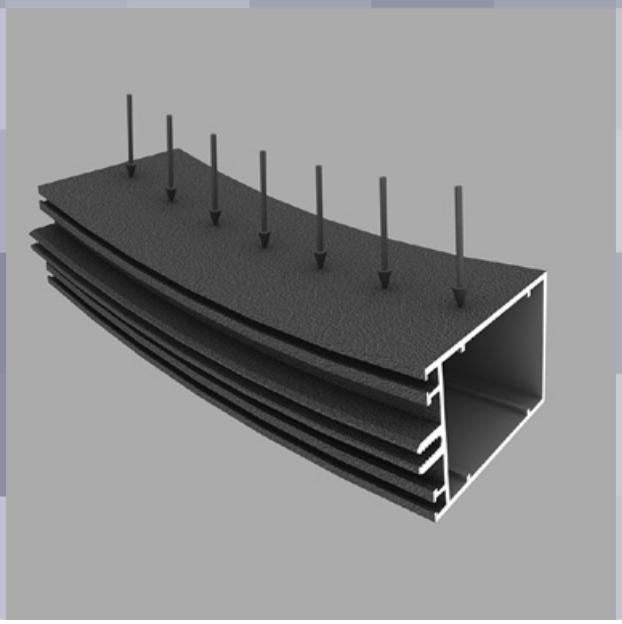


SCT

Statics
Computer-Service
Technical Terms and conditions

SCT International

1 General note

The present information and tables are intended for static pre-dimensioning of window and façade elements and have been drawn up to the best of our knowledge. They are based on the indicated dated standards. As standards are subject to constant revision, processors must always verify their respective validity on their own responsibility.

The static proof must be drawn up by an authorised person and must be submitted to a certified structural engineer or the responsible architect for verification.

2 Product standard window / façade

By now, curtain walls are regulated by a product standard from which requirements regarding the maximum deflection in case of wind and/or dead loads result. In EN 13 830, para. 4.1, for example, the permissible profile deformation under the underlying wind load is L/200 or a maximum of 15 mm.
Furthermore, the maximum deformation of the profiles under the vertical load of the inserted glass or other infillings is L/500 or 3 mm (para. 4.2).

The product standard for windows EN 14 351-1 contains no requirements regarding maximum profile deflection caused by wind or dead loads. As windows are usually glazed with insulating glass, however, the requirements result from the glazing guidelines of the insulating glass manufacturer (cf. Chapter 4 on this topic).

In addition to the requirements in the product standards, national regulations and guidelines must be observed. These might further restrict the deflection of profiles and loads.

3 Treatment of metal profiles with thermal barrier

Since 1986, the “Guideline for the proof of stability of metal profiles with thermal barrier“ [1]has been used in Germany to regulate the assessment by the building inspectorate of the longterm stability of insulated, thermally separated aluminium profiles.
The scope of the guideline is restricted to the load-bearing main elements (supports, transoms and similar) of façades and window walls in accordance with DIN 18 056: 1966-06 with a width and/or height ≥ 2 m and a total surface of ≥ 9 m². It is not used for components in up to two complete storeys and/or 8 m above ground and for storey-high window elements behind patios or balconies.
In 2004, the European standard EN 14 024 “Metal profiles with thermal barrier – Mechanical performance – Requirements, proof and test for assessment“ was published. The contents of this standard correspond to the German guideline and define a verification procedure that is

1 The complete wording of the guideline was published in the notification by the Deutsches Institut für Bautechnik no. 17 (1986), vol. 6, page 197 ff

recognised throughout Europe. The standard makes a distinction between thermally separated profiles for use in windows, doors and window walls (category W) as well as in curtain walls (category CW). In this context, the profiles for curtain walls must meet higher requirements.
The standard distinguishes between tests regarding the suitability of the material for thermal separation on the one hand and the definition of the mechanical properties transverse tensile strength Q, shear strength T and thrust spring rigidity c on the other hand, the latter being required as input parameters for the determination of the profile's effective geometrical moment of inertia I_{ef}. The composite parameters are documented in the general test certificates issued by the building inspectorate. Hueck-Hartmann's profile systems have been tested for use in curtain walls (category CW).

The effective geometrical moments of inertia I_{eff} are calculated from the moments of inertia of the profile's individual metallic half-shells as well as the mechanical properties of the composite zone by means of approved computer programs. They depend on the length and are documented in the catalogues.

