

## 1. General Conditions

All RAICO products have been developed or selected for usage in the construction of façades, windows, and doors. They are meant to be assembled by specialized companies following the acknowledged technical regulations, in particular as applicable to constructing façades, windows, and doors, and also following all directives, norms, regulations and recommendations which are standards within the industry. All RAICO documentation should be considered as non-binding recommendations in regard to the planning, designing, processing, finishing and assembly of these products. They are intended to offer suggestions to the certified specialist, or inform on successful applications. The specialist must always check carefully whether the suggestions and documentations are appropriate also in his particular case, and in every respect.

### Scope of delivery and RAICO warranty

Our scope of delivery covers the contents of our known Sales Terms. We assume no liability for damages caused by the use of system accessories, parts, and hardware which are not named in our product documentation as suitable original parts and hardware.

### Advisory service by RAICO employees

Our specialists offer free-of-charge advisory services and recommendations. All suggestions, proposals, designs and the like, be it in written or oral form, calculations, drawings, sketches etc. provided by our employees in the course of advice given or by mutual correspondence, are to be considered as non-binding suggestions from our company, and thus result in limiting our liability to deliberate intention and culpable negligence only. This limit also applies to construction designs and tender documents.

### Support in cost estimation

Help regarding the estimation of costs is offered to the best of our knowledge and is in any case non-committal. Generally speaking, material prices are calculated only concerning RAICO's product range. Supplements for operating costs, as well as times for manufacture and assembly are calculated according to manufacturer's instructions.

### Statics

The statics information published by us, as well as the Chart on the greatest possible window dimensions have been prepared to the best of our knowledge. Construction elements dimensioned according to the correct application of this information and processed expertly are thus sufficiently dimensioned in line with the currently applying industry norms. Supporting structures and enforcements must be defined according to individual static calculations. Our suggestions and proposals regarding statics have to be checked by the processing specialist, by a certified stress analyst, or by the architect before order placement, and be accepted by the orderer.

## 2. Requirements regarding the processing company

### Production facilities

An essential preliminary for the professional processing of RAICO products is the availability of appropriate technical devices and machinery in the company which will process RAICO materials. Facilities must be furnished in such a way that profiles and construction parts will not be damaged during storage, removal or processing. All materials and parts must be stored in a dry place and in a way that they will not be subject to damage caused by external influences. In particular, they must be safely kept away from lime, mortar, dirt, steel chips, grinding sparks, acids, and the like. Concerning the use of solvents, the Data Sheet (MO 17) published by the Berufsgenossenschaft der chemischen Industrie (the German Government Safety Organization of Chemical Industries) is binding.

### Instructions and employee training

In order to keep up with newest technical standards it is essential to provide the necessary training - by the study of our documentations on how to process our materials and products, by the study of specialist literature, by visiting seminars etc.

### Dimensions, drawings, statics

All measures such as site measuring, cutting measures, glass measures must be determined by the processing company independently. It is necessary to back up details, connections etc. with the help of drawings, and to carry out static calculations for stressed profiles and bracings, and have them checked if applicable.

## 3. Norms

The basis for these Technical Conditions are the following relevant DIN norms (German industrial standards), or DIN EN norms respectively, applying to the construction of façades, windows and doors:

DIN 1055	– Parts 1 to Part 5, load assumptions for buildings.
	– Part 4 A 1 (Additional DIN 1055 Part 4), aerodynamic form co-efficients for building structures
DIN EN 573	– Parts 3 and 4, extruded aluminum sheaths and sheaths made of forgeable aluminum alloys, features and technical delivery terms
DIN 1748	– Parts 3 and 4, extruded aluminum sheaths and sheaths made of forgeable aluminum alloys, design and allowable tolerances
DIN EN 755	– Parts 1 and 2, extruded aluminum sheaths and sheaths made of forgeable aluminum alloys, features and technical delivery terms
DIN 4102	– Parts 5, 13, 18, reaction of building materials and components to fire
DIN 4108	– Parts 1 to 5, heat protection in high-building
DIN EN ISO 10077-1	– Thermo-technical qualities of windows, doors, and joints
DIN 4109	– Sound proofing in high-building
DIN 4113	– Part 1, aluminum constructions under predominantly static stress
DIN EN 12152	– Light curtain-wall façades, joint permeability, requirements and classifications
DIN EN 12153	– Light curtain-wall façades, joint permeability, inspection method
DIN EN 12154	– Curtain-wall façades, tightness to hard rain, laboratory testing under static stress
DIN EN 12179-4	– Light curtain-wall façades, resistance to wind stress
	– Part 4: Laboratory testing
DIN 17611	– Anodized semi-finished goods made of aluminum and forgeable aluminum alloys with layer thicknesses of at least 10 mm, technical delivery terms
DIN 17615	– Parts 1 to 3, precision profiles made of alloys type AlMgSi 0.5
DIN 18055	– Windows, joint permeability, tightness to heavy rain, and mechanical wear. Requirements and testing.
DIN EN 12207	– Windows and doors, air permeability, classification
DIN EN 12208	– Windows and doors, tightness to heavy rain, class

