

# Material data sheet

Insulating strips of Low Lambda  
**PA 66 GF25** – dry impact resistant.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

**Insulating strips of Low Lambda PA 66 GF25  
- dry impact resistant.**

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips	
			Dry <sup>(1)</sup>	Equilibrium moisture content <sup>(2)</sup>
melting temperature	EN ISO 11357-3	°C	min. 250 <sup>(3)</sup>	min. 250 <sup>(3)</sup>
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,0 +/- 0,1	1,0 +/- 0,1
annealing residue (glass fibre content)	EN ISO 1172	%	25 +/- 2,5	25 +/- 2,5
shore hardness D	EN ISO 868	-	77 +/- 4 <sup>(4)</sup>	67 +/- 4 <sup>(4)</sup>
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 20 <sup>(5)</sup>	min. 30 <sup>(5)</sup>
tensile strength	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 50 <sup>(6)</sup>	min. 35 <sup>(6)</sup>
Young's modulus	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 2900 <sup>(6)</sup>	min. 1300 <sup>(6)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 3 <sup>(6)</sup>	min. 8 <sup>(6)</sup>

- 1) Sample water content less than 0,2 % by weight
- 2) Fast conditioning acc. to EN ISO 1110 (23°C / 50%)
- 3) Maximum temperature 300°C
- 4) Specimen thickness 2mm, unstacked
- 5) Specimen Typ 2fU (50 mm x 10 mm x 2mm)
- 6) Specimen Typ 1BA

**In case of specific questions we gladly offer our individual support.**

**Insulating profiles for windows, doors and facades.**

# Material data sheet

Insulating strips of bio-based **PA 610 GF25**.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

## Insulating strips of bio-based PA 610 GF25.

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips		Injection-moulded samples
			Dry <sup>(1)</sup>	Equilibrium moisture content <sup>(2)</sup>	Dry <sup>(1)</sup>
melting temperature	EN ISO 11357-3	°C	min. 220 <sup>(3)</sup>	min. 220 <sup>(3)</sup>	min. 220 <sup>(3)</sup>
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,25 +/- 0,05	1,25 +/- 0,05	1,25 +/- 0,05
annealing residue (glass fibre content)	EN ISO 1172	%	25 +/- 2,5	25 +/- 2,5	25 +/- 2,5
shore hardness D	EN ISO 868	-	80 +/- 4 <sup>(4)</sup>	77 +/- 4 <sup>(4)</sup>	80 +/- 4
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 20 <sup>(5)</sup>	min. 20 <sup>(5)</sup>	min. 50 <sup>(6)</sup>
tensile strength	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 70 <sup>(7)</sup>	min. 50 <sup>(7)</sup>	min. 90 <sup>(8)</sup>
Young's modulus	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 3200 <sup>(7)</sup>	min. 2200 <sup>(7)</sup>	min. 5500 <sup>(8)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 1,5 <sup>(7)</sup>	min. 1,5 <sup>(7)</sup>	min. 1,5 <sup>(8)</sup>

- 1) Sample water content less than 0,2 % by weight
- 2) Fast conditioning acc. to EN ISO 1110 (23°C / 50%)
- 3) Maximum temperature 280°C
- 4) Specimen thickness 2mm, unstacked
- 5) Specimen Typ 2fU (50 mm x 10 mm x 2mm)
- 6) Specimen Typ 1fU (80 mm x 10 mm x 4mm)
- 7) Specimen Typ 1BA
- 8) Specimen Typ 1A

This characteristic values were prepared from a small amount of test results.

Therefore some values include high safety factors. Tested values were much higher than published herein.

Insulating strips made of this material successfully passed the test according to EN 14024 at IFT-Rosenheim.

**In case of specific questions we gladly offer our individual support.**

**Insulating profiles for windows, doors and facades.**

# Material data sheet

Insulating strips of bio-based **PA 410 GF25**.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

## Insulating strips of bio-based PA 410 GF25.

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips		Injection-moulded samples
			Dry <sup>(1)</sup>	Equilibrium moisture content <sup>(2)</sup>	Dry <sup>(1)</sup>
melting temperature	EN ISO 11357-3	°C	min. 240 <sup>(3)</sup>	min. 240 <sup>(3)</sup>	min. 240 <sup>(3)</sup>
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,27 +/- 0,05	1,27 +/- 0,05	1,27 +/- 0,05
annealing residue (glass fibre content)	EN ISO 1172	%	25 +/- 2,5	25 +/- 2,5	25 +/- 2,5
shore hardness D	EN ISO 868	-	80 +/- 4 <sup>(4)</sup>	77 +/- 4 <sup>(4)</sup>	80 +/- 4
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 25 <sup>(5)</sup>	min. 25 <sup>(5)</sup>	min. 45 <sup>(6)</sup>
tensile strength	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 75 <sup>(7)</sup>	min. 50 <sup>(7)</sup>	min. 100 <sup>(8)</sup>
Young's modulus	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 3700 <sup>(7)</sup>	min. 2600 <sup>(7)</sup>	min. 5800 <sup>(8)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 1,5 <sup>(7)</sup>	min. 1,5 <sup>(7)</sup>	min. 1,5 <sup>(8)</sup>

- 1) Sample water content less than 0,2 % by weight
- 2) Fast conditioning acc. to EN ISO 1110 (23°C / 50%)
- 3) Maximum temperature 280°C
- 4) Specimen thickness 2mm, unstacked
- 5) Specimen Typ 2fU (50 mm x 10 mm x 2mm)
- 6) Specimen Typ 1fU (80 mm x 10 mm x 4mm)
- 7) Specimen Typ 1BA
- 8) Specimen Typ 1A

This characteristic values were prepared from a small amount of test results.