Pre-dimensioning by the metal window manufacturer is carried out as usual by means of standard calculation procedures. In case of thermally separated profiles, however, the effective moment of inertia $I_{x,eff}$ is used instead of the moment of inertia I_x.
It must be pointed out, however, that the indicated effective moments of inertia I_{ef} are based on a limitation of deflection of 1/300 of the distance between supports. This means that this limitation of deflection is decisive for thermally separated aluminium profiles, even if other rules permit greater deflection (e.g. EN 13 830).

4 Limitations of deflection in case of insulating glass

Regardless of the maximum profile deflections permitted by the product standards or similar, restrictions may result from the building components that are used.
This includes insulating glass where the glazing guidelines issued by the manufacturer usually restrict deflection in the glass edge area to 1/300 of the glass edge length and/or a maximum of 8 mm. Thus larger necessary moments of inertia result for the frame profiles, in particular in case of storey-high glazing.

5 Necessary moments of inertia I_x

The tables do not apply to non-load bearing components for static pre-dimensioning of the necessary moments of inertia for mullions and transoms. The diagrams are standardised to an area load of 1 kN/m². The necessary moments of inertia exclusively apply to profiles made of aluminium with alloy EN-AW 6060 and age-hardening state T66 (formerly AlMgSi0,5, F22). For this purpose, a modulus of elasticity of $E = 7 \times 10^3$ kN/cm² is used.

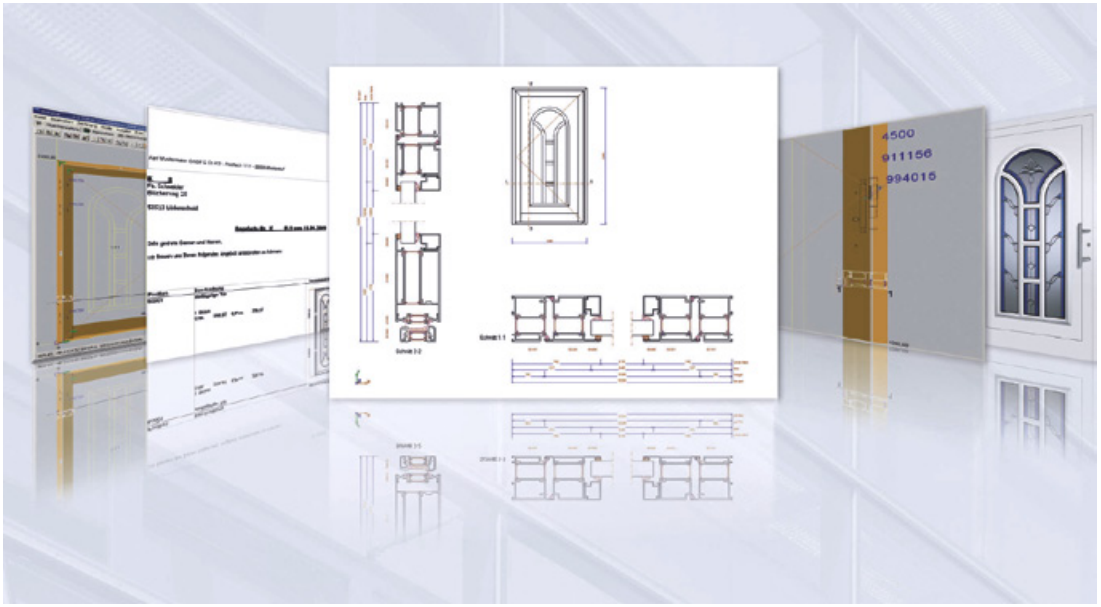
The area loads (usually wind loads) are determined in accordance with national rules.

6 Blocking guidelines

The glass loads are transmitted to the supporting structure via the blocking. The number and position of the glazing blocks depend on the type of glazing (sashes that can be opened, fixed glazing). The distance between the glazing blocks and the glass corner usually is 100 mm. In particular in case of fixed glazing and transoms with large spans, it can be advisable to move the position of the glazing blocks towards the glass corners in order to reduce transom deflection.
As this may increase the risk of breakage of glass depending on the type and thickness of the glass, such a procedure must in any case be agreed with the glass manufacturer in advance.

