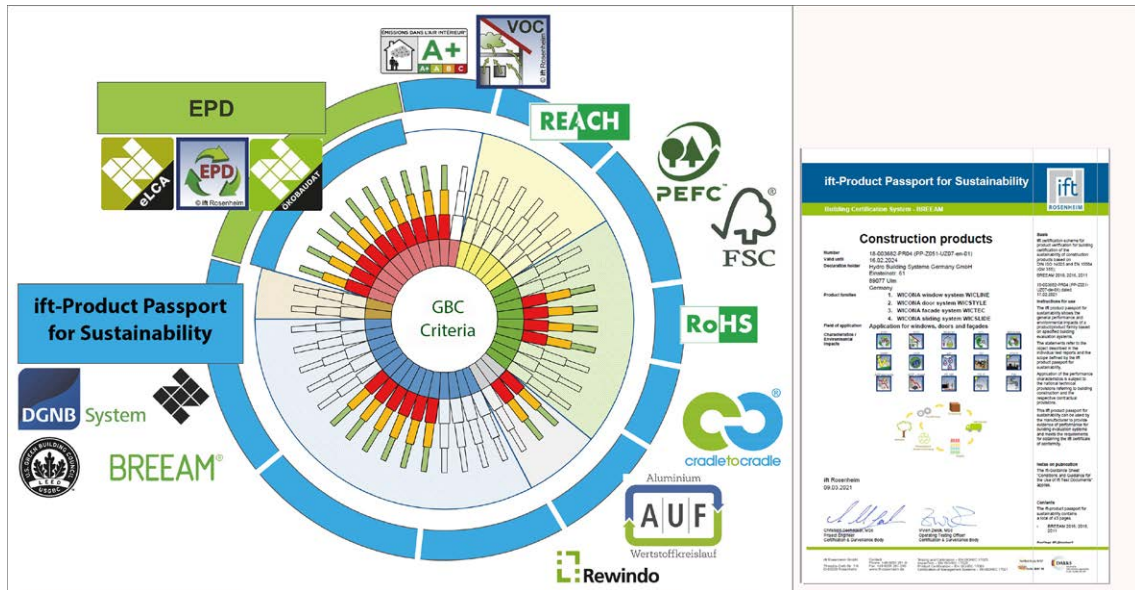


Fig. 22 Information on the assessment of sustainability criteria of different certification systems is clearly summarised in the ift Product Passport Sustainability. (Source: ift Rosenheim)

Tab. 3 PCF of selected consumer goods

Product / Service (Selection)	PCF in kg CO ₂ equivalent over all life cycle phases
1 coffee cup	0,06
600 g frozen vegetable mix	0,11
100 g fish fingers	0,34
1 wash with Persil detergent	0,70
6 pieces organic free-range eggs	1,10
500 g chicken cutlets	1,35
1 m ² flat glass	2,18
10 rolls of toilet paper	2,50
1 running metre spacer	9,81
1 kg beef	13,00
1 running metre aluminium window frame	15,18
1 m ² multi-pane insulating glass (2-fold)	24,41
1 year telephone and internet connection	89,60
1 m ² Roller shutter	90,78
1 m ² sliding gate	132,52
1 m ² Aluminium front door	144,93
1 m ² stainless steel window	365,54
1 m ² Fire door (T90)	954,05

Sources: PCF Pilot Project Germany; Grießhammer R., Hochfeld, C., ift Rosenheim

Since not only CO₂ contributes to anthropogenic climate change, but also other climate-relevant greenhouse gases such as methane (CH₄) or nitrous oxide (N₂O) are emitted, so-called CO₂ equivalents serve as a unit of measurement for the CO₂ footprint. These make it possible to compare different greenhouse gases based on their impact on climate change over a defined period of time. The impact of one kilogramme of CO₂ serves as the base value. According to the UBA, one kilogramme of CH₄ is around 25 times and N₂O almost 300 times more harmful to the climate than one kilogramme of CO₂.

4.4.1 Product CO₂ footprint (Product Carbon Footprint – PCF)

The German Federal Ministry for the Environment (BMU) and the Federation of German Industries (BDI) have developed a guideline for companies that describes the purpose, objective and system of this indicator in detail. The carbon footprint can be determined in a standardised manner in accordance with DIN EN ISO 14067 and can also be used in the context of sustainability management and promote the discovery of undiscovered savings potential.

However, direct product comparisons based on the PCF are currently more of an indicative nature and are not suitable for a comprehensive sustainability assessment because accuracy and reproducibility are not sufficient. This is a consequence of varying data quality, inconsistent definitions and reference limits of the life cycle phases as well as different databases as a basis for calculation. LCAs, eco-efficiency and sustainability analyses are therefore more suitable for a well-founded assessment of sustainable management because the relevant environmental categories are analysed more comprehensively. However, this makes the assessment more complex, which is why the PCF is often used by companies for communication and marketing purposes.

4.4.2 CO₂ footprint for companies (Corporate Carbon Footprint, CCF)

The Greenhouse Gas Protocol (GHG Protocol), founded by the World Resource Institute and the World Business Council for Sustainable Development, provides the basis for calculating a company's carbon footprint in the form of various standards. Standardisation has also taken up the issue and developed the ISO 14064 series of standards Parts 1 to 3, which are largely based on the standards of the Greenhouse Gas Protocol. The difference to the product CO₂ footprint lies in the reference value: while the PCF refers to a unit of product, the CCF deals with entire companies. The structure of the CCF is therefore not divided into life cycle stages, but into so-called scopes, which cover the various areas in companies.



Fig. 23 The UN's 17 Sustainable Development Goals (SDGs) are recognised worldwide and provide good orientation on the path to becoming a sustainable company. ift Rosenheim supports the SDGs

4.5 Corporate strategy Sustainability

4.5.1 Sustainable Development Goals (SDG goals)

Sustainable action is not just about climate protection, but also encompasses the three pillars of ecology, economy and social responsibility. The United Nations (UN) has developed 17 Sustainable Development Goals (SDGs) for this comprehensive approach in order to promote peace and prosperity to protect our planet. The UN goals are recognised worldwide and offer a good and comprehensive guide on the path to becoming a sustainable company. In thematic terms, the 17 goals are therefore very broadly based, which is why prioritisation is necessary on a company-specific basis.

When prioritising goals and defining measures, it makes sense to involve employees and stakeholders. A Germina guide for SMEs [28] provides practical tips for initial steps and measures.

4.5.2 Sustainability report

Many companies are already being asked to make a contribution to a sustainable economy (see also section 1.2). The European Commission provides the framework for this in the CSR Directive (Corporate Social Responsibility / CSR) published on 22 April 2021 and specifies the reporting obligations. From 2023, companies will also be obliged to comply with and apply the CSR Directive if they fulfil two of the three criteria:

1. have over 250 employees,
2. the balance sheet total is over 20 million euros,
3. the net sales revenue is over 40 million euros.

This can take the form of a sustainability report based on DIN ISO 26000 "Guidelines on social responsibility". This describes the economic, ecological and social aspects of a company. However, the introduction of CSR management also has very practical benefits, such as possible cost reductions through energy savings or disposal costs. The existence of a sustainability report is included in the overall assessment of the EU certification mark "climate.proof.build" of ift Rosenheim.

4.5.3 EU Green Claim Directive – avoiding "green washing"

On 22 March 2023, the EU Commission published the "Directive on Green Claims" [29] to protect consumers from misleading and false environmental claims. The directive is to apply to all companies with more than 10

employees and a turnover of over €2 million. The draft is being discussed in the EU Parliament, is expected to be adopted in summer 2024 and must then be transposed into national law by the member states within 24 months.

The "Green Claims Directive" requires well-founded and transparent standards for the use of environmental claims by companies, which must be scientifically proven. The proof must be verified in advance by an accredited body on the basis of life cycle analyses (LCA), product environmental footprint (PEF) and other procedures. In the event of violations, companies can be excluded from being awarded public contracts and fined up to four per cent of their annual turnover. The draft also contains regulations for new private-law eco-labels, whose environmental targets are to be more ambitious than those of existing schemes.