Therefore some values include high safety factors. Tested values were much higher than published herein.

Insulating strips made of this material successfully passed the test according to EN 14024 at IFT-Rosenheim.

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**Insulating profiles for windows, doors and facades.**

# Material data sheet

High precision strips of **PBT GF30**.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

## High precision strips of PBT GF30.

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips <sup>(1)</sup>	Injection-moulded samples <sup>(2)</sup>
melting temperature	EN ISO 11357-3	°C	min. 215	min. 215
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,53 +/- 0,05	1,53 +/- 0,05
annealing residue (glass fibre content)	EN ISO 1172	%	30 +/- 2,5	30 +/- 2,5
shore hardness D	EN ISO 868	-	82 +/- 4 <sup>(3)</sup>	77 +/- 4
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 17 <sup>(4)</sup>	min. 30 <sup>(5)</sup>
tensile strength	EN ISO 527-2 and -4	MPa	min. 67 <sup>(6)</sup>	min. 95 <sup>(7)</sup>
Young's modulus	EN ISO 527-2 and -4	MPa	min. 3600 <sup>(6)</sup>	min. 6800 <sup>(7)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 1,9 <sup>(6)</sup>	min. 2,2 <sup>(7)</sup>

<sup>1)</sup> Water Content less than 0.2 % (EMC 0.2 % at 23°C/50 % RH )

<sup>2)</sup> Dry as moulded

<sup>3)</sup> Specimen thickness 2mm unstacked

<sup>4)</sup> Specimen Type 2fU (50mm x 10mm x 2mm)

<sup>5)</sup> Specimen Type 1fU (80mm x 10mm x 4 mm)

<sup>6)</sup> Specimen Typ 1BA

<sup>7)</sup> Specimen Type 1A

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**Insulating profiles for windows, doors and facades.**



# Material data sheet

Insulating strips of **PA 66 GF40**  
– dry impact resistant.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

**Insulating strips of PA 66 GF40**  
**- dry impact resistant.**

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips	
			Dry <sup>(1)</sup>	Equilibrium moisture content <sup>(2)</sup>
melting temperature	EN ISO 11357-3	°C	min. 250 <sup>(3)</sup>	min. 250 <sup>(3)</sup>
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,45 +/- 0,05	1,45 +/- 0,05
annealing residue (glass fibre content)	EN ISO 1172	%	40 +/- 2,5	40 +/- 2,5
shore hardness D	EN ISO 868	-	83 +/- 4 <sup>(4)</sup>	78 +/- 4 <sup>(4)</sup>
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 30 or without break <sup>(5)</sup>	min. 40 or without break <sup>(5)</sup>
tensile strength	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 100 <sup>(6)</sup>	min. 60 <sup>(6)</sup>
Young's modulus	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 5500 <sup>(6)</sup>	min. 2500 <sup>(6)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 3 <sup>(6)</sup>	min. 7 <sup>(6)</sup>

- 1) Sample water content less than 0,2 % by weight
- 2) Fast conditioning acc. to EN ISO 1110 (23°C / 50%)
- 3) Maximum temperature 300°C
- 4) Specimen thickness 2mm, unstacked
- 5) Specimen Typ 2fU (50 mm x 10 mm x 2mm)
- 6) Specimen Typ 1BA

**In case of specific questions we gladly offer our individual support.**

**Insulating profiles for windows, doors and facades.**

# Material data sheet

Insulating strips of **PA 66 GF25**  
– dry impact resistant.

Insulating profiles  
for windows, doors  
and facades.

# Material data sheet

**Insulating strips of PA 66 GF25**  
**- dry impact resistant.**

Characteristic	Reference standard	Unit	Samples prepared from extruded insulating strips		Injection-moulded samples
			Dry <sup>(1)</sup>	Equilibrium moisture content <sup>(2)</sup>	Dry <sup>(1)</sup>
melting temperature	EN ISO 11357-3	°C	min. 250 <sup>(3)</sup>	min. 250 <sup>(3)</sup>	min. 250 <sup>(3)</sup>
density	EN ISO 1183-1 or -3	g/cm <sup>3</sup>	1,3 +/- 0,05	1,3 +/- 0,05	1,3 +/- 0,05
annealing residue (glass fibre content)	EN ISO 1172	%	25 +/- 2,5	25 +/- 2,5	25 +/- 2,5
shore hardness D	EN ISO 868	-	82 +/- 4 <sup>(4)</sup>	78 +/- 4 <sup>(4)</sup>	84 +/- 4
impact strength	EN ISO 179-1	kJ/m <sup>2</sup>	min. 30 or without break <sup>(5)</sup>	min. 40 or without break <sup>(5)</sup>	min. 35 <sup>(6)</sup>
tensile strength	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 80 <sup>(7)</sup>	min. 50 <sup>(7)</sup>	min. 110 <sup>(8)</sup>
Young's modulus	EN ISO 527-2 and -4	N/mm <sup>2</sup>	min. 4500 <sup>(7)</sup>	min. 2000 <sup>(7)</sup>	min. 6000 <sup>(8)</sup>
elongation at break	EN ISO 527-2 and -4	%	min. 3,0 <sup>(7)</sup>	min. 7,0 <sup>(7)</sup>	min. 3,0 <sup>(8)</sup>

