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DEUTSCHES INSTITUT FÜR BAUTECHNIK[1]

Anstalt des öffentlichen Rechts[2]

10829 Berlin, 11 October 2005
Kolonnenstraße 30 L
Telefon[3]: +49-30-78730-246
Telefax[4]: +49-30-78730-320
GeschZ[5]: I 35-1.14.1-24/05

General Building Inspectorate Approval

Approval No.: Z-14.1-181

Applicant: Corus Bausysteme GmbH
August-Horch-Strasse 20-22
56070 Koblenz

Object of Approval: Kalzip Aluminium Standing Seam Roof

Valid Until: 30 September 2010

The above-mentioned object is herewith approved by the General Building Inspectorate.
This General Building Inspectorate Approval consists of 10 pages and 33 sheets in the Annex.

(official seal)

The object was fist approved by the General Building Inspectorate on 22 February 1980.

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[1] German Institute for Construction Engineering
[2] Public Institution
[3] Phone
[4] Fax
[5] File No.

Publicly Appointed And Sworn Translator
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299
For The English Language

I. GENERAL PROVISIONS

1 The General Building Inspectorate Approval proves the usability and suitability of the above-mentioned object according to the Landesbauordnungen[6].

2 The General Building Inspectorate Approval does not replace any of the authorisations, approvals and certificates legally required for the implementation of building projects.

3 The General Building Inspectorate Approval is granted notwithstanding any rights of third parties, industrial property rights in particular.

4 The manufacturers and distributors of the above-mentioned object are, notwithstanding any further regulations in the "Special Provisions", obliged to provide the user or applicant with copies of the General Building Inspectorate Approval and to point out that the General Building Inspectorate Approval must be available at the place of use. Copies of the General Building Inspectorate Approval must be made available to the authorities involved upon their request.

5 The General Building Inspectorate Approval may only be copied in its entity. Any publication of excerpts hereof requires the prior consent of the *Deutsches Institut für Bautechnik*. Texts and drawings in advertisements must not contain any information contradictory to the General Building Inspectorate Approval. Translations of the General Building Inspectorate Approval must contain the remark "translation of the German original version not examined by the Deutsche Institut für Bautechnik".

6 The award of the General Building Inspectorate Approval is revocable. The provisions of the General Building Inspectorate Approval may be supplemented and modified subsequently, in particular, if this should be necessary because of new technical findings.

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[6] German Federal Building Regulations

II. SPECIAL PROVISIONS

1 Object of approval and application range

The approved object is a construction mode consisting of several construction products, i.e. load-bearing, space-enclosing roofing elements and non load-bearing, space-enclosing plastic lighting elements as well as the corresponding fixing elements (clips, drilling screws, etc.). The roofing elements are made of stucco-embossed, Aluminium sheet in mill finish which is galvanised or coated with synthetic material and cold-formed into profiled sheets of trough shaped cross section or with raised seams positioned parallel in supporting direction. The clips are made of extruded Aluminium rods or plastic (polyamide with steel core). The drilling screws referred to in this General Building Inspectorate Approval in connection with the roofing elements and clips are made of stainless steel.

Individual plastic lighting elements can be installed between the profiled sheets. The geometry of these plastic lighting elements corresponds to that of the profiled sheets to such an extent that they can be positioned anywhere between the profiled sheets. They are joined with the profiled sheets on the lateral outer raised seam using specially designed locking rails.

The profiled sheets are joined together by mechanical zipping of the lateral raised seams of the adjacent roofing elements to give a continuous, completely rainproof roof. The sheets are joined with the substructure by means of special clips which sit within the raised seams at each side of the sheet and are fastened to the substructure. The clips are not visible from above.

The General Building Inspectorate Approval controls the manufacture of the construction products and the use of the construction mode.

2 Provisions relating to construction products

2.1 Properties and composition

2.1.1 Dimensions

The dimensions of the profiled sheets, clips and drilling screws*) must comply with the information provided in Annexes 1, 2, 11, 12 and 13. Details on the exact dimensions of the plastic clips illustrated in Annex 14 can be found at the *Deutsches Institut für Bautechnik.* The profiled sheets of version AF may also be manufactured with longitudinal stiffeners in the large flange (version AS).