The statement by Cyrus Engerer (rapporteur of the EU Parliament's Environment Committee) "[...] It is time to put an end to greenwashing and the spread of fraudulent green claims that have deceived consumers for far too long [...]" shows the seriousness of the project [30].

5 Climate-proof and climate-adapted construction with sustainable and climate-resilient building products

Climate change and its consequences require consistent and holistic action to ensure that new buildings and energy modernisation are sustainable – i.e. to reduce CO₂



Fig. 24 The EU's "Green Claims Directive" aims to create clear and objective standards for the use of environmental claims for products and services based on scientifically sound methods (Source: Screenshot Google research by ift Rosenheim)

emissions as much as possible and to effectively protect people and buildings against weather extremes caused by climate change. Future-proof and climate-proof building products must therefore be energy-efficient, resilient to climate extremes and sustainable. However, the entire topic is very extensive and complex and comprehensive building certification (DGNB, BNB etc.) is often too time-consuming and cost-intensive for smaller buildings and the gradual modernisation of existing buildings. Nevertheless, building owners, investors and planners naturally want or need to assess which building products and building elements are suitable for a climate-proof and sustainable building. An online survey [23] has shown that planners, manufacturers, retailers and building owners consider a neutral assessment of sustainability, greenhouse gas (GHG) reductions and climate safety at product level to be necessary.

For this reason, ift Rosenheim has developed suitable requirements and assessment criteria to enable a reliable decision to be made in favour of suitable building products. Both the companies and the products are assessed. After all, it makes no sense to produce an energy-efficient and climate-resilient product which is produced not eco-friendly.

Construction products are currently very often placed on the market without reference to the building, so that in addition to the assessment of buildings (including construc-

tion products), labelling of construction products with statements on sustainability and climate resilience is necessary. A suitable assessment of construction products must fulfil requirements for both the product and the company in order to promote the most sustainable development of the entire value chain. The assessment covers the consumption of energy and resources and the improvement of environmental impacts as well as the properties with regard to improving the climate resilience of buildings - i.e. their resistance to flooding, heat waves and storms. The assessment methodology is transparent and is carried out objectively on the basis of recognised standards and regulations (harmonised DIN, EN or ISO standards or generally accepted rules of technology).

The requirements of the EU taxonomy were also taken into account in the criteria, so that an assessment is also possible in this direction and investments in climate-safe construction products can be defined as a "significant contribution to climate protection" in accordance with the EU Tax Regulation.

The assessment must be objective, transparent and easy to understand in order to enable simple product selection and comparison. All properties and characteristics are summarised in a score (similar to the Nutriscore for food) to enable planners, investors, manufacturers, retailers and end users (building owners) to make a simple and reliable

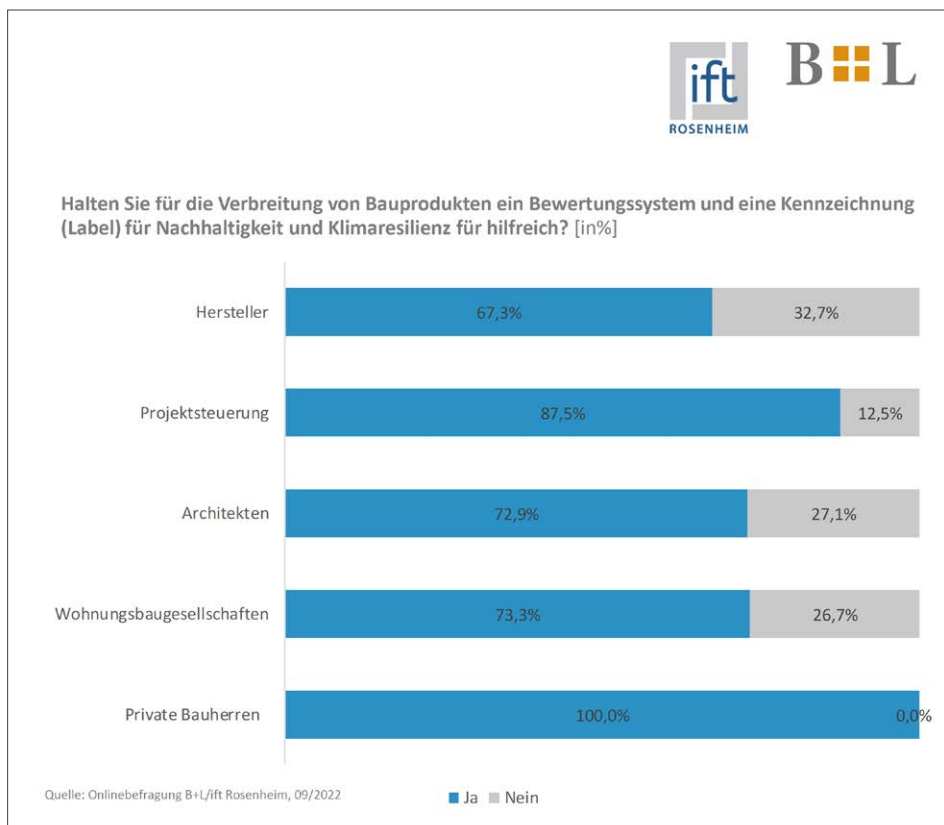


Fig. 25 Online survey shows the need for a simple assessment of building products in terms of sustainability and climate resilience. (Source: ift Rosenheim)

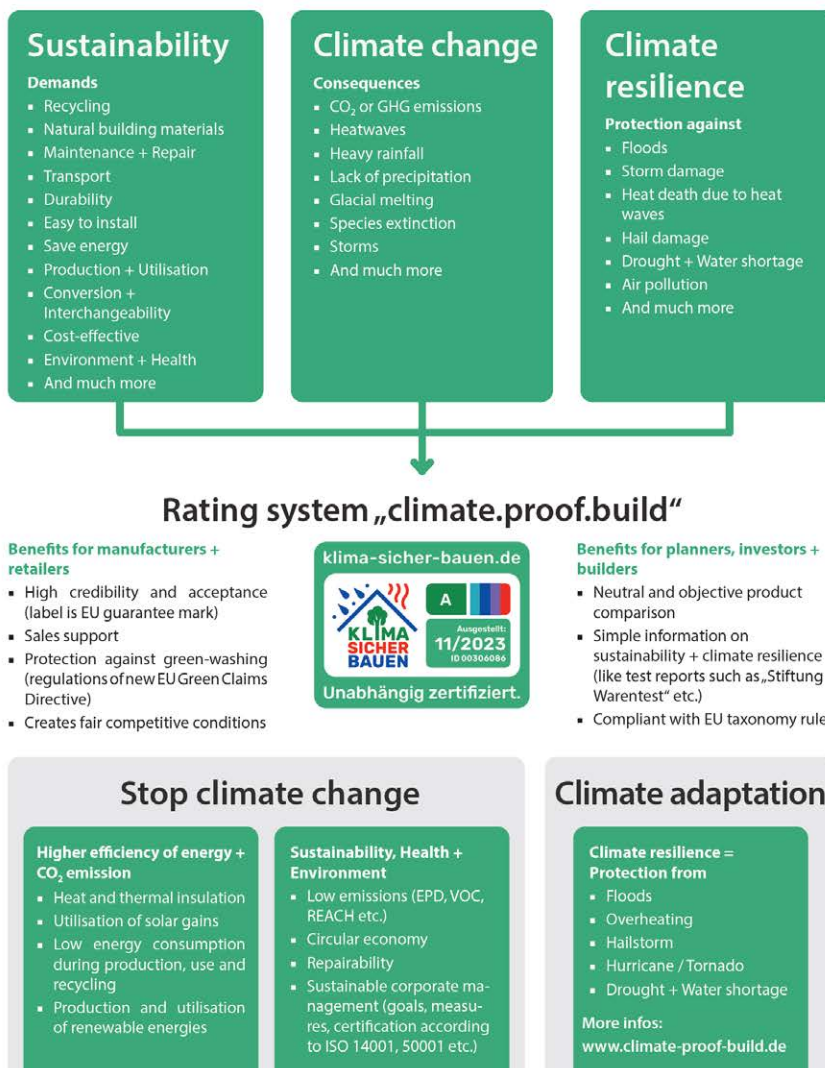






Fig. 26 Basic structure of the "climate.proof.build" assessment system (Source: ift Rosenheim, © lovelyday12 – stock.adobe.com)

product decision. Important product characteristics that are necessary for the individual planning and certification of a building are also available. The label is registered as an EU certification mark and therefore fulfils high consumer protection requirements. It can be used by manufacturers of construction products if they fulfil the requirements and undergo regular external monitoring. Manufacturers

benefit from the bundling of the topics of sustainability, CO₂ efficiency and climate resilience and are simultaneously protected against risks that may arise from green-washing accusations (s. chapter 4.5.3).