DIN 18056	– Window walls, dimensioning and construction	DIN V ENV 1630	– Windows, doors, closings-off – burglary inhibition – testing procedures for determining the resistance against manual attempts at burglary
DIN 18073	– Closing-off by rolling elements, sun protection devices and blinds in construction, definition of terms and requirements	DIN V 18103	– Burglary-inhibiting doors, definition of terms, requirements; testing, labeling
DIN 18095	– Parts 1, 2 smoke protection doors	DIN V 18054	– Burglary-inhibiting doors, definition of terms, requirements; testing, labeling
DIN 18201	– Tolerances in construction, definition of terms, basics, application, and inspection	DIN EN 1522	– Windows, doors, closings-off – inhibition of full-penetration shots – requirements and classification
DIN 18202	– Tolerances in high-building, buildings	DIN EN 1523	– Windows, doors, closings-off - inhibition of full-penetration shots – requirements and testing procedures
DIN 18263	– Part 1 and Part 4, locks and hardware, door locking devices with hydraulic absorption	TRLV	– Technical regulations for the usage of glazings with linear supports
DIN EN 1154	– Door locking devices with hydraulic absorption, automatic door closers with linear operation, door closers	TRAV	– Technical regulations for the usage of glazings with anti-fall guards
DIN EN 1155	– Door closers with hydraulic absorption: lockable door closers with and without override		
DIN 18273	– Door handle fittings, doors with protection against fire and smoke		
DIN 18351	– VOB (German Construction Contract Procedures), Part C General technical contractual terms for construction work and façade works		
DIN 18357	– VOB (German Construction Contract Procedures), Contracting rules for award of public works Part C, General technical regulations for construction work, hardware works		
DIN 18358	– VOB (German Construction Contract Procedures), Contracting rules for award of public works Part C, General technical regulations for construction work, rolling shutter works		
DIN 18360	– VOB (German Construction Contract Procedures), Contracting rules for award of public works Part C, General technical regulations for construction work, metal construction work, locksmith works		
DIN 18361	– VOB (German Construction Contract Procedures), Contracting rules for award of public works Part C, General technical regulations for construction work, glazing works		
DIN 18516	– Parts 1, 3, 4, cladding for external walls ventilated at rear		
DIN 18545	– Parts 1 to 3, sealing of glazings with sealing compounds		
DIN 52290	– Parts 1 and 5, assault-inhibiting glazings, definition of terms; testing of features inhibiting full-penetration shots, and classification		
DIN EN 1063	– Assault-inhibiting glazings, definition of terms; testing of feature inhibiting full-penetration shots, and classification		
DIN EN 356	– Assault-inhibiting glazings; testing of features inhibiting assault with cutting and beating tools. Testing of features inhibiting full-penetration throwing, classification.		
DIN V ENV 1627	– Windows, doors, closings-off – burglary inhibition – requirements and classification		
DIN V ENV 1628	– Windows, doors, closings-off – burglary inhibition – testing procedures for determining the resistance against static stress		
DIN V ENV 1629	– Windows, doors, closings-off – burglary inhibition – testing procedures for determining the resistance against dynamic impact		

All our systems and technical products have been developed in accordance with the preliminaries and conditions of the Deutsche Institut für Normung e. V. (DIN, i. e. German Institute for Industrial Norms). In individual cases, deviations from norms valid outside the coverage of DIN standards may occur. Our customers are advised in any case to make comparisons with valid national norms and standards as well.

#### Quality control

The features and functions of our systems, as described and evaluated in test reports, certificates etc. can only be expected when using original RAICO products. In order to ensure perfect quality, only our original parts should be processed.