- 1) Sample water content less than 0,2 % by weight
- 2) Fast conditioning acc. to EN ISO 1110 (23°C / 50%)
- 3) Maximum temperature 300°C
- 4) Specimen thickness 2mm, unstacked
- 5) Specimen Typ 2fU (50 mm x 10 mm x 2mm)
- 6) Specimen Typ 1fU (80 mm x 10 mm x 4mm)
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**In case of specific questions we gladly offer our individual support.**

**Insulating profiles for windows, doors and facades.**

# Declaration sheet

Absence of hazardous substances in  
Technoform Bautec material **PA66 GF25**  
– dry impact resistant.

# Declaration sheet

**Absence of hazardous substances in Technoform Bautec material PA66 GF25  
- dry impact resistant.**

We hereby confirm, that the above-mentioned material does not intentionally contain any of the additives listed below.

## Living Building Challenge Red List

- Asbestos

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- Cadmium

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- Chlorinated Polyethylene and Chlorosulfonated Polyethylene

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- Chlorofluorocarbons (CFCs)

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- Choloroprene (Neoprene)

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- Formaldehyde (added)

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- Halogenated Flame Retardants (PBDE, TBBPA, HBCD, Deca-BDE, TCPP, TCEP and other retardants with bromine or chlorine)

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- Hydrochlorofluorocarbons (HCFCs)

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- Lead (added)

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- Mercury

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- Petrochemical Fertilizers and Pesticides

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- Phthalates

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- Polyvinyl Chloride (PVC or CPVC)

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- Wood treatments containing Creosote, Arsenic or Pentachlorophenol

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## Google's Materials of Concern

- Anti-microbial chemicals

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- Coal ash

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- Nanomaterials

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## U.S. EPA Chemicals of Concern

- Benzidine Dyes

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- Bisphenol A (BPA)

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- Methylene Diphenyl Diisocyanate (MDI)

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- Nonylphenol and Nonylphenol

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- Ethoxylates

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- Perfluorinated chemicals (PFCs, including PFOA and Teflon)

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- Short chain chlorinated paraffins

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- Toluene Diisocyanate (TDI)

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The absence of hazardous substances was not determined by Technoform Bautec through specific testing but it is based upon information provided by our raw material suppliers, who do not exclude that some of the substances mentioned above may possible be present as trace impurities.

This statement is only valid for the material mentioned above. We cannot guarantee that your final product does not contain any additives as these may be result of additional processing at your plant, which is not under our control.

The product information presented above is correct to the best of our knowledge today.

**Insulating profiles for windows, doors and facades.**

# Declaration sheet

## Absence of hazardous substances in Technoform Bautec material PA66 GF25 - dry impact resistant.

We hereby confirm, that the above-mentioned material does not intentionally contain any of the additives listed below.

### State of the Environment Norway :

#### List of Priority Substances

Arsenic
Bisphenol A
Brominated flame retardants
Diethylhexylphthalat
Certain surfactants (DTDMAC, DSDMAC, DHTDMAC)
1,2-Dichloroethane (EDC)
Dioxins and furans
Cadmium
Chlorinated alkyl benzenes (CABs)
Chromium
Hexachlorobenzene
Lead
Medium-chain chlorinated paraffins

Mercury
Musk xylenes
Nonylphenol and its ethoxylates
Octylphenol and its ethoxylates
Polycyclic Aromatic Hydrocarbons (PAH)
Pentachlorophenol (PCP)
Polychlorinated biphenyls (PCBs)
PFOA
Short-chain chlorinated paraffins
Siloxane-D4
Siloxane-D5
TCEP (tris (2-chloroethyl) phosphate)
Tetrachloroethene (PER)

The absence of hazardous substances was not determined by Technoform Bautec through specific testing but it is based upon information provided by our raw material suppliers, who do not exclude that some of the substances mentioned above may possibly be present as trace impurities.

This statement is only valid for the material mentioned above. We cannot guarantee that your final product does not contain any additives as these may be result of additional processing at your plant, which is not under our control.

The product information presented above is correct to the best of our knowledge today.

# **EC-safety data sheet**

**PA 66**

**Insulating profiles  
for windows, doors  
and facades.**



# EC-safety data sheet

## 1. Product and company name

### 1.1 Product data

**Subject No.:** 200000-999900  
**Designation:** Insulating strips

### 1.2 Data on manufacturer

**Supplier:** Technoform Bautech Kunststoffprodukte GmbH  
 Ostring 4, D-34277 Fuldabrück  
 Phone: +49 561/9583-400  
 Fax: +49 561/9583-521

## 2. Composition / Data on constituents

### 2.1 Chemical properties (individual substance)

PA66  
**Additional information:** In addition to PA66, also contains pigments, fillers, additives, stabilizers and glass fibres.