The label can be attached to the construction product by the manufacturer and used for advertising and informati-

Tab. 4 Criteria for assessing the climate resilience of building products according to the "climate.proof.build" assessment system i.e. of building elements. (Source: ift Rosenheim)

Criteria for climate adaptation and climate resilience (climate security)		
	Flood / inundation	<ul style="list-style-type: none"> Building products in the building envelope must be flood-tight up to a height of $\geq h = 30$ cm to protect against flooding (in the event of heavy rainfall) (test in accordance with ift guideline FE-07/1). The requirement applies to at least one product in the product family (product range). Building products must also have increased resistance to driving rain in areas not directly at risk of flooding (from the 1st floor) (e.g. windows and French doors \geq Class 7A in accordance with EN 12208, corresponds to driving rain resistance up to 300 Pa, direct weathering)
	Heat protection	<ul style="list-style-type: none"> To protect interior spaces (where people are present) from overheating during heat waves (temperatures above 30 °C), transparent building elements must have adaptable solar shading. The total energy transmittance g_{tot} must not exceed 0.20 (glazing incl. sun protection device) in accordance with DIN 4108-2 (Fc method), EN ISO 52022-1 (simplified) or EN ISO 52022-3 (spectral)) Materials and surfaces that are exposed to direct sunlight must be equipped with suitable coatings (reflective) to prevent structural damage due to deformation or material damage (e.g. plastic profiles ≤ 80 °C) Opening elements such as windows and doors must allow air exchange rates of at least 4 l/h in order to achieve night-time cooling during periods of heat. This is only possible to a limited extent in urban residential areas or basin locations (Stuttgart). Protective mechanisms to warn or close the opening elements during storms or rain are considered favourable.
	Storms, tornadoes and hurricanes	<ul style="list-style-type: none"> To maintain the structural integrity of the building envelope (statics), ensure an airtight building envelope to minimise energy losses, ensure comfort (no draughts), the resistance to wind load must also withstand higher loads (strong wind events) (e.g. windows: \geq Class B3 according to EN 12210. (Design wind load 1.2 kN/m², deflection l/200) To protect against "flying" objects during storms, construction elements in the building envelope should fulfil at least level 2 according to ISO/PWI 16316:2022 (hurricane test). Level 2 applies to buildings and other structures where a moderate risk to human life is to be expected in the event of strong winds, e.g. residential or commercial buildings, industrial buildings.
	Hail protection	<ul style="list-style-type: none"> Building products in the building envelope should achieve at least class \geq HW 2 according to VKF test regulations no. 00a (General Part A and VKF test regulations no. 00b General Part B.) (hail test) to avoid structural and visual damage













on documents, including further detailed information. The rated and labelled building products are also listed on the website www.climate-proof-build.de. Similar to common websites with test reports (e.g. Chip, Stiftung Warentest etc.), planners, retailers and end users can use product filters to search for products that are suitable for their own preferences. A link makes it easy to contact the manufacturer to request a quote or clarify further details.

5.1 Product evaluation of climate resilience

Due to the consequences of climate change, extreme weather events such as heat waves, heavy rainfall with flooding, strong winds and hail are becoming increasingly frequent. It is therefore no longer enough to limit climate

change by using energy-efficient and sustainable building products. Building products must therefore provide better protection against the increasing number of extreme weather events (climate adaptation). In addition to the sustainability of products, it is therefore also a question of protecting life, health and property - in other words, greater climate resilience. The requirements for climate-proof products must therefore fulfil increased requirements in the areas of energy efficiency, environmental impact and climate resilience in order to better withstand the consequences of climate change (extreme weather events). Products and manufacturers are assessed objectively on the basis of recognised standards and regulations. The product-related requirements with regard to climate resilience are described in detail in Table 4 using the example of building components.

Tab. 5 Criteria for assessing the sustainability of building products according to the "climate.proof.build" assessment system
(Source: ift Rosenheim)

		Sustainability, environment and health criteria
A.		Product evaluation (energy efficiency, use of materials, service life/repairability, recycling, etc.)
A1		Product design Type and purpose of the product (consumption, basic needs such as food/housing/culture, investment for/against reducing environmental impacts)
A2		Product features Product quality and evaluation of technical properties in terms of energy efficiency, reduction of GHG potential (CO ₂ footprint), durability and recycling
A3		Product emissions in the utilisation phase Proof of environmental impact (EPD), air pollutants (VOC) or toxic substances (REACH)
A4		Materials/Resources Proportion of materials and reduction of substances of concern (toxic substances/REACH) or increase in positive materials (renewable raw materials, recycling/reuse)
A5		Durability Maintenance, cleaning, disposal
A6		Repairability Dismantlability, availability of spare/wear parts, instructions, repair service, etc.
B.		Evaluation of companies (management, production, purchasing, employees, etc.)
B1		Corporate philosophy and communication Description (internal/external) of sustainable behaviour with targets, measures and controlling as well as consideration of awards/certificates or memberships in associations/institutions
B2		Monitoring and control Sustainability as a decision-making criterion for purchasing materials, operating resources and evaluating business partners (stakeholders)
B3		Certification Existence of guidelines/certification/management systems for sustainable work/management
B4		Energy consumption Documentation + measures to reduce all energy consumption and increase the use of renewable energies (production, administration, distribution, travel, employees, etc.)
B5		Resources Documentation and measures to reduce all resources used (water, raw materials, packaging, operating materials, etc.)
B6		emissions Documentation and measures to reduce all emissions (GHG, CO ₂ footprint, compliance with/undercutting of legal limits)

5.2 Sustainability assessment

Windows, external doors, facades and gates as components of the building envelope have a significant influence on the sustainability of buildings, in specific a significant influence on the external appearance, energy consumpti-

on and quality of use. The environmental impact of these components is becoming increasingly important. In order to assess the performance and environmental impact, it is necessary to consider the entire "product life cycle" from raw material extraction to disposal or recycling. Here, the products are analysed with the help of a life cycle assess-

ment and evaluated according to wide variety of criteria. The assessment of sustainability is based on proven assessment systems, such as life cycle assessments in accordance with DIN EN ISO 14040 and 14044 and environmental product declarations in accordance with DIN EN ISO 14025 and DIN EN 15804 (see sections 4.1 and 4.2).