HueckTec for Windows

Complete software for the metalworker



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Construction

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Viewing fittings and works

Minimization

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1. General

The Hueck/Hartmann construction profile series and the corresponding accessories are developed for different applications in metal construction work. The series are intended for processing by specialist metal construction companies, window manufacturers and similar companies which are familiar with the recognised rules of engineering, in particular in the field of metal construction work and window, door, partition wall and façade construction, and which can be presumed to be aware of all relevant DIN standards, the VOB (Germany's standard building contract terms) and guidelines and directives from guilds, quality standards associations and trade associations.

2. Technical advice, support for plans and offers

All suggestions, proposals for tenders, designs and installations, static calculations, material calculations, etc., which are made in the framework of advice and discussions in sketch form, correspondence or study papers from Hueck/Hartmann's employees, are provided to the best of the company's knowledge and belief and, as non-binding ancillary services, must be subjected to a critical examination by processors and where necessary approved by the architect or the builders.

3. Requirements for plants, storage and machining, training

A material precondition for the perfect manufacture of building components is the establishment of a plant with equipment and machinery intended for machining and processing aluminium. These installations must be designed so that the profiles or components are not damaged during storage, removal and machining. All materials and components must be stored in a dry place and so that nothing can impair their quality or condition. In particular, they must be kept away from lime, mortar, construction dirt, swarf, grinding sparks, acids and similar. To satisfy the state of the art it is essential that employees of the manufacturing company are given the opportunity to gain further training by studying the Hueck/Hartmann processing instructions, by reading relevant literature, or attending training or seminars.
The processing company must take all measurements, such as overmeasures, cutting-to-length and glass measurements, on its own responsibility. Details, connections, etc., must be verified through drawings, and static calculations carried out, and where necessary checked, for load-bearing profiles and anchors.

4. Standards

The following standards in particular must be taken into consideration when manufacturing and assembling construction elements from aluminium:

DIN EN 107	Test procedure for windows; mechanical tests
DIN EN 573 -1-4	Aluminium and aluminium alloys; chemical composition and shape of semifinished goods
DIN EN 755 - 1-2	Aluminium and aluminium alloys; extruded rods, tubes and profiles
DIN EN 1026	Windows and doors - air permeability - test procedure
DIN EN 1027	Windows and doors - watertightness under heavy rain- test procedure
DIN 1055	Design loads for buildings
DIN EN ISO 1461	Zinc coatings on steel applied through hot galvanising; requirements and test
DIN V ENV 1627	Burglar-resistant building products (not for prefabricated concrete parts) - Requirements and classification
DIN V ENV 1628	Windows, doors, ends - burglar retardant - test procedure for determining the resistance under dynamic load
DIN V ENV 1629	Windows, doors, ends - burglar retardant - test procedure for determining the resistance under static load
DIN V ENV 1630	Windows, doors, ends - burglar retardant - test procedure for determining the resistance to manual attempts at breaking in
DIN 4102	Behaviour in fire of building materials and components
DIN 4108	Thermal insulation and energy saving in buildings
DIN 4109	Sound insulation in building construction
DIN 4113	Aluminium constructions under mainly static load
DIN 7863	Non-cellular elastomer gasket profiles in window and façade construction
DIN EN 12020 – 1-2	Aluminium and aluminium alloys; extruded precision profiles made of alloys ENAW-6060 and ENAW-6063
DIN EN 12152	Curtain walls - air permeability - performance requirements and classification