The tolerances according to DIN EN 485-4 are applicable to the limit deviations of the nominal sheet thickness of the profiled sheets. For the bottom limit deviations, however, the values to be applied must be halved.

2.1.2 Materials

2.1.2.1 Profiled sheets

The following materials shall be used as Aluminium alloy for making the profile sheets of the sheet thickness specified in the Annexes:

- EN AW-3004 (AlMn1Mg1) or
- EN AW-3005 (AlMn1Mg0.5) according to DIN EN 573-3 and
- EN AW-6025 (AlMg2.5SiMnCu).

*) The exact dimensions of the drilling screws illustrated in Annexes 11 and 13 can be found at the *Deutsches Institut für Bautechnik.*

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If the manufactured Aluminium sheet is clad, the film thickness of the cladding must amount to at least 4% of the nominal sheet thickness on each side.
The Aluminium alloy EN AW-7072 according to DIN EN 573-3 shall be used as cladding material.
One-sided cladding of the profiled sheets is also admissible with Titanium Ti1 (material no. 3.7025) according to DIN 17850.
The base material (smooth or stucco-embossed Aluminium sheet) not yet profiled must have at least the following mechanical material properties at each sheet thickness (strength values and elongation assessed on flat samples (t x 12.5 mm x 50 mm) according to DIN EN 10002-1):

$R_{p0.2}$ [N/mm²]	R_m [N/mm²]	Sheet Thickness t [mm]	$A_{50\ mm}$ [%]
185	220	0.7	3.0
		0.8	3.5
		0.9	3.8
		1.0	4.0
		1.2	4.0

The manufactured building components in their final state intended for use must also comply with these requirements.

2.1.2.2 Clips

The following material shall be used for making the clips: Aluminium alloy EN AW-6060 according to DIN EN 573-3, 0.2% proof strength $R_{p0.2}$ = 220 N/mm² or Aluminium alloy EN AW-6061 according to DIN EN 573-3, temper T6 according to DIN EN 755-2.
The base material used for the steel core of the plastic clips illustrated in Annexes 14 must have at least the mechanical qualities of steel grade S280 according to DIN EN 10326.
Further information on the material qualities of the polyamide (density, melt-flow index, Shore-D-hardness, tensile strength, notched-bar impact test) and the manufacturing process of the plastic clips illustrated in Annexes 14 can be found at the *Deutsches Institut für Bautechnik*.

2.1.2.3 Drilling screws according to Annexes 11 and 13, other fixing elements

The drilling screws according to Annexes 11 and 13 shall be made of stainless steel of material number code 1.4567. For other fixing elements (cf. Annex 9), the information specified in the General Building Inspectorate Approvals for fixing elements (e.g. Approval No. Z-14.1-4) or in DIN 1052 are applicable.

2.1.3 Corrosion protection

2.1.3.1 Profiled sheets

The provisions of DIN 18807-9 are applicable.

2.1.3.2 Drilling screws according to Annexes 11 and 13, other fixing elements

The provisions of the General Building Inspectorate Approval No. Z-14.1-4 are applicable. Furthermore, DIN 18807-9:1998-06, section 4.5.2 is applicable by analogy.

2.1.4 Fire resistance

The provisions of DIN 18807-9 are applicable.

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2.2 Marking

2.2.1 Profiled sheets

The packaging of the profiled sheets must be marked with the conformity symbol ("Ü-Zeichen") according to the country-specific conformity regulations. The packaging may only be marked with the conformity symbol if the requirements according to section 2.3 are fulfilled.

Moreover, each packaging unit must be provided with a sign indicating the manufacturing plant, the year of manufacture, the profile designation, the sheet thickness and the apparent minimum limit of elasticity.

2.2.2 Clips

The packaging of the clips must be marked with the conformity symbol ("Ü-Zeichen") according to the country-specific conformity regulations. The packaging may only be marked with the conformity symbol if the requirements according to section 2.3 are fulfilled.

Moreover, each packaging unit must be provided with a sign indicating the manufacturing plant, the year of manufacture, the type of clip and the material used.