#### Regulations and recommendations

VDI (Association of German Engineers) regulation 2719 – sound protection Chart for determining the exposure categories regarding window glazing – Institut für Fenstertechnik e. V. Rosenheim (Institute for Window Technology), explanatory notes on glazing – Institut des Glaserhandwerks für Verglasungstechnik und Fensterbau (German glazing crafts institute for glazing technology and window construction).

Systems admitted by building inspection authorities must be manufactured according to the admittance declarations (DIBt). Deviations from the admittance declarations must in any case be authorized by the superior building supervision authorities.

## 4. Materials and products

Materials delivered by us have been manufactured according to applying norms and standards. Materials and products made of materials produced outside our area of influence are to be selected by the processing company at their own accountability.

#### Aluminium

For the manufacture of aluminum windows, façades, etc. we deliver anodized profiles made of AlMgSi 0.5 F 22 alloy. For specific anodizing procedures, such as single-stage procedures, deviating specific alloys must be used. Specific alloys can be delivered by us only upon prior inquiry and agreement from our side. Extruded aluminum sheaths are delivered in accordance with DIN 17615. We deliver metal sheets and bands in accordance with DIN EN 485, Parts 1 and 2. Various materials and forms of delivery (profiles, metal sheets, bands) are to be adjusted according to the required looks and appearance.

#### Profiles made of plastic

The qualities of the used molding material corresponds at least to the molding material PVC-U, EDLP, 078-25-28 according to

DIN EN ISO 1163, Parts 1 and 2. Slight flat unevenness caused by production are admissible inasmuch as their correct functioning will not be affected.

**Steel**

Regarding steel parts necessary for load-bearing construction elements and anchoring constructions, DIN 18800 Part 4 and DIN 18801 apply. All steel parts no longer accessible after assembly must be galvanized. Admitted procedures are hot galvanization and flame spraying galvanization. DIN EN ISO 1461 applies regarding the welding spots of galvanized constructions, and the spots where the corrosion protection of the steel parts is subject to damage during assembly. Parts no longer accessible after assembly must have a surface protection according to DIN 18360 fig. 3.1.8 or higher.

**Joining elements**

Connecting elements such as screws, bolts, rivets etc. must be sufficiently protected against corrosion. If used together with aluminum they must be made of specific alloys. Aluminum may be used for parts exposed to less static stress.

Under particular climatic or other environmental influences, fixing elements made of stainless steel A4 must be used, especially when visible outside. The processing company has to make sure about their usage at its own accountability.

**Hardware**

According to our specifications, RAICO hardware and relating components are sufficiently dimensioned and protected against corrosion in regard to the expected exposure and wear. Hardware parts are to be selected by the processing company according to the wear and tear expected under normal conditions. Only hardware as approved and admitted by us is to be used. Movable hardware parts must be maintained.

Thus the wear and tear of movable parts and their susceptibility to corrosion will be reduced. The intervals for cleaning and care depend on the environmental conditions

**Glass**

The particular guidelines issued by glass manufacturers regarding the processing of insulation glass and special glass apply. Glass manufacturers must produce triplex glass in general, and duplex glass from a glass thickness of 36 mm and higher on the standing edge, to ensure even glass load transfer.

**Sealing compounds for glazing and sealing**

Used sealing compounds must be resistant to influences of age and climate, and have to be malleable or permanently elastic, depending on the applied load. They must be suitable to their intended purpose, in line with DIN 18545 according to all applying individual requirements.

**Sealing profiles**

The sealing profiles which are used must be non-hardening and abrasion-proof, and must keep their elastic qualities including their reset force to a large extent within the existing temperature range. The shore hardness must remain the same with only little tolerances. Sealing profiles have to be resistant to normal atmospheric influences.

**Assembly of various materials**

When assembling various materials, it must be ensured that neither corrosion nor other unfavorable influences occur. In particular it must be ensured that no disturbing sounds will be caused by changes in length as a result of temperature influences.

**5. Construction features**

**System profiles**

We only deliver profile systems which have been tested, admitted and certified, if necessary, by an acknowledged test institute or by the DIBt. The processing company will itself select the profile systems to be used, considering the expected requirements. Profile dimensions regarding frame, wing, mullion and transom are to be determined according to statics for profiles and hardware. For blind frames and sashes, hollow profiles are to be used in general.