DIN EN 12153	Curtain walls - air permeability - test procedure
DIN EN 12154	Curtain walls - watertightness in heavy rain - performance requirements and classification
DIN EN 18800-1	Steel structures - Design and construction
DIN EN 12155	Curtain walls - watertightness in heavy rain - laboratory test under application of static pressure
DIN EN 12179	Curtain walls - resistance to wind load - test procedure
DIN EN 12207	Windows and doors - air permeability - classification
DIN EN 12208	Windows and doors - watertightness in heavy rain - classification
DIN EN 12210	Windows and doors - resistance to wind load - classification
DIN EN 12211	Windows and doors - resistance to wind load - test procedure
DIN EN 13116	Curtain walls - resistance to wind load - performance requirements
DIN EN 13947	Thermal behaviour of curtain walls - calculation of the heat transition coefficients
DIN 16935	Plastic waterproof sheeting made of polyisobutylene (PIB); requirements
DIN 17611	Anodic oxidised products made of aluminium and aluminium forging alloys - technical delivery terms
DIN 18055	Windows; joint permeability, watertightness in heavy rain and mechanical loads, requirements and test
DIN 18056	Window walls; dimensioning and implementation
DIN 18073	Roller end covers, sunshades and screens in building construction; terms and requirements
DIN 18095	Doors; smoke protection doors
DIN 18195	Building seals
DIN 18200	Verification of conformity for building products - factory production controls, outside monitoring and certification of products
DIN 18202	Tolerances in building construction; buildings
DIN 18263 – 1, 4	Locks and hardware; door closers with hydraulic damping
DIN 18273	Building hardware; door handle sets for fire safety doors and smoke protection doors
DIN 18299 VOB, Part C	General rules for all types of building work
DIN 18357 VOB, Part C	Mounting of metal fittings
DIN 18358 VOB, Part C	Fitting shutters
DIN 18360 VOB, Part C	Metal construction work
DIN 18361 VOB, Part C	Glazing work
DIN 18364 VOB, Part C	Corrosion protection work on steel and aluminium constructions
DIN 18516	External wall cladding, rear ventilation
DIN 18540	Sealing external wall joints in building construction with joint sealing material
DIN 18545	Sealing glazing with sealing materials
DIN 50939	Corrosion protection; chromatising aluminium; principles of the procedure and test procedure
DIN 52460	Joint and glass seals terms

If other standards are affected they must be applied as well.
Because of the current conversion from German to European harmonised standards the validity of the standards referred to above should be checked continuously.

5. Quality assurance

Hueck/Hartmann system profiles are system-checked and fulfil the precondition for quality-tested windows under the provisions of RAL-RG 636/1, issued by the Gütegemeinschaft Aluminiumfenster, ("Quality Association Aluminium Windows") Frankfurt am Main. Hueck/Hartmann profiles fulfil the conditions of the "Guideline for verifying the stability of metal profiles with thermal barriers", issued by the Deutsche Institut für Bautechnik (German Institute of Building Engineering), Berlin.

Hueck/Hartmann recommends to its processors that they take out membership in one of the two quality associations:

Gütegemeinschaft Aluminiumfenster e. V. Ruhrallee 12 45138 Essen	RAL-Gütegemeinschaft Fenster und Haustüren Walter - Kolb - Str. 1 - 7 60594 Frankfurt / Main

6. Materials, processing information

6.1 Extruded aluminium profiles

Normally we supply extruded profiles from the
alloy ENAW-6060 in accordance with DIN EN 573
material condition T 66 in accordance with DIN EN 755
mechanical properties in accordance with DIN EN 755
permissible dimensional deviations in accordance with DIN EN 12020-2
quality EQ (anodising quality) in accordance with DIN 17611
for the production of aluminium windows, façades, etc. In some cases special alloys from aluminium are used for bullet resistant safety constructions. Deviating special alloys must be used for particular anodising processes, e.g. one-shot processing. These special alloys can only be supplied after prior enquiry and approval. Large-surface profiles may in certain circumstances show a slight change to the surface in a lengthways direction as a consequence of the mould seam caused by the die. This is therefore not a cause for a complaint.
With four sides as projection surfaces one side must be planned as the discharge surface.
With large-surface thermally insulated profiles with a sealing groove (sash profile), notching the PA strip at the start and end of the rod by 25 mm is necessary to prevent PU clogging. A corresponding amount of waste must be calculated. The thermal insulation zone (foam filling) must not be damaged on rigging and contacting. See the technical information "Anodising and coating, cleaning and maintaining semifinished aluminium products and thermally-insulated aluminium profiles".
The processor must check the dimensional accuracy, surface and warp before cutting.

6.2 Fittings

Our fittings and related components are sufficiently dimensioned and protected against corrosion for the expected loads in accordance with our data. The processing company must select the fittings in accordance with the loads that can normally be expected. Only fittings which we have released and approved may be used.
Moving lock furniture must be maintained (see the VFF leafl ets WP.01 and WP.02 as well on this). This will reduce the wear on moving parts as well as their susceptibility to corrosion. The intervals for cleaning and care depend on the extent of the chemical and mechanical load.

6.3 Sealing materials

The sealing materials that are used must be aging- and weather-resistant and plastic or permanently elastic, depending on the load. Their properties must conform to the purpose of the application with regard to all requirements occurring in an individual case (DIN 18545-2). It must be ensured that they are compatible with adjacent construction materials.