### 2.2 Chemical properties (preparation)

**Description:** Product consists of PA 66, glass-fibre reinforced.  
**Hazardous constituents:** None.

## 3. Potential hazards

None.

## 4. First-aid measures

**Upon contact with skin:** Burns caused by molten material require medical care.

## 5. Fire-fighting measures

**Suitable extinguishing agents:**  
 Water, foam, dry powder and CO<sub>2</sub>.  
 Unsuitable extinguishing agents for reasons of safety: None.  
**Possibly released at temperatures in excess of 300°C:**  
 Toxic gases, CO, Accompanied by traces of: hydrogen cyanide.  
**Further information:** Formation of further breakdown and oxidation products is dependent on the conditions of the fire. Dispose of fire residues and contaminated fire-fighting water in accordance with regionally applicable official directives.  
**Special protective equipment:** When fighting fires, it is necessary to wear a gas mask with an independent air supply.

## 6. Measures in case of accidental leakage

No personal or environmental precautionary measures necessary.

## 7. Handling and storage

**Notes on safe handling:** No special measures required.  
**Notes on fire and explosion protection:** No special measures required.  
**Industrial hygiene:** No special measures required.  
**Storage:** Store in a dry place to ensure that handling properties are maintained.

## 8. Exposure limits and personal protective equipment

None.

## 9. Physical and chemical properties

### 9.1 Appearance

**Shape:** Oblong  
**Colour:** Black  
**Odour:** Odourless

### 9.2 Safety data

**Melting point:** 250–265 °C  
**Flash point:** 490 °C  
**Ignition point:** 530 °C  
**Density:** 1.25–1.35 g/ccm  
**Fire-promoting properties:** Incineration or overheating.

### 9.3 Further data

**Combustion rate of PA66:** 1–2 cm/min

## 10. Stability and reactivity

Thermal decomposition at > 300 °C.  
**Hazardous decomposition products:** Carbon monoxide, hydrogen cyanide; Depending on fire conditions: Aldehydes, amines, ammonia, ketones, nitriles and traces of nitrogen oxides possible.  
**Further data:** No hazardous reactions observed.

## 11. Toxicological data

According to our experience and information, the product does not constitute a health hazard when handled and used correctly.

## 12. Ecological data

**No ecotoxic effects; water hazard class (WHC):** 0 (generally not a water hazard because water-insoluble, non-toxic solid)  
**General note:** When handled correctly, no environmental risks expected.

## 13. Notes on disposal

The material in the product can be recycled. The product can be disposed of as household refuse in accordance with local directives or can be fed into a suitable incinerator.

## 14. Transportation data

Does not constitute a hazard in terms of transportation regulations.

## 15. Regulations

Not classified by Dangerous Chemicals Ordinance or relevant EC Guidelines.  
 When handling dust generated during mechanical processing, e.g. grinding, observe the relevant directives/limiting values for fines (lower toxic limit for fines: 6 mg/m<sup>3</sup>).

## 16. Other data

The cited data are based on our current knowledge and must not be taken as a warranty of properties.  
 The recipient of our product assumes responsibility to observe existing laws and provisions.

# **EC-directives info sheet**

Confirmation of fulfilment of EC directives.

**Insulating profiles  
for windows, doors  
and facades.**

# EC-directives info sheet

## Confirmation of fulfilment of EC directives.



### Directive 2002/95/EC

We hereby confirm that, in the production of Technoform Bautec products from PA66 GF25 dry impact-modified reinforced and PA66 GF40 dry impact-modified reinforced, none of the heavy metals listed in Directive 2002/95/EC (“restriction of the use of certain hazardous substances in electrical and electronic equipment”) such as lead, cadmium, chrome VI and mercury, as well as polybrominated biphenyls (PBB) or poly-brominated diphenyl ether (PBDE).



### Directive 76/769/EEC

We confirm, furthermore, that the above-mentioned products satisfy the requirements of Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations.

Ongoing amendments to this Directive, e.g. 2003/11/EC, are systematically analysed in our company and their implementation ensured.

# Handling instructions

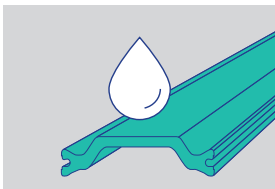
Storage of insulating strips made of PA 66.

# Handling instructions

## Storage of insulating strips made of PA 66.

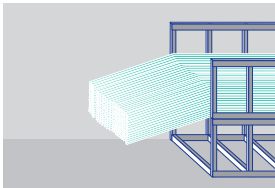
Insulating strips made of polyamide are initially dry but absorb moisture from the environment in the course of time after manufacture. The rate and level of moisture absorption depend on the following factors:

- Ambient humidity
- Ambient temperature
- Storage period

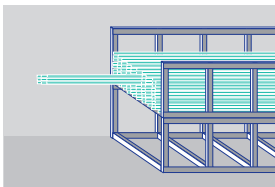


### The problem

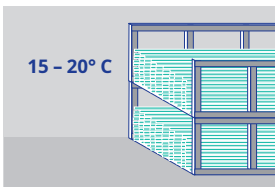
In summer, when the temperature and relative humidity in warehouses are higher than usual, the insulating strips absorb more moisture than in the remaining seasons, even when stored properly for brief periods. During storage under dry conditions, the equilibrium moisture content is lower, approx. 2%. During extended storage periods, the strips change shape according to storage conditions.