Due to the complexity, it is becoming increasingly difficult for planners, building owners, consumers and decision-makers to select the right product for the respective application. For this reason, ift Rosenheim has developed the certification programme QM 378 [27] to enable an assessment of the performance, sustainability and climate resilience of windows and external doors and to achieve a continuous process of sustainability improvement within a company (table 5). Certification is carried out according to the following procedure:

- Conclusion of a certification and monitoring contract,
- Definition of the scope of the product certification/certificate (allocation of the product),
- Assessment of the test certificates and the product documentation or documents submitted and, if necessary, performance of any type test(s) still required. The product properties must be verified by a notified and/or accredited test centre recognised by ift-Q-Zert. Proof can also be provided via an ift product pass/ift system pass, a RAL suitability certificate in accordance with RAL GZ 695 or a RAL system pass in accordance with RAL GZ 716. It is important that the minimum requirements for the product properties in accordance with ift Guideline FE-07/1 are fulfilled.
- First visit,
- In the event of a positive assessment: certification and award of certificate.

5.3 Advantages and use of the ift label "climate.proof.build"

The "climate.proof.build" label is registered as an EU certification mark and is awarded by ift Rosenheim (or licence partners) as an independent body for construction products. This label is used to assess building products in terms of sustainability, energy and resource consumption and their characteristics with regard to improving the climate resilience of buildings – i.e. their resistance to flooding, heat waves and storms. The "climate.proof.build" certification mark is a European label which requires independent monitoring. It will support planners, architects, awarding authorities, building owners, property owners, tenants as well as manufacturers, system providers and processors of construction products in product comparisons and purchasing decisions for sustainable, climate-friendly and climate-resilient construction products. The EU certification mark "climate.proof.build" thus offers the following advantages:

1. Greater credibility and acceptance than advertising claims from manufacturers
2. Avoidance of liability risks and penalties for false statements (greenwashing)
3. Easy and quick information about the different criteria (e.g. test reports for consumer products, i.e. dishwashing machines, computers, cars etc.)
4. Sales support for committed manufacturers
5. Simple and objective product comparison
6. Creation of fair competitive conditions
7. Promotion of product development

The label can be used by manufacturers of building products (building materials and building elements) who

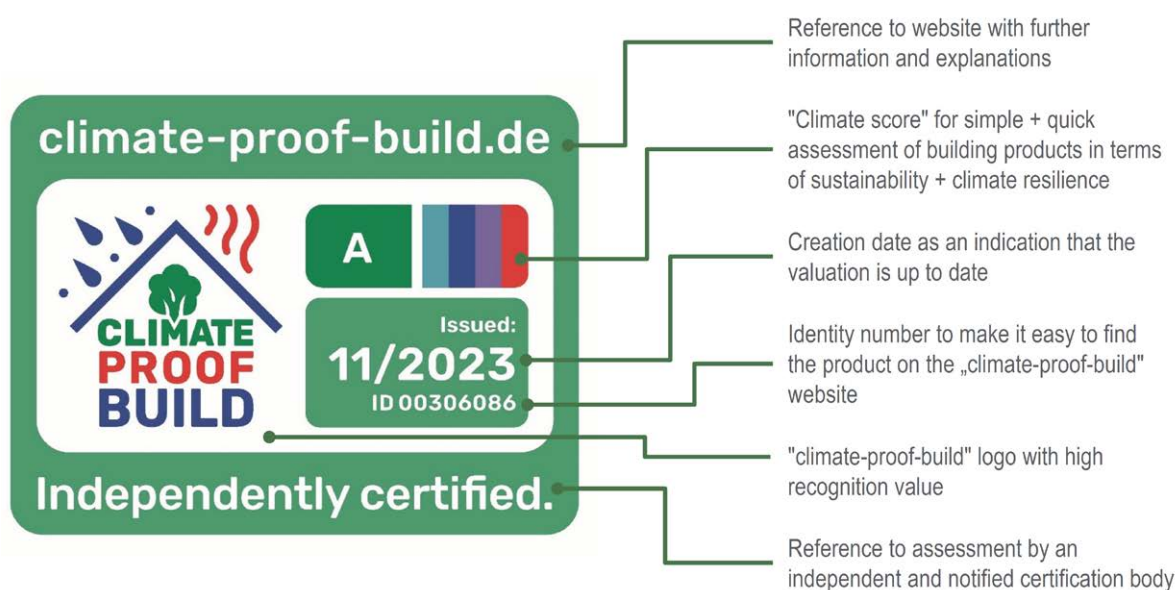


Fig. 27 The "climate.proof.build" label contains the most important information for assessing the sustainability and climate resilience of building products (Source: ift Rosenheim)

have the relevant evidence for the defined assessment criteria (see sections 5.1 + 5.2). The assessment methodology is transparent and is carried out objectively on the basis of recognised standards and regulations (harmonised DIN, EN or ISO standards, generally recognised rules of technology and validated test procedures of ift Rosenheim). All properties/key data are weighted and summarised in a "climate score" (A-E) to enable a simple product comparison, especially for the end user (building owner) when renovating existing buildings.

The label can be attached to the product and should be used in information and sales documents. The "climate.proof.build" label places requirements on both the product and the company in order to ensure and promote the most sustainable development of the entire value chain.

5.4 "climate-proof-build.de" website

The website "www.climate-proof-build.de" provides objective and easy-to-understand information on the "climate.proof.build" rating system as well as a list of rated and certified building products. The function and layout are similar to well-known websites and test reports (for consumer products, i.e. dishwashing machines, computers, cars etc.) which builders, property owners and planners can use to search for and select specific products and product features. Direct contact or enquiries can be made via a link to the manufacturer or retailer. The different information

requirements of end users and construction experts are catered for with a distinction between standard and expert mode. The website includes the following functions:

- Graded (from simple to detailed) information on the evaluation methodology with a description of the relevant evaluation criteria, scoring and the topic clusters (climate resilience, sustainability, energy efficiency, CO₂ emissions, quality and usability, recycling, etc.)
- Product search by total score (climate score)
- Product search by individual criteria and topic clusters (expert mode)
- Product search by QR code, manufacturer, product ID and region (postcode)
- Product comparison of up to 5 products
- Blacklist for withdrawn labels
- Enquiry to the manufacturer / supplier (dealer) with automatic transfer of the selected information, products and filter settings
- Saving search results and search queries for registered users
- Upload of product and manufacturer information for interested manufacturers to pre-assess the products in a simplified short procedure.
- Upload of the complete product and company data for certification once the manufacturer has been commissioned.

The website www.climate-proof-build.de is currently under construction.



Fig. 28 The labelled building products are listed on the website "www.climate-proof-build.de", including detailed information, thus enabling simple and reliable product selection. (Source: ift Rosenheim)

6 Conclusion

The dangerous consequences of climate change can only be stopped if we achieve a rapid and consistent reduction in greenhouse gas emissions through appropriate measures. The necessary technologies are available and competitive at current energy prices [13]. Future-proof and climate-proof building elements must be energy-efficient, resilient to climate extremes and sustainable. Planners, investors and building owners must also be able to compare products easily in terms of sustainability in order to make a sensible product decision. For this reason, ift Rosenheim has developed guidelines and sensible system boundaries for the assessment of sustainability in order to enable a simple product comparison. The following aspects must therefore take centre stage for the development and successful sale of windows, doors and facades

- Minimisation of energy losses via building components, including ventilation losses,
- Optimum utilisation of solar gains with simultaneous protection against overheating in summer,
- Resilience to floods, storms, hail and heat,
- low energy consumption during manufacture, maintenance and operation,
- reusable (recyclable) materials as the basis for a circular economy,
- sustainable processes, production methods and forms of business.

Those aspects must be communicated to the end consumer in an easily understandable form to help them select suitable products. For an industry whose biggest driver in recent decades has been the optimisation of energy losses, the chances of mastering this future are certainly good. The ift Rosenheim will actively support the companies and the industry with appropriate research projects, test procedures and certificates in order to enable fair competition and to convince consumers and politicians of the value of modern building elements by providing objective information.