6.4 Sealing profiles

The sealing profiles that are used must conform to DIN 7863, be non-hardening and abrasion-resistant and retain their elastic properties, including the restoring forces, to a great extent in the prevailing temperature range. The Shore hardness must remain the same, with slight tolerances. The sealing profiles must be resistant to normal atmospheric influences.

6.5. Waterproof sheeting

Waterproof sheeting must conform to DIN 18195 and plastic waterproof sheeting made of polyisobutylene must conform to DIN 16935. They must not contain any aggressive components. The compatibility with adjacent building materials and the aging- and weather-resistance must be ensured. The water vapour diffusion resistance of the waterproof sheeting must be adapted to the requirements.

6.6. Glass

The glass types to be used depend on the prescribed building engineering requirements.
The glass thicknesses must be dimensioned taking account of the wind load in accordance with the standards in the "Technical regulations for using in-line bedded glazing".

7. Requirements for windows

7.1 Mechanical load

7.1.1 Static requirements and information

The processing company is responsible for selecting the profiles, accessories and fittings in dependence on the building conditions, the static requirements, the architecture and the customer's wishes, and in conformity with our processing information. Among others, DIN 1055, DIN 4113, DIN 18056, the "Technical regulations for using in-line bedded glazing" and the statics tables for the selected systems are relevant for the calculations and the implementation. The approved standards and values in dependence on the load-bearing capacity of the fittings must not be exceeded. When moving parts are dimensioned they must be assumed in the most unfavourable position.
It must be noted here that the window is not usually there to absorb forces from the building. For this reason expected changes of shape of the connecting building parts and of the window must be taken into account in planning through appropriate dimensioning of the connecting or cross joints. Forces that have an effect, for example, wind loads, must be led off through the component into the building's supporting framework.
The processing company must adjust the building connections shown in the Hueck/Hartmann documents to the respective construction conditions. Our information on permitted sash sizes, weights and shapes, the standards, information and regulations issued by trade associations and regulations issued by authorities must all be complied with.

7.1.2 Other traffic loads

Additional loads must be reckoned with, depending on the position of the window in the façade, and the loads must be taken into account on the selection of the construction and the dimensions. The type and extent of the loads must be checked and ascertained from case to case, whereby possible superpositions must be examined. Frequently occurring cases are

- impact loads on windows as a result of traffic loads
- accident-proof components
- roof deflections
- loads from bimetal effects
- external road installations in the case of window walls

7.1.3 Loads at the sash

The sashes must meet the expected loads in both a closed and locked position and in the open position. In the closed and locked position the loads under DIN 1055-4 must be complied with together with the loads under DIN 18055 for ensuring watertightness under heavy rain and joint permeability. In compliance with the requirements of DIN 1055 the safety needs and not the characteristics of use must be fulfilled. The requirements for sashes in the open position are stipulated in DIN 18055 and the test procedures in the European standard DIN EN 107 "Test procedures for windows: mechanical test".
Where necessary the influence of the dead weight in the most unfavourable position, e.g. in the case of pivoting windows in the horizontal open position, must also be taken into account.

7.1.4 Requirements for mechanical loads

The mechanical loads at the window that are expected in accordance with the plans must not lead to changes which permanently alter the reliability performance of a window and the individual components. The permissible material tensions must not be exceeded. The necessary proof must be supplied in a verifiable form for the bearing parts of the window and for the anchors, in so far as these are not sufficiently dimensioned in accordance with experience values.
For mathematical verification the permissible tensions in accordance with the appropriate materials standards or in accordance with the manufacturers' data apply, namely
• for aluminium: DIN 4113 "Aluminium in building construction"
• for steel: DIN 1050 "Steel in building construction"
• for glass: "Technical regulations for using inline bedded glazing" / TRAV
and the manufacturers' instructions.
Windows may be regarded as sufficiently dimensioned if their shape and size are covered by standards or verified through tests. Verification of suitability for use takes place for fixed frame parts through the verification of the deflection delimitation. Where insulating glass is used the delimitation of the deflection through the manufacturer's instructions must be complied with (1/300 or 1/200, max. 8 mm between the sheet edges). Compliance with the limit values is linked to the guarantee from the insulating glass manufacturer for the freedom from condensation water in the interspace.

8. Building physics requirements and information

8.1 Air permeability

The air permeability of windows and doors is tested in accordance with DIN EN 1026 and classified in accordance with DIN EN 12207. The air permeability of curtain walls is tested in accordance with DIN EN 12153 and classified in accordance with DIN EN 12152. The air permeability describes the flow of air that flows through via joints as a result of a pressure difference occurring at a building component. The reference air permeability in relation to the total surface or to the joint length may not exceed the required limit values (A0 to A4) in accordance with DIN EN 12207 and DIN EN 12152 respectively.