2.2.3 Drilling screws according to Annexes 11 and 13

The packaging of the drilling screws according to Annexes 11 and 13 must be marked with the conformity symbol ("Ü-Zeichen") according to the country-specific conformity regulations. The packaging may only be marked with the conformity symbol if the requirements according to section 2.3 are fulfilled.

Furthermore, the provisions of the General Building Inspectorate Approval No. Z-14.1-4 are applicable.

2.3 Proof of conformity

2.3.1 General information

Conformity of the construction products with the provisions of this General Building Inspectorate Approval must be proved by each manufacturing plant by means of a certificate of conformity based on a factory production control and an external supervision at regular intervals including initial testing of the construction products in accordance with the following provisions.

To obtain the certificate of conformity and regarding the external supervision including the resulting product tests, the manufacturer of the construction products must contact an authorised certification office and an acknowledged supervisory institute.

The certification office must submit a copy of the certificate of conformity to the *Deutsches Institut für Bautechnik.*

2.3.2 Factory production control

A factory production control must be set up and implemented in each manufacturing factory.

A factory production control is to be understood as the constant supervision of production by the manufacturer ensuring that the manufactured construction products conform to the provisions of this General Building Inspectorate Approval.

Within the framework of the factory production control at least those measures listed in the following must be implemented.

- Profiled sheets:

  The required dimensions specified in section 2.1 (particularly the sheet thickness) must be checked on the basis of regular measurements in the manufacturing plant.

  If applicable, the cladding film thickness must be checked on each coil by means of microsection on the rolled-out material.

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The required material properties of the base material specified in section 2.1.2.1 must be checked upon each material delivery. Proof of the material properties of the base material must be provided in the form of an approval certificate "3.1" according to DIN EN 10204. Compliance of the information in the approval certificate "3.1" with the information in section 2.1.2.1 must be checked.
A folding test according to DIN EN ISO 7438 must be implemented on each coil in order to prove that the ductility of the base material and the profiled sheets is sufficient. No cracks must form during this test.

- Clips:
  The required dimensions and material properties of the clips specified in sections 2.1.1 and 2.1.2.2 must be checked regularly. Proof of the material properties of the base material must be provided in the form of an approval certificate "3.1" according to DIN EN 10204. Compliance of the information in the approval certificate "3.1" with the information in section 2.1.2.2 must be checked.
- Drilling screws according to Annexes 11 and 13:
  The provisions of the General Building Inspectorate Approval No. Z-14.1-4 are applicable.

The results of the factory production control must be recorded and evaluated. The records must contain at least the following information:

- Designation of the construction product or the base material and the components
- Type of control or test
- Date of manufacture and testing of the construction product or the base material and the components
- Result of the controls and tests and comparison with the requirements
- Signature of the person responsible for the factory production control.

The records must be kept for at least 5 years and be presented to the supervisory institute responsible for the external supervision. They must be presented to the *Deutsche Institut für Bautechnik* and the highest building inspectorate authorities upon request.
Should the test results be unsatisfactory, the manufacturer is obliged to take measures to remedy the respective defect(s) immediately. Any construction products which do not fulfil the requirements must be handled in such a way that they will not be mixed up with conforming products.
Once the defect has been remedied, the test concerned must be repeated immediately, if technically possible and as far as this is necessary to prove that the defect has been remedied.

2.3.3 External supervision

The factory production control must be inspected in each manufacturing plant on the basis of external supervisions at regular intervals, i.e. at least twice a year. Within the framework of the external supervision, an initial testing of the construction products is required and random sampling shall be used to implement the following tests:

- Profiled sheets:
  Random sampling shall be used to check the dimensions and the material properties. The external supervision must prove that the requirements according to section 2.1.1 or 2.1.2.1 are complied with.
- Clips:
  Random sampling shall be used to check the dimensions and the material properties of the clips. The external supervision must prove that the requirements according to section 2.1.1 or 2.1.2.2 are complied with.
- Drilling screws according to Annexes 11 and 13:
  The provisions of the General Building Inspectorate Approval No. Z-14.1-4 are applicable.