7 Literature

- [1] Brief report on the revision of requirement systems and standards in the Building Energy Act for new and existing buildings, including economic feasibility studies for new and existing buildings, ifeu – Institut für Energie- und Umweltforschung GmbH, Heidelberg 2022
- [2] DIN 4108-4:2017-03
Thermal insulation and energy conservation in buildings – Part 4: Thermal and moisture insulation design values
Beuth Verlag GmbH, Berlin
- [3] DIN EN 14351-1:2016-12
Windows and doors - Product standard, performance characteristics – Part 1: Windows and external doors
Beuth Verlag GmbH, Berlin
- [4] EN ISO 10077-1:2020-10
Thermal performance of windows, doors and shutters – Calculation of thermal transmittance" (ISO 10077-1:2017 with corrected version 2020-02)
Beuth Verlag GmbH, Berlin
- [5] ift Guideline FE-07/1
Flood-resistant windows and doors, ift Rosenheim
- [6] "Limits of the methods for evaluating summer thermal insulation according to DIN 4108-2:2013", Peggy Freudenberg, Oda Budny, Ernst & Sohn Verlag, Bauphysik 44 (2022), Issue 1
- [7] Mannheim Heat Action Plan, City of Mannheim (Climate, Nature, Environment, Youth Welfare and Health Departments), Mannheim 9/2021
- [8] "The heat etiquette", Federal Environment Agency (UBA), Dessau-Roßlau 2021
- [9] HeatResilientCity – "Scientific concept for optimising the summer heat insulation of a Gründerzeit apartment building in Erfurt's Oststadt", Leibniz Institute of Ecological Urban and Regional Development, and HTW Dresden University of Applied Sciences, Dresden 9/2020
- [10] DIN EN ISO 14040:2021-02
Environmental management – Life cycle assessment – Principles and framework
Beuth Verlag GmbH, Berlin
- [11] DIN EN ISO 14044:2021-02
Environmental management – Life cycle assessment – Requirements and guidance
Beuth Verlag GmbH, Berlin
- [12] DIN EN 15804:2020-03
Sustainability of construction works – Environmental product declarations – Basic rules for the product category construction products
Beuth Verlag GmbH, Berlin
- [13] "What we know about the climate today", German Climate Consortium, Berlin 6/2021
- [14] EU Construction Products Regulation (CPR) (Regulation (EU) No 305/2011 of the European Parliament and of the Council), Brussels 3/2011
- [15] "Referenten-Entwurf Gebäudeenergiegesetz GEG 2023" from 29 April 2022 with marked changes, ENEV-Online, Institute for Energy-Efficient Architecture with Internet Media, Melita Tuschinski, https://geg-info.de/geg_nouvelle_2023/index.htm
- [16] Sustainable building air conditioning in Europe Concepts for avoiding heat islands and for a comfortable indoor climate, Umweltbundesamt, Dessau-Roßlau, 6/2022
- [17] ift technical information NA-02/4
Green Envelope – Sustainability for building products
ift Rosenheim 7/2022
- [18] DIN EN 1991-1-4:2010-12
Eurocode 1: Actions on structures – Part 1-4: General actions – Wind loads; German version EN 1991-1-4:2005 + A1:2010 + AC:2010
Beuth Verlag GmbH, Berlin
- [19] ISO TC 162 WG4+WG5 – Windows, Doors and Curtain Walling – Impacted by wind-borne debris in windstorms

- [20] ASTM E1996-20 – Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
- [21] Guidelines for planning and installing windows and front doors for new builds and renovations
Gütegemeinschaft Fenster, Fassaden und Haustüren e.V., Frankfurt and ift Rosenheim (Institut für Fenstertechnik e.V.), Frankfurt 3/2020
- [22] Development of environmental product declarations for transparent building elements – windows and glass – for assessing the sustainability of buildings, research report, ift gemeinnützige Forschungs- und Entwicklungsgesellschaft mbH, Rosenheim 11/2011
- [23] ift online survey "climate.proof.build", ift Rosenheim 10/2022, www.ift-rosenheim.de/shop/onlinebefragung-klimasicherbauen-download
- [24] REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088 (EU Taxonomy Regulation), Official Journal of the European Union, 22.6.2020.
- [25] COMMISSION DELEGATED REGULATION (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity is considered to contribute significantly to climate change mitigation or adaptation and for determining whether that economic activity avoids significant harm to any of the other environmental objectives, Official Journal of the European Union, 9.12.2021
- [26] ift Guideline FE-21/1
"Climate-proof building – Methods and criteria for assessing sustainable and climate-resilient windows and external doors", ift Rosenheim, Rosenheim 10/2023
- [27] ift certification programme QM 378 "climate.proof.build", ift Rosenheim, Rosenheim 11/2023
- [28] Goals for sustainable development - Guide for SMEs, Bavarian Chamber of Industry and Commerce (BIHK) e. V. and Bavarian State Office for the Environment (LfU), 2/2020
- [29] EU Green Claim Directive https://environment.ec.europa.eu/publications/proposal-directive-green-claims_en and Enabling sustainable purchasing decisions and green-washing (europa.eu)
- [30] Press release of the EU Parliament with statements on the current consultation status of the "Green Claim Directive", <https://www.europarl.europa.eu/news/de/press-room/20240212IPR17624/greenwashing-how-eu-firms-can-validate-their-green-claims>

Authors



Prof. Jörn P. Lass is the director of ift Rosenheim and has been working in the window and façade industry for over 40 years. As a trained glazier and window manufacturer, he completed a degree in wood technology and held management positions at a system provider, window and façade manufacturers as well as 14 years at ift Rosenheim in the areas of research, testing, quality monitoring, standardisation and certification. For six years, he was a full time professor at Rosenheim Technical University of Applied Sciences, where he led the "Building Envelope" programme. Now he is back at ift Rosenheim as Institute Director since January 2020.



Dipl.-Ing. **Jürgen Benitz-Wildenburg** is Head of PR & Communication at ift Rosenheim. As a carpenter, timber construction engineer and marketing expert, he has been working in the timber and window industry in various functions for 38 years. He passes on his experience as a lecturer, speaker and author.



Dipl.-Ing. (FH) **Christian Kehrer** heads the ift Certification Body and is a lecturer at Rosenheim University of Applied Sciences. He is a long-standing member of national and international standardisation committees, technical committees and various associations.



Christoph Seehauser, M.Sc., has been at ift Rosenheim since 2018 and is responsible for the areas of sustainability certification, CO₂ footprints and environmental product declarations. Prior to this, he studied environmental, process and energy technology at the Management Centre Innsbruck. He worked for several years in the industry sector on energy issues/energy monitoring, among other things.

Product

MB-86N Window system

Company

ALUPROF SA

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aluprof@aluprof.eu

www.aluprof.com

ALUPROF

Product description

The highly efficient MB-86N window and door system makes it possible to satisfy the diverse needs of users. There are two versions of the profiles, the ST and the SI, which are designed to meet different thermal energy efficiency requirements. The system provides superb performance parameters. Another advantage of the MB-86N is the high durability of the profiles, which make it possible to produce large-scale and heavy structures. Several versions are available. More info: at: <https://tiny.pl/dqtwq>



SkyTwin is the first solution on the market combining an external roller shutter and a screen type sunshade in a single product. This innovative integration results in a compact high-tech system that offers excellent thermal insulation year-round, leading to significant savings in heating and cooling costs. The technology of the SkyTwin system provides for a screen ZIP technology that ensures maximum sealing and protection of the interior against the presence of insects. More info at: <https://tiny.pl/dqtwk>



Product benefits

1. MB-86N provides a very good thermal insulation – U_w from $0,62 \text{ W}/(\text{m}^2\text{K})$,
2. MB-86N offers the wide range of profiles guarantees the aesthetics and resistance required of the structure
3. SkyTwin roller screen is equipped with two independently operating motors
4. SkyTwin includes common box that guarantees space and cost savings as well assembly time, providing faster assembly.



MB-86N SI

Product

Bundesverband Flachglas

Company

Bundesverband Flachglas e.V.