**Corner connectors and T-connectors**

The production of corner connectors, T-connectors, butt joints and angle couplings for construction elements, by welding, screwing and bonding, bonding with off-center pins, pressing and bonding, must be done in accordance with the valid regulations. For an adhesive a cold-hardening two-component glue is to be used. The joints must feature sufficient firmness, stiffness and tightness throughout the complete profile's cross-section.

**System drainage**

The drainage of the system must be provided for. Penetrating water must be drained off in any case. Please refer to the drainage cross section as shown in RAICO's processing guidelines. All openings and joints in the frame (such as screw holes, notches of the corner connectors, and the like) must be made tight, particularly regarding the lower horizontal zone. Water tightness at miter joints, joints and crossings of the construction must be ensured.

**Assembly of the components**

Where the construction makes joints necessary, additional polytuft brushes, or EPDM/chloroprene sealings respectively, must be used for soundless moving and gliding. Where directly joined or screwed profiles and components have been used, functional sealing bands or interlayers are to be used in order to avoid permeability, sound emission caused by expansion, and contact erosion.

**Static requirements**

All components must absorb the affecting forces and transfer them to the supporting structure of the building. DIN 18056 on window walls, dimensions and processing applies.

**Wind loads**

Wind loads must be considered according to DIN 1055, Part 4 with the addition on increased suction coefficients (at the building edges), if no exceeding loads are indicated.

**Superficial loads**

If the load of a person leaning out affects the transom (when the window wing is open), the additional vertical load which is then required must be considered as well. In case of ceiling-high infills the horizontal superficial loads (caused by persons pressing against the mullion or transom from the inside) must be accounted for.

**Special loads**

Additional loads, such as sun protection devices, scaffolds, etc. must be considered in the static calculations.

Our standard products and systems are not to be used in maritime environments, swimming pools and spas without prior modifications.

**Bending**

The determined flecion of mullion and transom must be in accordance with the requirements as defined in DIN 18056. Additional requirements, in particular when using specific insulation

glass panes, must be considered when calculating the admissible deflection.

## Protection against heat and humidity

According to DIN 4108 on heat protection in high-building, building components are among light external walls when featuring weights of up to 300 kg/m<sup>2</sup>. The resulting influences on the room climate must be particularly considered, above all regarding the type and location of heating and air conditioning, heat storage, wall surfaces, and the respective solar radiation. The builder's requirements are to be tuned to the economical and technical possibilities in window construction. In particular, DIN 4108 applies here. Drainage measures must be agreed. The applicable insulation and avoidance of thermal bridges must be considered when external wall claddings, carriers, supports, panels and other fillings are used.

## Rear-ventilated wall claddings

Wall claddings and socle wainscotings ventilated from the rear must be done in a fashion that little quantities of water having penetrated the ventilation gap are led to the outside in a controlled manner. Inasmuch as is required, anti-drumming devices have to be built in. The openings for entering and escaping ventilation air must be distributed evenly over the width, their total resulting in a sufficient cross section. In any case, a rear-ventilated façade requires a perfectly insulated and airtight wall.

## Sound proofing

For bigger sheet surfaces, claddings, cover profiles and window sills, anti-drumming materials must be used. VDI guideline 2719 on the sound protection of windows and DIN 4109 on sound protection in high-building are the basics. If higher requirements than those defined in sound-protection category 2 are demanded, particular requirements must be considered and agreed.

## Sun protection

Sun protection devices and the resulting construction design must be agreed between the processing company and the builder.

## Protection against fire and smoke

Due to building regulations and obligations by local authorities differing regionally, protective measures against fire and smoke must be taken from the tender documentation, or agreed with the orderer.

## Movement and deformation of building and building components

Building components must not absorb loads from the structure. Snow loads, differences in temperature, as well as lowering and shrinking must be considered. Expansion joints must be done accounting for differences in temperature from – 20° to + 60° Centigrade with light surfaces of natural color; with colored and dark surfaces from -20° to +80° Centigrade.

## 6. Production

Accuracy grade, surface qualities and deformation risks have to be checked before cutting. For the manufacture and processing of our constructions we provide multiple processing guidelines, tools, and auxiliary means to the processing company, which serve as a help to reach the required quality standards. General basic processing instructions will not be mentioned here.

### Processing

The focus must be on the angular accuracy during cutting and assembly in particular. With steel profiles or heat-insulated profiles, fitting pieces should be used for precise cutting. The effect caused by released internal stress, deflection and the like in the

profiles must be checked not only before and after cutting, but also after milling and stamping. The cutting edges must be deburred carefully. Especially the burs from the workpiece must be removed wherever they inhibit correct functioning or result in possible accident hazards.