The longer the storage period, the greater the possibility of the sag becoming permanent. If the strips are stacked on pallets which are shorter than the strip length (e.g. 6.500 mm strips on 6.000 mm pallets), they sag at the ends. This applies to strips stored in pallets where there is no floor. The strips shouldn't overlap the end of the supports.



A twisting of the strips, which can occur, for example, when individual bundles are removed from a pallet, can also become permanent if the strips are not straightened.



### The correct storage

In order to avoid bending or twisting of the strips, take note of the following factors:

- Store the strips so that the degree of sag is minimized
- Make sure to support protruding sections
- Brief storage periods
- Store covered with an ideal room temperature range of 15 – 20 °C

# Handling instructions

Coating of composite metal / plastic profiles.

**Insulating profiles  
for windows, doors  
and facades.**

# Handling instructions

## Coating of composite metal/plastic profiles.

Composite metal / plastic profiles are generally coated as follows:

### 1. Conventional cleaning and / or pre-treatment baths

### 2. Drying of profiles

(e.g. blowing-out or drainage using compressed air)

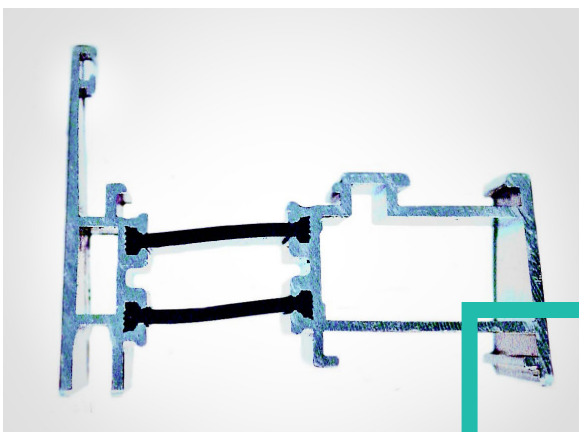
It must be ensured that no residues from the bath are present on the profiles, in the cavities or gaps. Such moisture can lead to the following problems: Formation of blisters or even rupture of insulating strips as a result of oven temperature.

### 3. Suspending profiles for coating

In order to avoid excessive bending in the horizontal coating process the profile might have to be supported if either the weight of the assembled profile is too high or if the geometry-dependent expansions are too different. In order to eliminate lob-sidedness in the vertical coating process it is important to hang the assembled profile from the aluminium part / parts (heavier part) so that it will hang as vertically as possible.

### 4. Coating the profiles in the oven

The object temperature of 180°C – 200°C and the dwell time of approx. 20 min. must not be exceeded. If this temperature or time is exceeded, the stability of the insulating strips may suffer. There is the risk of the profiles dis-aligning and moving out of parallel as well as a considerable loss of strength in the connection between the two aluminium sections.



Dis-aligning  
of the composite profiles

# Handling instructions

Assembling of PA insulating strips in  
aluminium profiles.



# Handling instructions

## Assembling of PA insulating strips in aluminium profiles.

The insulating strips are usually assembled as follows:

### 1. Room temperature

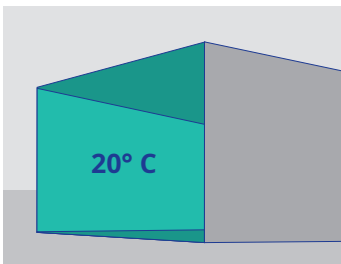
Assembly should be performed in a production hall at room temperature under standard climatic conditions. Before assembly, ensure that the insulating strips have also attained room temperature (refer also to handling instructions on "Storage").

### 2. Knurling

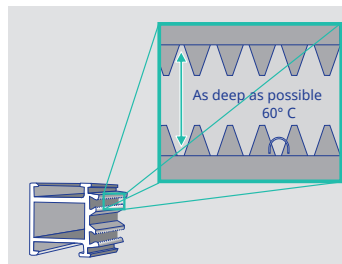
As the degree of knurling of aluminium profiles subsequently influences the shearing strength of the assembled profile, the knurling edges should be as pronounced and sharp as possible. It is essential to ensure that the insulating strips can still be inserted into the groove after knurling (also in the case of painted aluminium profiles). When knurling painted aluminium profiles, take into consideration that the paint layer may cause the opening of the groove to be smaller.

### 3. Assembling

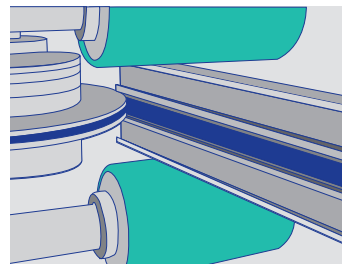
The rolling-in machine must be adjusted for the geometry involved. Parallel guidance of the aluminum profiles should be ensured, if necessary by using supporting rollers. The hammer must penetrate the head of the insulating strip.



1. Ideal room temperature



2. Close-up view of a knurling



3. Assembling process

# Handling instructions

Blistering and foaming of insulating strips  
consisting of **PA 66 GF25**.

# Handling instructions

## Blistering and foaming of insulating strips consisting of PA 66 GF25.

**Problem statement:**

Polyamide is a hydrophilic thermoplastic which absorbs moisture from the environment in the course of time. The rate and degree of moisture-absorption is dependent on the ambient temperature and ambient humidity.