Mülheimer Straße 1
53840 Troisdorf, Germany

☎ +49 (0) 2241 – 8727-0

✉ info@bundesverband-flachglas.de

www.bundesverband-flachglas.de/



Product description

The BF is the recognised voice of the building glass industry in the areas of Lobbying & Networking / Standardisation & Technology and Communication & Public Relations.

Approximately 90 member companies with around 180 production plants and over 50 supporting members cover more than 90 % of German glass manufacturing. The BF's members include industrial glass producers as well as medium-sized companies that process construction glass into ready-to-use products (insulating glass, safety glass, etc.).

The BF represents the interests of its members in national and international standardisation committees and initiates/ supports research projects.

At a political level, the BF supports, for example the energy-saving regulations, campaigns for the use of solar gains and natural daylight and is involved in various initiatives, particularly for the energy-efficient refurbishment of existing buildings.

Product

Testing + Certification

Company

BSI Regulatory Services

Kitemark House, Maylands Avenue
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product.certification@bsigroup.com

www.bsigroup.com

bsi.

Product description

Market Access

Whether exporting to global markets or importing into the UK, our dedicated team of fenestration professionals support your certification process from concept to completion. With in-depth regulatory knowledge and product expertise we can assist you every step of the way.

Our team of experts includes Certification Managers regional Business Development Managers, Client Managers and Customer Care Advisors, not to mention our Test Engineers. We take care to test your products and assess your factory production controls with accuracy, providing a premium service and certification you can build on.

Our current team holds over 205 years of certification and industry experience, with 161 years dedicated specifically to fenestration testing and certification. We are ideally equipped to work with you from the design stage through to the testing and compliance process, helping you to get your products into the desired marketplace working with our local country offices.

Product benefits

UKCA Marking

The UKCA (UK Conformity Assessment) mark is the new UK conformity mark that came into force for construction products, including windows and doorsets, that are placed on the market in Great Britain (England, Wales and Scotland) after BREXIT. It covers most products that previously required the CE marking and will become mandatory from 30 June 2025. As a UK Approved Body (0086) for UKCA marking we can provide this service, so contact us to find out more.

CE Marking

The Construction Products Regulation, via CE marking continues to be a visible declaration from the manufac-



turer or importer that the product meets the minimum legal requirements for supply of construction products, including windows and doorsets placed on the market within the EU. We can offer CE marking services from our Netherlands (Notified Body No. 2797) Centre of Excellence.

The BSI Mark of Trust

Organizations who achieve third party certification (for their products or services) can display the BSI Mark of Trust on their products. BSI certification goes beyond the minimum requirements, and the Mark of Trust is unique to BSI. As a result, it is not only acknowledged by consumers but also accepted by specifiers, architects and procurement professionals as a method of demonstrating 'best in class' around the globe.

Product

Curtain wall system heroal C 50

Company

heroal – Johann Henkenjohann GmbH & Co. KG

Österwieher Str. 80
33415 Verl, Germany

+49 (0) 5246 507 0

info@heroal.de

www.heroal.de



Product description

As part of the ift special show at Fensterbau Frontale 2024, the aluminum system house heroal is presenting the multi-variant, insulated curtain wall system heroal C 50 with all-glass corner. The exhibit with partially integrated curtain wall sun protection heroal VS Z CS, external blinds from Folgner and ventilation flap heroal W 72 VF is integrated into the building automation in cooperation with Beckhoff Automation and thus offers a holistic solution for sustainable, comfortable, safe and intelligent buildings for today's and future residential and commercial construction.

In order to seamlessly integrate sun protection systems, the heroal VS Z, into mullion-transom curtain walls such as heroal C 50, heroal VS Z CS was developed partially integrated with the guide rail. heroal GR 25. The motor-driven ventilation flap heroal W 72 VF fulfills the desire for a pleasant and healthy indoor climate. The cooperation between heroal and Beckhoff Automation creates an incomparable range of solutions that covers all requirements for intelligent curtain walls and integrated building control.



Product benefits

The multi-variant, insulated curtain wall system heroal C 50 has proven itself in the design as a vertical or vertically folding mullion-transom, transom-transom or mullion-mullion curtain wall and offers a wide range of integration options.

The user-independent motorized ventilation flap heroal W 72 VF enables ventilation concepts for day and night. Narrow, floor-height opening elements integrate unobtrusively into the curtain wall.

The sun protection system heroal VS Z CS can be installed on standard mullion-transom systems with a minimum width of 50 mm as a classic front mounting using standard



sun protection bolts. The screw-on base for heroal VS Z CS semi-integrated is provided by an integration profile, which can already be processed in the workshop with the curtain wall mullions - this saves time on the construction site. Due to the installation close to the curtain wall, heroal VS Z CS semi-integrated is wind-stable up to 145 km/h.

The partnership with Beckhoff Automation not only offers the perfect integration of our products and systems, but also our support throughout the entire process on the way to the smart building. From planning to installation and service. This ensures that the entire technology matches perfectly and that maximum functionality and efficiency can be achieved.



Product

Holistic technical support

Company

ift Rosenheim ConTec GmbH

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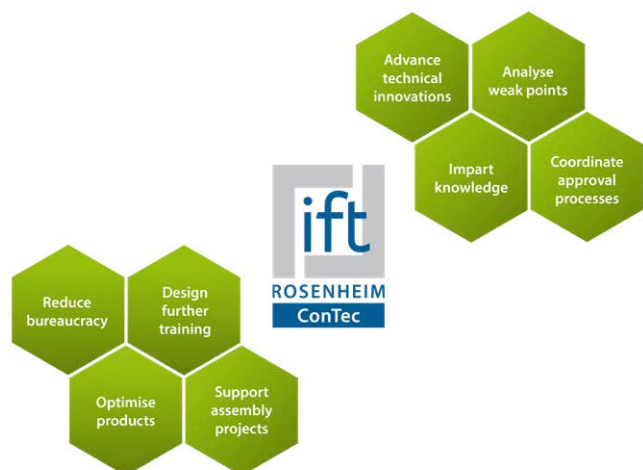
Product description

Range of services:

- Support with national and EU approval procedures (e.g. ETA, abZ, etc.)
- Support in the preparation, implementation or adaptation of factory production control based on national or European regulations
- Standards research with direct access to standards relevant to the industry
- Individual training concepts on technical/organizational tasks in the window, facade and building products industry
- Assessment and optimization of wall connections and concepts for freedom from barriers, monument protection and fire protection

Product benefits

1. **Holistic Support:** ift Rosenheim ConTec GmbH sees itself as a full-service provider for technical services in the component industry and accompanies you throughout the entire process of your projects - e.g. for approvals or new developments. The holistic support during all stages of a project can lead to faster time-to-market for new developments as well as better cooperation with official bodies
2. **Industry Expertise:** Our employees are experts in the components industry and have extensive technical experience. This is how we warranty discussions at eye level with engineers and technicians. You also benefit from our expertise in the introduction of sustainability measures, so that we can address your company-specific requirements in a targeted manner. This distinguishes us from other consulting companies on the market that are not focused on the components industry.
3. **Bureaucracy Reduction:** A short time-to-market is crucial in the development of new products. Our experience and expertise help to reduce bureaucra-



cy and handle methods faster and more efficiently: Approval procedures or new developments require cooperation with official bodies or authorities. Unfortunately, this is often a lengthy process that claims a lot of time and resources. Thanks to our experience, we know exactly how to make methods less complicated, faster and less bureaucratic. In this way, we minimize problems with official bodies such as DIBt, can clearly define deadlines and timelines, and optimize processes. We also bring our expertise to bear in areas that are not covered by standards.