8.2 Watertightness under heavy rain

The watertightness under heavy rain of windows and doors is tested in accordance with DIN EN 1027 and classified in accordance with DIN EN 12208. The are permeability curtain walls is tested in accordance with DIN EN 12155 and classified in accordance with DIN EN 12154. The watertightness under heavy rain describes the impermeability of a building component to water from outside in appropriate wind loads. Windows and doors are classified in dependence on the test pressure in classes 1A to 9A and 1B to 7B, depending on the spray procedure (A or B).
The watertightness under heavy rain of curtain walls is classified R4 to R7.
The stipulation of the requirements depends on the geographical location, the wind load, the shape of the building and the ground level elevation.

8.3 Resistance to wind load

The resistance to wind load of windows and doors is tested in accordance with DIN EN 12211 and classified in accordance with DIN EN 12210.
The resistance to wind load of curtain walls is tested in accordance with DIN EN 12179.
The performance requirements are defined in DIN EN 13116.
The classification of the resistance to wind load results from the relative frontal deflection (class A, B or C) under appropriate wind pressure (class 1 to 5).

8.4 Protection from heat and damp

DIN 4108-2 applies to the minimum thermal insulation. This stipulates minimum requirements for frames, glazing and panels.
The customer will inform the metal constructor of the requirements for the heat transition coefficients of windows (U_x) and façades (U_{cw}).
Hueck/Hartmann publishes the heat transition coefficients and the corresponding measured values of Hueck/Hartmann profiles and profile combinations. DIN V 4108-4, Table 6 ff. must be included when determining the $U_{W,BW}$ value for windows.
The calculation of the U_{cw} value for façades is carried out in accordance with DIN EN 13947.
In spite of the best possible thermal insulation condensation formation on glass and profiles cannot be ruled out in unfavourable building physics situations. In these cases construction measures must be carried out to ensure that the condensation water does not cause any damage to the building.

8.5 Thermal insulation in summer

See DIN 4108-2 with regard to planning and implementing thermal insulation in summer (sunshades).

8.6 Sound insulation

The indication of the evaluated sound insulation factor $R_{w,R}$ or the sound proofing class usually describes the window sufficiently with regard to sound insulation requirements.
The connections between the element and the building must be sealed taking account of the requirements for sound insulation in accordance with the state of the art.

9. Surface treatment

Detailed information can be seen in the Hueck-technical information on "Anodisation and coating (www.eduard-hueck.com), cleaning and maintaining semifinished aluminium products and thermally insulated aluminium profiles".

10. Transport and storage

Special protective measures must be planned for transport and storage which guarantee that the aluminium profiles are protected from mechanical damage.
Semimachined profiles must be transported and stored dry and free of dust. Major fluctuations in temperature can lead to the formation of condensation, which will damage the untreated surface. This must be ensured in particular before anodisation following surface treatment E6! In addition, it should be ensured that the period between delivery from the manufacturer and anodisation is kept as short as possible.
Anodised and coated profiles are protected from normal atmospheric effects. However, they must not be stacked for longer periods in damp packing material. Pressure, impact and deflection loads can destroy the surface coating.
Damage of this nature cannot be remedied. This applies to all plastic-coated profiles as well.
In the case of packing units made of cardboard make sure that not too many packing units are stacked on top of one another, because otherwise the bottom cartons will be damaged. Stores must be arranged in such a way that profile lengths can be removed without scratching.

11. Processing, installing fittings

When diagonal, L-bar and butt joints are made, the Hueck/Hartmann processing instructions, as amended, must be observed together with the standard rules of engineering. Only accessories from the Hueck/Hartmann range may be used.
Fittings must be attached in accordance with our latest installation drawings and recommendations.
Smooth running, the exact fit of all fittings and the tightness of the elements must be guaranteed.
Our data on permissible sash dimensions and weights and the relevant standards, provisions and regulations must be observed.

12. Glazing

Glazing of aluminium windows must be carried out correctly and professionally in accordance with the relevant standards.
The installation instructions and requirements of the insulation glass manufacturer must be complied with in all cases, because any claims under guarantee and complaints with regard to the insulating glass will otherwise not be recognised.
If the window manufacturer does not carry out the glazing itself it must agree the exact type and implementation of the glazing with the glazing company. All sealing profiles used for the glazing must consist of aging- and weather-resistant elastomers (APTK/EPDM). If sealing masses are used make sure that they are compatible with the surface-refined profiles and with the insulating glass, including its edging bond.