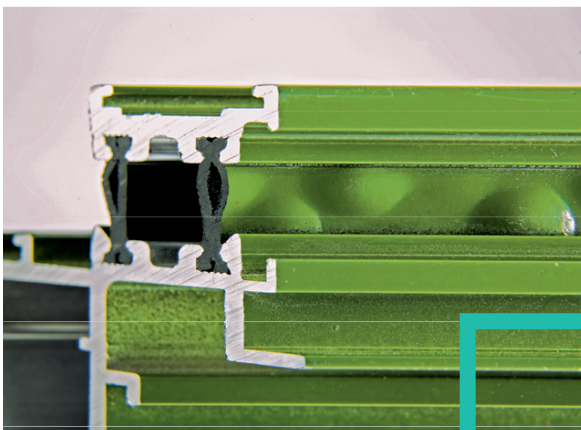
If a polyamide insulating strip is subjected to extreme temperatures after having absorbed moisture, this moisture is converted into the vapour phase. This change of state is accompanied by an increase in volume, which can result in blistering or foaming of the insulating strip.

**This is dependent on the combined action of two parameters (temperature and moisture content):**

Our experience has shown that “conventional” moisture contents resulting from absorption from air during storage of strips/composite allow object temperatures of 180 °C to 200 °C and dwell times of approx. 20 minutes during the baking of powder coatings.

**To prevent blistering and foaming of insulating strips consisting of PA66 GF25, please ensure the following:**

- dry storage of insulating strips and of untreated composites (Rainwater, condensation etc. which has collected on the insulating strips will be absorbed by the strips thereby increasing the normal storage moisture level.)
- thorough drainage of composites following pre-treatment and anodization (residual water is absorbed more rapidly by the insulating strip during baking as a result of the oven temperatures and thus increases the normal storage moisture level.)
- uniform temperature in drying and baking ovens (depending on oven type and location of temperature sensor, the temperature of the injected air can significantly exceed the selected oven temperature. Please observe the appropriate object temperature for the various shell weights.)



Blistering/Foaming inside the insulating profile

**Insulating profiles for windows, doors and facades.**

# LCA-study

Life-cycle assessment study about the production of polyamide insulating strips.

**Insulating profiles  
for windows, doors  
and facades.**

## LCA-study

Life-cycle assessment study about the production of polyamide insulating strips.

### Summary

Technoform Bautech Kunststoffprodukte GmbH commissioned the PE Product Engineering GmbH to perform an LCA study about the production of insulating strips. The study is usable as a part of an LCA study about the total life time (production, use, recycling/disposal phase) of aluminum windows.

The figure on the bottom illustrates the system boundaries, the study is based on. The data used in the study are representative for Germany in the year 1996. Functional unit in this study is 1 kg of polyamide insulating strips. The results are dominated by the production of the raw material. The reduction of the laughing gas emissions (N<sub>2</sub>O) during the polyamide 66 synthesis over the last years is taken into account.

Production residues are recycled, therefore is the amount of waste in the plant small. All transportation processes are secondary.