Product

Hurricane missile testing device

Company

ift MessTec GmbH

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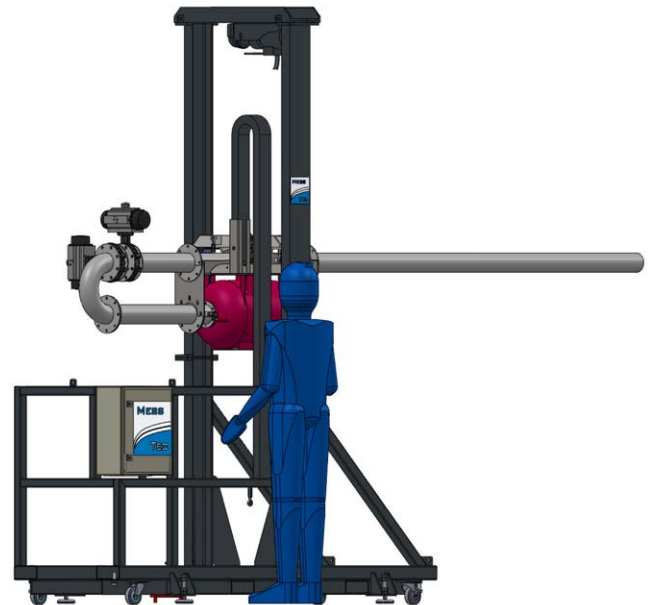
Product description

The test method described in ASTM E1886-13a is currently used to test resistance to these missiles. Alternatively, ISO/AWI 16316 is currently being developed, which is available in the 2022 draft.

It describes a firing device for large wooden slats with a cross-section of 38.1 x 88.9 or 50 x 100 (W x H in mm) and lengths between 525 and 4000 mm, at speeds of 9 to 30 m/s on average. There is also an apparatus for small missiles for steel balls with a diameter of 8 mm.

To generate reproducible test results, ift MessTec GmbH uses a standard-compliant pressure accumulator with correspondingly prescribed pressure measurement technology. The launch velocity is measured at the muzzle using an HMG400 velocity measuring system. This makes it easy to achieve the required 2 % measuring accuracy. The aiming points on the test specimen can be set with a laser depending on the lath dimensions and the required impact velocity.

The photometric calibration procedure with a high-speed camera can also be offered.



Product benefits

1. Use with height adjustment for single-storey components or lifting option for impacting facades.
2. Precise and reproducible adjustment and measurement in conjunction with laser pointing
3. Calibration standards with connection to national or international standards.
4. Standard-compliant with ASTM 1886-X1 and preparation for ISO/AWI 16316



Product

Slim 50 Wood Alu windows

Company

LOKVE d.o.o.

Homer 39
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lokve@lokve.com

www.lokve.com



Product description

Wood:	4 layered lamellas of spruce, larch or oak
Profile thickness:	103 mm
Installation depth:	103 mm
Wing profile width:	50 mm
Glass:	Three-layered insulation glass 48 mm
Gasket:	6
Hardware:	ROTO Designo (Hidden)
Safety:	Basic, RC1 or RC2

The wood-aluminium windows represent the windows of finest quality and design. SLIM 50 characterizes larger glass area, better thermal conductivity of windows – U_w , minimal CO₂ footprint. They are the best choice for the new generation of modern, low-energy and passive houses.



Product benefits

1. Three-layered insulation glass (the opportunity for various configurations of glass type and surface)
2. Aluminium mask for protection (modern design with aligned aluminium)
3. Glazing without silicone (the new generation of glazing with gasket)
4. Rectangular sash shape (without glass strip)
5. Six gaskets (the best heat and sound insulation)
6. Wood/aluminium windows saves energy and money
7. Environmental green production (contributes to the reduction of greenhouse gases in the atmosphere, and mitigates climate change)
8. Wood/aluminium windows provided sense of comfort, create a healthy and a pleasant atmosphere in the space, raise the value your real estate



Product

MEALUXIT AQUA MEALON AQUA

Company

MEA Bautechnik GmbH

Sudetenstraße 1
86551 Aichach, Germany

+49 (0) 8251 91-0

info@mea-group.com

www.mea-group.com

Product description

Heavy rainfall leads to an excessive volume of water, which overloads the sewer system and forces water to run off above ground. Standard basement windows and conventional residential windows offer only limited protection when light wells are full. Storm damage can occur in minutes. With MEALUXIT AQUA, MEA offers watertight window solutions that meet the flood resistance requirements of ift Rosenheim. Retrofitting requires minimal manual work and causes hardly any dirt, as only the window insert needs to be replaced.

If no MEA frame is installed, the MEALON AQUA is the ideal solution. It is suitable for all types of cellar openings and can also be used without a built-in frame. The basement windows are flexibly adapted to the existing openings, providing an adaptable solution for different requirements.

Product benefits

MEALUXIT AQUA

- Tilt and turn window insert with laminated safety glass
- Version with double or triple glazing
- Tested by ift Rosenheim, PB no. 11-002124-PR03 GASA01-02-en-01 (for all sizes), in accordance with ift guideline FE-07/1

MEALON AQUA

- Turn and tilt complete window with laminated safety glass
- Version with triple glazing
- In accordance with ift Rosenheim test, identical AQUA components such as MEALUXIT window insert



BUILDING SUCCESS



Product

blaugelb Triotherm⁺ Pre-Wall Installation System

Company

Meesenburg KG

Westerallee 162
24941 Flensburg, Germany

+49 461 5808-0

flensburg@meesenburg.de

www.meesenburg.com

Product description

Resulting forces from the construction elements are safely introduced by the blaugelb Triotherm⁺ Pre-Wall Installation System into the load-bearing anchor base. At the same time, the requirements for professional 3-level sealing (air-tightness, thermal/sound insulation, weather protection) of the construction element are guaranteed.

The blaugelb Triotherm⁺ Pre-Wall Installation System is the only installation system with an independent ETA (European Technical Assessment) recognised by the building inspectorate.

When using the blaugelb Triotherm⁺ Pre-Wall Installation System, heating and cooling costs are reduced by around 30 % compared to installation flush with the reveal. Additional living space is created by the positioning in the insulation layer. Thanks to their dovetail joint, low weight and compact dimensions, the blaugelb Triotherm⁺ Profiles are quick and straightforward to process, with unlimited options and free of waste.

blaugelb Triotherm⁺ System sustainability

For building certification in accordance with DGNB, LEED, BREEAM, the product has an EPD (Environmental Product Declaration) and is C2C Certified.

Product benefits

- Tested to be low in pollutants according to EMICODE EC1 Plus
- EPD (Environmental Product Declaration)
- Cradle to Cradle Certified® (C2C) at the Silver level
- Independent ETA (European Technical Assessment) recognised by the building inspectorate
- Can be infinitely extended, free of waste
- Low weight
- Time savings thanks to few working steps and swift combination of the system components



Product

Testing + Certification

Company

National Fenestration Rating Council (NFRC)

6305 Ivy Lane #410
Greenbelt, MD. 20770, USA

+1 301-589-1776
danderson@nfdc.org
www.nfrccommunity.org



Product description

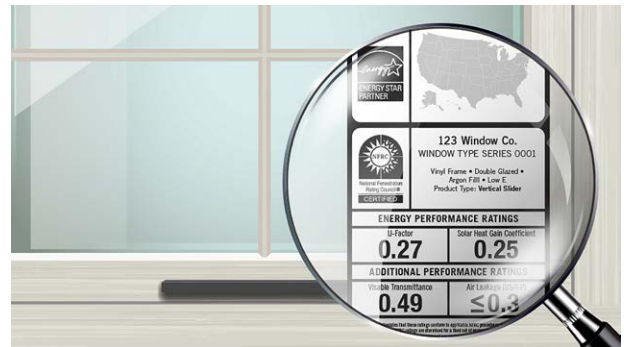
National Fenestration Rating Council (NFRC) puts windows, doors, skylight, applied films through rigorous performance testing with our accredited laboratories and Inspection Agencies to provide fair, credible and accurate ratings so the public via a label can make a well-informed purchase decision.