During production, the following issues must be carefully observed:

- a) Accuracy of fit, flush corner connections and joints
- b) Dimensional accuracy of profiles and components
- c) Build-in of sealings and tightness, fitting accuracy of corners and joints
- d) Drainage (dimensioning and distribution)
- e) Sealing of all profile joints, notches, and screwing
- f) Fitting accuracy of the wing bearing
- g) Damages to the surface
- h) Hardware must be mounted according to the newest state-of-the-art technology and to our specific instructions in such a way that the smooth-running motion (by lubrication), correct fit of the hardware, and tightness of the component will all be ensured.
- i) Lubrication of all moving parts (lock bars, scissors, handles, etc.)

### Function test

RAICO components, being high-quality items with long life cycles, should fulfill, among others, the following requirements:

### Tightness against heavy rain

A window's tightness against water penetration is defined according to DIN EN 12208, and is categorized by four exposure groups. The exposure group to be chosen depends on the geographical location, a normal or excessive wind load, the form of the building, the position of the building and its height. If not agreed otherwise, DIN EN 12208 applies.

### Hardware function

Ensuring the easy operation of all hardware. Faultless functioning of the safety devices, or the faulty-operation blockers respectively.

### Surface treatment of aluminum

All component surfaces have to be protected against influences normally expected. The processing company decides at its own accountability on the suitable individual surface treatment. It will also make sure that specific features of the construction, such as the combination with metals of higher value within the electrochemical series (Cu, Sn, Pb etc.), will be considered, as well as specific emissions caused by the individual location including the effect of sea water. We do not give any warranty for profiles hardware and components which have been anodized or color-coated outside our area of influence; in particular this applies to combinations of heat-insulated profiles.

### Anodic oxidation

The surface treatment of components made of aluminum must be carried out in accordance with DIN 17611. The look of the surface in regard to shine, structure, color shade, and evenness, and the required surface treatment (E0 – E6) are to be taken from the tender documentation or agreed individually.

For color shading only procedures are admissible which create oxidation layers that are color-fast and light resistant without exception. For judging varieties in appearance and color, an evaluation by means of average or limit samples must be agreed.



**Please observe:**

The E0 procedure is only applicable in case that there are no demands whatsoever regarding an even, decorative surface. The E6 procedure may only be applied under the condition that the factory-packed aluminum can be transported within an assuredly short time from the manufacturing factory to the anodizing workshop. The profiles must not be exposed to humidity and/or affected by human sweat, or subjected to lack of packaging during transport, storage, inappropriate handling and the like. If these preliminaries are not observed, RAICO cannot accept any warranty claims.

**Coating**

Color coating procedures of the surface of aluminum components are not standardized. Due to the various possible procedures, details are to be taken from the tender documentation, or agreed with the orderer and RAICO (in case we deliver surface-coated profiles). Regarding high-gloss colors undesirable effects may be more clearly visible than in case of standard coating. This cannot be influenced by RAICO. At offshore locations and in indoor swimming pools with brine water or sea water, filiform corrosion may occur. In these cases the usage of pre-anodized profiles is recommended. Please inquire for more details.

**Protective measures during completion time**

According to VOB (Contracting Rules for Award of Public Works), the building owner is liable to all damages regarding his services until buy-off through the building owner. For temporarily protecting the components during completion time, in particular against mechanical damage or damaging effects of plaster, mortar, cement, color and the like, adhesive tapes, plastic foils and suitable protective paint can be used which can be removed later without leaving traces.

**7. Transport and assembly**

During transport and storage, appropriate protective measures are to be taken in order to avoid damages. Assembly of the components is to be done only after having finished all plastering work. On demand of the building owner and for a certain compensation to be agreed on, the components must be protected against possible damage with the help of protective bands or foils in case later plastering work is carried out.

**Fastening**

Build-in and bracing must be carried out according to DIN 18056 and DIN 18360. It must be ensured that the bracing safely transfers forces from the building component to the structure. The fixing elements must be adjusted to the building shell, supporting the adjoining profiles in such a way that they will be protected against torsion and bending. In case the firmness in the bracing spots seem doubtful, the orderer must be informed without delay according to VOB/B § 4, Paragraph 3 (German Construction Contract Procedures). If components with moving wings, mullions and transoms are used, the blind frames must be mounted in such a way that the forces emanating from bands, bearings, mullions and transoms will be transferred to the structure. Each side of the window wall must be joined to the structure at least at two points. The maximum distance of the bracing spots is 80 cm. The necessary assembly clearance, caused by thermal expansion of the building components, necessary sealing joints, and dimensional changes of the adjacent components has to be controlled by means of expansion joints. If required, gliding elements for expansion compensation which are soundproof, airtight and watertight must be used. During mounting and plastering, door frames should be planned, also considering heat insulation and moisture barriers.