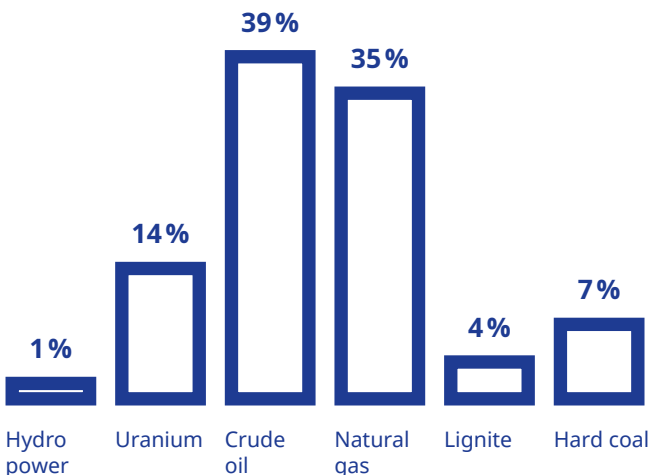
Dettingen/Teck, Nov 17th 1998

### Eco-profile polyamide insulation bridges

#### Evaluation of primary energy (PE)

primary energy n. renewable	MJ/kg	139,8
primary energy hydro power	MJ/kg	1,7

#### Contribution of different non renewable energy careers



#### Impact assessment (kg/kg)

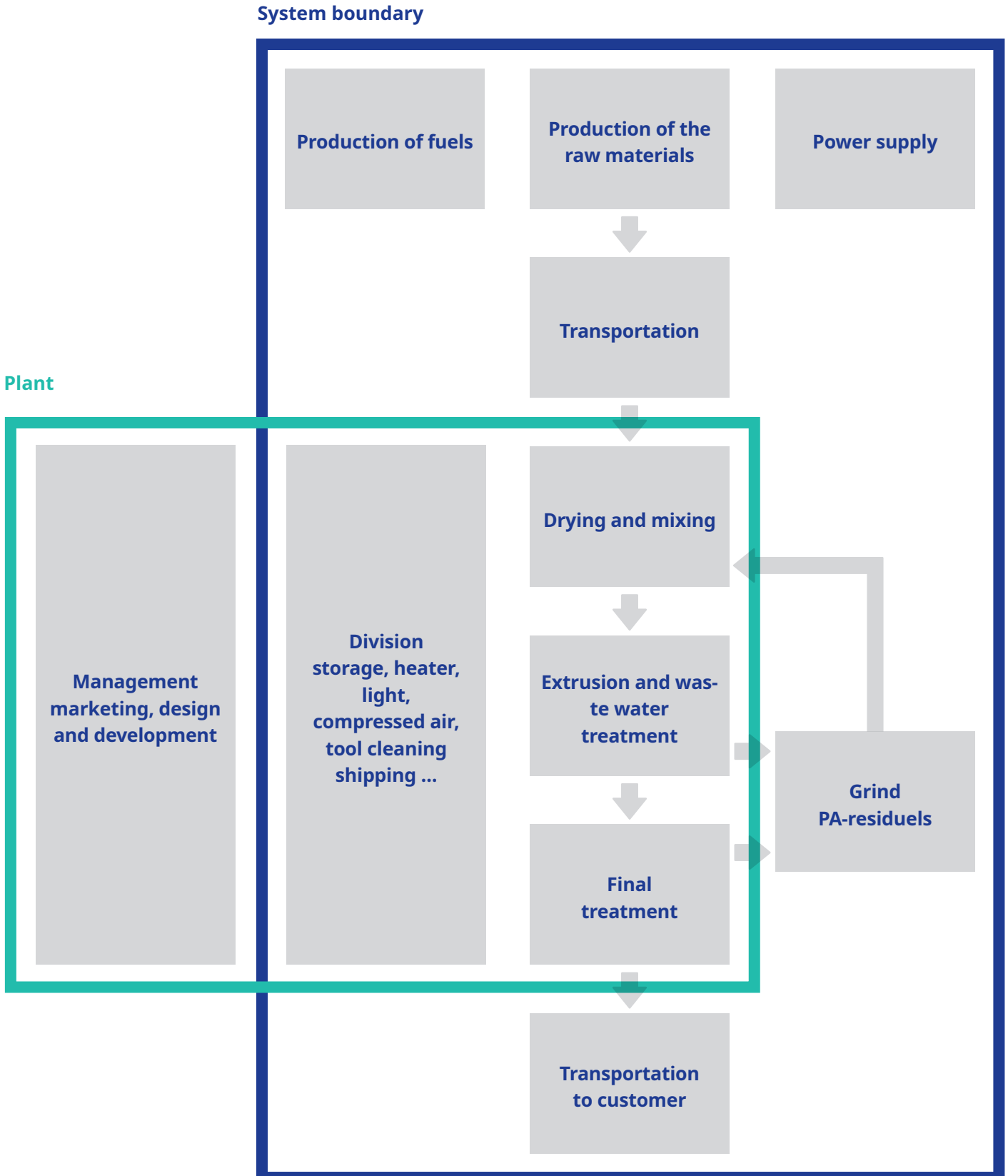
Global warming potential (GWP)	CO <sub>2</sub> -Äq.	8,18
Ozon depletion potential (ODP)	R11-Äq.	8,7*10 <sup>-8</sup>
Acidification potential (AP)	SO <sub>2</sub> -Äq.	0,0198
Eutrophication potential (NP)	PO <sub>4</sub> -Äq.	0,0036
Photoch. ozone creation p. (POCP)	C <sub>2</sub> H <sub>4</sub> -Äq.	0,0076

#### Evaluation of Waste

Overburden	kg/kg	11,95
Ore proceeding residual	kg/kg	1,15
Waste	kg/kg	0,153
Hazardous waste	kg/kg	0,0021
Radioactive waste	kg/kg	0,0072

# LCA-study

Life-cycle assessment study about the production of polyamide insulating strips.



D05TB-Group11 Version2\_25.11.2009

Insulating profiles for windows, doors and facades.

# Confirmation sheet

Fire classification and calorific value of  
**PA 66 GF25.**

# Confirmation sheet

## Fire classification and calorific value of PA 66 GF25.

### Reaction to fire classification

according to EN 13501-1

We confirm that, unmanufactured material used by Technoform Bautech to produce insulating strips "PA66 GF25 dry impact-modified" conforms to the requirements of "reaction to fire class E" according to EN 13501-1.

The test has been carried out with insulating strips with a wall-thickness of 2,1 mm and 1,6 mm in accordance to EN ISO 11925-2.

### Confirmation of calorific value

of raw material PA66 GF25

We hereby confirm the calorific value of the raw material PA 66 GF25 dry impact processed by Technoform Bautech:

**Hi = 23 MJ/kg**

Reference standard DIN 51900



# Confirmation sheet

Confirmation of fulfilment of REACH  
regulation.

**Insulating profiles  
for windows, doors  
and facades.**

# Confirmation sheet

## Confirmation of fulfilment of REACH regulation.

### EC No 1907/2006

We hereby confirm that in the production of Technoform Bautech products, none of the defined substances in the REACH regulations EG Nr. 1907/2006 requiring registration and evaluation are used.

Polymers are exempted from registration and evaluation as prescribed by REACH regulation in Title I, Chapter 1, Article 2, Section 9. This definition applies to our products in PA66 GF25 dry impact-modified reinforced and PA66 GF40 dry impact-modified reinforced.