The purchasing decisions are made helpful through NFRC's Efficient Window Collaborative Selection Tool. This searchable database helps you find energy-efficient options suited to your home and climate. You can find the link to the EWC database at the following URL:
<https://efficientwindows.org/window-selection-tool/>

You will also find unbiased information from the NFRC on the technologies behind energy-efficient windows, and the benefits they offer.

Product benefits

1. Helps ensure windows, doors, and skylights meet building codes.
2. Helps consumers compare windows, doors, and skylights so they can make a well-informed purchase decision.
3. Contributes to healthier and more energy-efficient buildings.
4. Our ratings accelerate sustainability in the built environment.



Largest independent third-party rating and labeling system for the energy performance of windows, doors, and skylights in the U.S.



Product

PAVA: RAL-A Window System (82 mm) with STV® Technology



Company

Oknoplast Sp. z o.o.

Ochmanów 117
32-003 Ochmanów, Poland

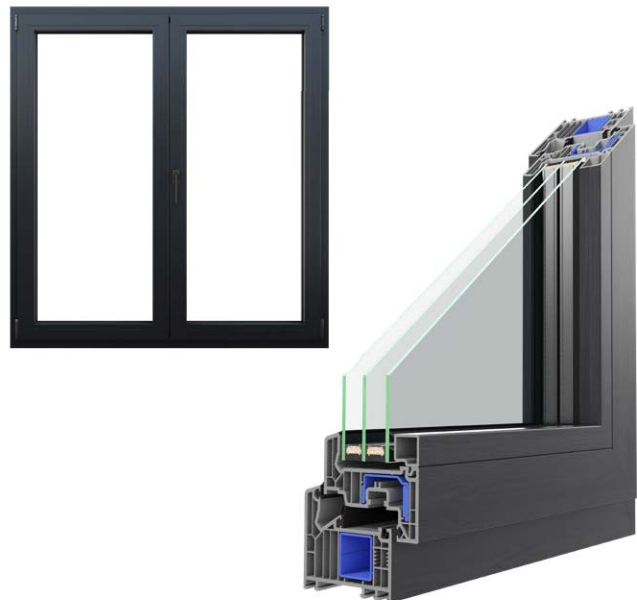
+49 (0) 5451 5458 37 70

info@oknoplast.de

www.oknoplast.de

Product description

The PVC window system PAVA (82 mm) in RAL-A quality is a multifunctional MD window system certified by ift Rosenheim for new construction and energy-efficient renovations. With a U-value of 0.73 W/(m²K), heat loss is significantly reduced. The special sun protection glass reduces heat permeability by 25 % while maintaining transparency. Vacuum glass without gas filling conserves resources. An internal blind and an external blind system allow precise regulation of light and heat. The cavity (SZR) blind shows minimal wear and tear. Homematic Smart Control Automation manages ventilation and sun protection. The smart ventilation system includes heat recovery and an anti-pollen filter. Additionally, it features heat-reflective foil and an ecologically and qualitatively sensible recycling component. STV® technology enhances the overall structural stability.



Product benefits

1. Exclusive OKNOPLAST profile developed jointly with VEKA.
2. 82 mm middle gasket system suitable for new builds and energy-efficient renovations.
3. U-value of 0.73 W/(m²K) minimizes heat loss.
4. Eligible for BAFA funding in energy-efficient renovations.
5. RAL A quality.
6. Certified product quality by ift Rosenheim.
7. STV® technology enhances overall structural stability.
8. Reduced risk of condensation, improved sound and thermal insulation in the glass rebate with STV® technology.
9. Special sun protection function reduces heat permeability by 25 % while maintaining transparency.
10. Vacuum glass without gas filling conserves resources.
11. Lowered narrow sash profile for up to 10 % more light penetration.
12. Up to 10 years OKNOPLAST warranty.
13. Internal blinds with minimal wear and protection from external influences.
14. External blind system allows precise light and heat control.
15. Homematic Smart Control Automation for ventilation and sun protection.
16. Smart ventilation system with heat recovery & anti-pollen filter.
17. Reduced thermal deformation through external heat-reflective foil.
18. Environmentally friendly and quality-conscious recycling component.
19. RC 2 / RC 2N certified.
20. Security fittings and warm edge already in standard.

Product

Nationwide recycling system for plastic windows, roller shutters and doors

Company

Rewindo GmbH Fenster-Recycling- Service

Am Hofgarten 1-2
53113 Bonn, Germany

+49 (0) 228 291283-0

info@rewindo.de

www.rewindo.de

Product description

Rewindo GmbH – Fenster-Recycling-Service, Bonn, which turned 20 in the summer of 2022, is the nationwide recycling Scheme of the leading German plastic window profile manufacturers. In addition to the nationwide collection system, the acquisition of further recycling and logistics partners, the establishment of more than 70 collection points and the establishment of a network along the value chain of PVC windows as supporters of Rewindo could be realized. Rewindo sees the window construction industry, demolition companies, private and public builders as well as the waste management industry as key target groups.





Product

Semperit Circularity

Company

Semperit Profiles Deggendorf GmbH

Land-Au 30
94469 Deggendorf, Germany

+49 (0) 991/2702 0

semperitprofiles@semperitgroup.com

www.semperitgroup.com



Product description

Semperit is a EPDM sealing provider of end-to-end solutions focusing on sustainability initiatives on the circular economy and reduction of CO₂ Footprint. Our vulcanized EPDM profiles can be integrated into a new life cycle.

Product benefits

1. Reduced CO₂ Footprint
2. Closes the Receycling Gap in the Construction Market
3. Implementing the Circular Economy of EPDM Sealing Gaskets



Product

Testing + Certification

Company

UL Solutions

Am Oberfeld
83026 Rosenheim, Germany

+44 (0) 1925 258876

EU.BuildingLifeSafety@ul.com

www.ul.com



Product description

As a global leader in safety science, we are uniquely qualified to support the building and construction products market. Our comprehensive offering helps you achieve and demonstrate quality, reliability and compliance with regulatory and environmental codes.

UL Solutions combines unparalleled building science expertise with state-of-the-art facilities to deliver the broadest range of building performance, testing, certification and advisory solutions.

We can help ensure that your materials, systems and assemblies are designed to meet these requirements by providing third-party certification of their safety and performance.

Our solutions also help confirm the safety, performance, reliability and security of your fire-resistant rated designs. Fire-resistance rated designs are used to achieve code compliant installations where the building codes require hourly rated designs. We test assemblies to international standards, establishing an hourly rating to provide evidence of compliance to code requirements.



Product benefits

1. We understand that meeting fire resistance safety requirements can be challenging, which is why we provide training, advisory, testing, verification, inspection and certification solutions for the fire resistance industry.
2. We can provide third-party Verification that your products are in compliance with industry standards, helping them get to the market faster.
3. The UL Certification Mark on fire resistant products, systems and assemblies is relied on by code enforcement officials and buyers to provide confidence that products and systems meet regulatory and market requirements.
4. The UL Evaluation Report provides code authorities with added assurance that assemblies have been evaluated to the diverse code requirements to which they must comply.
5. Our testing services span across a broad spectrum of standards and evaluate product performance to all the critical attributes necessary to provide confidence in product performance.

Product

Hydro CIRCAL 100R

Company

WICONA / Hydro Building Systems Germany GmbH

Einsteinstrasse 61
89077 Ulm, Germany

+49 (0) 731 8940-0

info@wicona.com

www.wicona.com

WICONA®

By  Hydro

Product description

Hydro CIRCAL 100R made from 100 % recycled end-of-life aluminum

Hydro is currently the only producer that can manufacture 100 % end-of-life aluminum – i.e. post-consumer scrap – with a CO₂ footprint of almost zero.

As a Hydro brand, WICONA is the first aluminum system house to offer this aluminum alloy for high-quality door, window and facade profiles.



Product benefits

1. 100 % end-of-life aluminum
2. 0.5 kg CO₂ per kg aluminum
3. Real circular economy
4. Urban mining

Imprint

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Notes:

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OKNOPLAST
Europas Fensterexperten