13. Protecting components, installing, connecting to the building

Adhesive tapes, plastic foils or suitable protective lacquers, all of which can be removed without residues, are suitable for the temporary protection of components during the construction period, in particular against mechanical damage and the effects of plaster, mortar, cement, paint and similar.
Installation must be perpendicular and flush in accordance with the markings made by the customer, for example, metre projections and perpendicular lines. The windows must be installed and anchored in accordance with the state of the art. Care must be taken here to ensure that the forces from the construction element are transmitted technically correctly to the building by means of suitable anchors. With windows and window walls the clearance between anchoring positions may not exceed 80 cm, each side must be anchored to the building at at least two positions. The type and installation of the anchors must be stipulated during planning. The anchor must not impair the load-bearing capacity of the building components. Connectors, couplers and fasteners must be realised in such a way that the construction elements can expand, contract and move without hindrance or noise on changes to the temperature.
With larger lintel widths and with all cantilever ceilings, in particular with concrete and steel skeleton constructions, creepage and shrinkage, and deflection as a result of the expected load on the lintel must be taken into account. If necessary, compensation elements must be planned, usually in the upper horizontal of the building connection. All steel parts that can no longer be accessed after installation must be galvanised. Approved processes are hot galvanising and flame spray galvanising. The welded points of galvanised constructions must be given secondary treatment with cold zinc. Damage to the corrosion protection of steel parts caused during installation must be remedied after the basic installation. Connecting elements such as screws, bolts, rivets, etc., must have sufficient protection against corrosion. Where they are in connection with aluminium they must be made of stainless steel. When aluminium is assembled with other metallic materials suitable measures, such as bitumen coating, intermediate layers of foil, must be taken to ensure that contact or crack corrosion cannot occur.
When thermally insulated aluminium windows are installed in assembly sub-frames or on preassembled base constructions effective thermal insulation to the building must be ensured. In addition, suitable foil must be used to prevent the penetration of moisture and formation of condensation in the area of the base construction.
The built-in elements must be sealed watertight against the building with open joints with joint sealing mass and where necessary back-filled with suitable materials. For the controlled drainage of water, rainwater and percolating water, where this can accrue from other components, must be collected immediately above the metal construction and drained in a controlled manner. Rainwater, condensation and percolating water which accrues from the building itself must be collected in the lower horizontal of each bay, irrespective of whether these are glazing bays or wings of different types of opening, and drained in a controlled manner. In the case of collection and drainage the maximum capillary rise of the water in the water chamber under the influence of external pressure must be taken into account. The capillary rise that is to be taken into account should be not less than 10 mm and must be increased in accordance with the expected maximum external pressure. It must be ensured that the water that is collected in this way is drained controlled to the outside and cannot penetrate into the building through construction joints and profile ends.

14. Surface protection, care, and maintenance

Anodised aluminium parts must be protected from the effects of non-hardened mortar and cement, because otherwise as a result of alkaline reactions discolouring will occur which cannot be removed.
Mechanical damage to the anodised surface cannot be repaired. We recommend therefore that the aluminium parts are handled with care. Plastic adhesive tape, peelable lacquer, self-weathering clear varnish and similar products provide a certain degree of protection.
To maintain the decorative appearance of anodised aluminium façades they should be cleaned at least once every year. Dust and dirt accumulations should be removed from painted aluminium parts by washing with warm water with added neutral surface-active agents which do not attack aluminium. Acidic and alkaline cleaning agents and mechanical cleaning with an abrasive action are not suitable.
The painted surface must be cleaned at least once a year, or more often in the case of heavier pollution. To conserve the cleaned aluminium parts we recommend liquid polish with a silicone additive which is wiped off with a soft cloth after drying. To ensure long and perfect functioning of the fittings the moving parts must be greased or oiled with a suitable grease or lubricant.

-> see list of neutral detergents
I. Anodized aluminium elements
available at Aluminium-Zentrale e.V.

Coefficient of heat transmission U_f

Hueck provides a Uf value calculator which can be used to calculate the U_f values for all the profiles and profile combinations.

It can be downloaded on the site **www.eduard-hueck.com**