**Sealing**

If not defined otherwise in the tender documentation, the parts of the building which serve as brick partitions (such as windows, window walls, doors, etc.) must be sealed in the joints of the building structure and the components by suitable sealing materials. The joints must be tight and sealed according to DIN 18360 and DIN 18540. Bigger hollow spaces at joining walls or joints in the construction have to be rear-ventilated by using water-repellent bands to fill the joints, with pore blocking. Only bands are allowable which can change their volume elastically due to their structure. Exterior joints and joining walls are sealed by means of permanent sealing agents or EPDM foils to be glued or clamped. For proper processing, sealing joints must be clean, dry and greaseless. The sealing joints must be dimensioned according to the instructions given by the manufacturers producing sealing agents.

**Glazing**

The glazing of window panes, panels, fillings and the like is to be carried out according to DIN 18361 (glazing work). Glass manufacturers' guidelines on glazing procedures must be observed. The company in charge of window construction, if not carrying out the glazing itself, upon order receipt must agree on the precise manner and execution of glazing works with the glazing company before placing the order on glass. The glazing contractor has to be informed on the selected system type, or way of mounting. The guidelines issued by the German Institute of Glazing Crafts referring to glazing technology and window construction, and the processing guidelines issued by the sub-suppliers of glass panels and insulation glass must be considered.

**Wet glazing**

For wet glazing the 'Chart for determining the exposure categories of window glazing', published by the German Institute for Window Technology must be considered.

**Dry glazing**

For dry glazing with duplex sealing profiles, the rebate must generally be equipped with a ventilation system and a controlled drainage system towards the outside. Materials used for the sealing profiles will be selected according to expected exposure. When processing the sealing profiles it is important that the tolerances and dimensions of the rebate width without sealing, of the sealing itself, and of the filling elements (e. g. the glass pane) will be adjusted to each other, ensuring that the adding tolerance values will not exceed the maximum allowances, and that they will remain water-tight (please see processing guidelines). Principally, however, the guidelines on glazing are to be considered.

**Pressure glazing**

For pressure glazing the specific processing guidelines issued by glass manufacturers and system producers must be followed.

**Usage of blocks**

With glass panes, panels, fillings and the like, blocks made of plastic or impregnated water-proofed hardwood featuring a minimum length of 10 cm must be used in an expert way dependent on the type of wing and rebate, to ensure that the wings will not touch and scrape. When single-sheet glazing and insulation glass are used, the guidelines on the use of blocks with even glass panes must be observed (as issued by the German Institute of Glazing Crafts for Glazing Technology and Window Construction).

**Controlled drainage**

Rain water and leak water penetrating from other building components must be collected right above the metal construction,

and drained off in a controlled manner. Water caused by rain, condensation and leak caught in the construction itself must be collected and drained off in a controlled manner within the lower horizontal of each zone, whether applying to glazing zones or wings with differing varieties of opening.

When collecting this water, the maximum level the water will rise inside the collecting chamber must be taken into account, also considering external pressure. The rising level should be at least 10 mm and must be increased according to the expected maximum external pressure. Collected water must be drained off in a controlled manner to the outside, preventing it to penetrate the building structure.

### **Cleaning**

Assembled components must be cleaned before buyoff, dirt and soil caused by mounting must be removed. Only allowable cleaning detergents may be used. Additional cleaning procedures have been defined in Explanatory Note A 5 on cleaning aluminum in construction (issued by the German Aluminum Center).

### **Protective measures**

To ensure faultless functioning and long life-cycles of hardware parts, suitable lubricants and grease have to be applied to moving hardware elements.

### **Final inspection**

Before delivery of the building components to the orderer, the following functions must be checked:

- a) the evenness of joints between frame and window sash, and the even circumferential wing bearing
- b) the easy motion and correct functioning of all hardware parts
- c) the operation blockers
- d) the correct and faultless fit of the wing seals
- e) the openings for ventilation and drainage of the rebate.