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The samples shall be taken and the tests be implemented by the respective authorised supervisory institute. The results of the certification and external supervision must be kept for at least 5 years. The authorised certification office and the acknowledged supervisory institute must present these to the *Deutsche Institut für Bautechnik* and the highest building inspectorate authorities upon request.

3 Provisions relating to design and dimensions

3.1 General information

The proof to be furnished must comply with the provisions of DIN 18800-1:1990-11. The serviceability limit state and the ultimate limit state must be proved in each individual case by means of static calculations. The proof may also be furnished by means of an officially approved static type rating.

3.2 Design loads (actions)

3.2.1 General information

The regulations of DIN standards 1055-1, -4, -5 are applicable to the design loads unless stated otherwise in the following.

3.2.2 Dead load of the profiled sheets

For the dead load of the profiled sheets, see Annexes 6.

3.2.3 Wind uplift forces

The increased wind loads resulting from the wind uplift forces in the roof edge and corner areas according to DIN 1055-4 are only to be taken into account for proof of the connections (incl. those with the substructure).

The increased wind loads resulting from the wind uplift forces do not need to be taken into account for the design calculation of the profiled sheets.

3.2.4 Single load

The proof of the ultimate limit state for the profiled sheets exposed to a single load of 1 kN according to DIN 1055-3:1971-06, section 6.2.2 is to be regarded as furnished if the provisions of this Approval are complied with (cf. also section 5).

3.2.5 Water pocket

The provisions of DIN 18807-3:1987-06, section 3.1.3, are applicable by analogy.

3.3 Static systems

The profiled sheets may either be single-span or cover several spans continuously.

The span is to be understood as the centre to centre distance of the clips. Continuous beams of below 1.0 m span must be proved to have at least 1.0 m theoretical span.

3.4 Proof of acceptance of loads rectangular to the roof surface

3.4.1 Calculation of loads

Section 7.2 of standard DIN 18800-1:1990-11 is applicable unless stated otherwise in the following. The loads must generally be calculated according to the elasticity theory.

The proof of the serviceability limit state (deflection according to DIN 18800-1:1990-11, section 7.2.3) may be furnished on the basis of the same combination coefficients as for the proof of ultimate limit state and $\gamma_M = 1.0$.

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3.4.2 Calculation of load resistances derived from characteristic resistance values
Section 7.3 of DIN 18800-1:1990-11 and the information provided in Annexes 6 to 9 and Annexes 12, 13 and 14.5 are applicable. The characteristic values in Annexes 6 are designated in accordance with the standards of the DIN 18807 series. The characteristic resistance values for profiled sheets of a cover width complying with those specified in the Annexes and for tapered profiled sheets may be determined based on linear interpolation.
The characteristic values indicated for profiled sheets of version AF may also be used for the profiles with longitudinal stiffeners in the large flange (version AS) referred to in section 2.1.1.
Either those values indicated in Annex 9 or the values for the admissible loads in the respective General Building Inspectorate Approvals (e.g. Approval No. Z-14.1-4) and standards (e.g. standard DIN 1052) multiplied by factor 2 may be taken into account as characteristic values for the maximum acceptable loads for the connections between the clips and the substructure. In this context, the partial safety factor shall be $\gamma_M = 1.33$.

3.5 Calculation of deformations
For the characteristic value for the moment of inertia (bending), see Annexes 6.

3.6 Roof shear forces
The transfer of shear forces and perpendicular forces active at roof level caused by the profiled sheets due to a roof pitch must not be taken into account for the calculation unless specific design requirements are fulfilled, e.g. by forming fixed points according to Annex 3 (cf. also section 4.1). The forces from fixed points are to be traced back to the substructure.

3.7 Horizontal shear transfer
Any possible horizontal shear transfer of the profiled sheets (diaphragm action) reinforcing the entire building structure or stabilising the substructure against torsional-flexural buckling must not be taken into account for the calculation.