### Notice

Ongoing amendments concerning the REACH regulations are systematically analysed in our company and their implementation ensured. Further information is recorded in our EC Safety Data Sheet (D05TB-Group05). This document is enclosed.

# Information sheet

Bio-based polyamides for insulating profiles.

**Insulating profiles  
for windows, doors  
and facades.**

# Information sheet

## Bio-based polyamides for insulating profiles.

### Why is Technoform working on bio-based polyamides?

Sustainable use of resources and environmentally friendly products is rapidly becoming more and more important. The use of renewable raw materials can significantly improve the carbon footprint of products. This can have a positive impact on environmental product declarations (EPD) and building certificates like LEED, BREEAM or DGNB.

### Current status at Technoform Bautec

There are three bio-based polyamides which come into consideration for insulating profiles, due to their good mechanical properties and their high temperature resistance: PA10.10 (100% bio-based), PA6.10 (62% bio-based) and PA4.10 (70% bio-based). In detailed research, Technoform Bautec successfully tested the processability of these different types of material. The mechanical properties fulfill the specifications of the Technoform material data sheet for standard material. The characteristic values of the assembly (tested using a standard geometry) reach the same values as standard profiles. On the basis of these findings we are now planning to launch a joint project for interested customers to explore the quality of these materials in their special systems.

### What are bio-based polymers?

The group of "biopolymers" includes "bio-based" polymers made of renewable raw material and "bio-degradable" polymers, which degrade in water or other chemicals and thus are used e.g. for packaging items. For insulating profiles, bio-based polyamides made from the fruits of the castor oil plant are qualified.

### Availability / Commercialization

Generally the bio-based material is not commonplace as commercialization has just started and the production capacity is still low. Of the different bio-based polyamides, PA6.10 is the raw material with the best availability and is the one offered by different suppliers. There are currently a limited number of suppliers offering PA10.10 and PA4.10.

### Pros and Cons: Food vs. animal feeds vs. industrially used raw material

The naturally irrigated potential arable land available on earth is limited, so there will be always a competition between the cultivation of food, animal feed and industrial material. A study by the Nova-institute concluded: "Even if an increasing share of arable land is used for energy and industrial material use, there is still much scope for the expansion of agricultural areas and even more scope for productivity increases" [M. Carus, Dr. S. Piotrowski]. Moreover, the castor oil plant has the advantage that it also grows in very dry areas. Additionally a by-product of the cultivation of plants for bio-plastics is very often high-value protein-rich animal feed.

**We gladly offer our support should you have specific questions or problems.**

**Insulating profiles for windows, doors and facades.**

# Information sheet

Recycling of PA66 GF insulating profiles.

**Insulating profiles  
for windows, doors  
and facades.**

# Information sheet

## Recycling of PA66 GF insulating profiles.

Technoform Bautech is an environmentally concerned company and our German subsidiary is already certified according to ISO 14001. We always aim to find the best balance between environmental aspects and product requirements. For this reason re-use of our own material in-house is a tried and tested practice. We use almost 100% of our production waste as internal re-ground material or regranulate and apply it in our production.

### Pre-consumer and post-industrial waste-in-house

In our extrusion process we can use in-house recycled material up to a level of 15% while staying in range with our product specifications. Indiscriminate admixture of (or pure use of) returned material may not always be advisable as the mechanical properties and processability of recycled material diminish with every application, preparation and re-use. Technoform Bautech offers its customers to return profiles not required – provided they were supplied by us – for re-use in the extrusion process. Therefore, the profiles have to be in an appropriate condition.

### Post-consumer waste from the aluminum window industry

The recycling of aluminum windows is becoming a predominant topic of window associations worldwide. Technoform Bautech is member of the German initiative Aluminium und Umwelt im Fenster- und Fassadenbau – A/U/F (Aluminum and environment in window and cladding construction – A/U/F). Their aim is the return of construction elements into the supply chain to produce new building components after renovation, dismantling or demolition of buildings. Currently there is no supply chain mechanism for returning insulating strips. We will closely investigate the use of these materials in collaboration with this initiative.

### Supply of material-recycled polyamide 66

Material recycled polyamide 66 is widely in supply on the market, but often not available in high enough quantity and quality. Unspecified material from unsuitable sources is not used at Technoform due to the inherent risks. Wherever recycled material is blended, clear evidence of origin and prior damage must be recorded in comprehensive and a complete quality assurance documentation by the raw material suppliers is required.

### Supply of chemically-recycled polyamide 66

Chemically recycled polyamide 66, which has the same quality as new material is not available on the market due to the high effort in the recycling process.

### REACH-conformity:

When recycled material is used, regardless of origin, there is consistently the danger of contamination with materials which are not legal, or which are harmful for re-use.

Pre-consumer and post-industrial material: There is no danger of contamination for our in-house recycled material (also stated in D05TB-Group12\_Version 1\_2008).

Post-consumer material: Conformity shall be established related to the coming rules out of the A/U/F initiative. Supply of material-recycled polyamide 66: REACH conformity must be ensured referring to respective material specifications with suitable suppliers and appropriate quality documentation.

**We gladly offer our support should you have specific questions or problems.**

**Insulating profiles for windows, doors and facades.**