4 Provisions relating to the implementation/installation

4.1 Profiled sheets
The profiled sheets must be joined with the substructure by means of clips fixed to each outer raised seam. Fixed points according to Annex 3 must be provided in order to fix the profiled sheets in the case of thermal movement and in order to counteract the roof shear forces found in sloping roofs. Transversal joints are only admissible if perfect water drainage is guaranteed even under full load.
Transversal joints must be made directly on top of a support if the joint is made at a fixed point. Otherwise, the profiled sheets must join in direction of the ridge (cf. Annex 4). In the case of roof pitches up to 17° (30%) the profiled sheets must overlap each other by at least 20 cm and by at least 15 cm in the case of larger roof pitches.
When using profiled sheets as water-bearing outer leafs for roofs, the following minimum roof pitches are to be observed:
The minimum roof pitch for roofs without transversal joints and with welded transversal joints amounts to 1.5° (2.6%). The required minimum roof pitch increases to 2.9° (5%) for roofs with sealed-in transversal joints and/or openings (e.g. for skylights).

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The increased minimum roof pitch required for openings in the roof (e.g. for skylights) may be ignored if the following requirements are fulfilled simultaneously:

1. Fully welded Aluminium skylight frames are used.
2. The Aluminium skylight frames are welded with the roof top made of the profiled sheets in such a way that a completely watertight roof is obtained.

The minimum roof pitch requirement is not applicable (limited locally) for the ridge area if the unjointed roofing elements in the area with roof pitches $\leq 2.9°$ (5%) are positioned continuously over the ridge.

4.2 Plastic lighting elements

Plastic lighting elements are to be installed according to Annex 5. Each lighting element must be joined with at least 3 profiled sheets on both sides (cf. also Annex 8). Furthermore, section 4.1 is applicable in analogy.

4.3 Clips

Clips according to Annexes 2 and 14 are to be used to join the profiled sheets with the substructure of the roof. The top end of the clips must be zipped with the profiled sheets. The clips must be fixed directly to the substructure made of steel, Aluminium or timber.
The clips are to be fastened to the substructure by means of suitable screws referred to in Annexes 9 and 11 or specified in the General Building Inspectorate Approvals (e.g. Approval No. Z-14.1-4) and standards (e.g. DIN 1052).
Rotating clips according to Annex 12 may also be used for joining profiled sheets with the substructure. The rotating clips must be anchored indirectly by means of the rotating clip rail according to Annex 12. Following the installation, the axis of the rotating clip must be swivelled towards the axis of the rotating clip rail by at least 45°.
The rotating clip rail is to be fastened to the substructure by means of the drilling screw illustrated in Annex 13 or suitable screws specified in the General Building Inspectorate Approvals (e.g. Approval No. Z-14.1-4) and standards (e.g. DIN 1052).
When joining the profiled sheets with concrete substructures, adequately anchored, continuous steel components (e.g. HTU bars or 8 mm thick flat steel) or wooden ledges (minimum thickness: 40 mm) at least 60 mm wide must be inserted.

4.4 Support depth

The minimum purlin width is 50 mm for end supports and intermediate supports. The profiled sheets must protrude by at least 100 mm at the end supports to guarantee sufficient ultimate limit state.

4.5 Gable end

The exposed edges in spanning direction of the profiled sheets must be reinforced by means of suitable reinforced borders (gable end profiles).

4.6 Installation of profiled sheets

The profiled sheets may only be installed by specialised staff from the manufacturing plant or by companies instructed and authorised accordingly by the manufacturer. The manufacturer or company commissioned to install the profiled sheets is obliged to draw up procedural instructions for the installation of the elements and to hand these over to the company in charge.
Damaged profiled sheets, including damage caused by plastic deformations, must not be used.
When using profiled sheets of different sheet thickness in one roof, these must be marked according to their thickness in order to avoid mix-ups.

The individual elements must be joined immediately after their installation by mechanical zipping of the outer raised seams. In so doing, perfect jointing with the clips must be ensured. Should the installation procedure be interrupted, the profiled sheet fixed last must be secured against lifting-off.
Additional protective measures against lifting-off must be taken if the construction is exposed to more stress caused by wind loads during the installation than in its final state.
During the assembly, profiled sheets yet unfixed on one edge may be walked on without taking any load-distributing measures if the limit spans according to Annex 10 are not exceeded. In the case of larger spans they may only be accessed via planks placed on top (cf. section 5).
Individual, unzipped profiled sheets, plastic lighting elements and profiled sheets according to Annex 1.4 must not be walked on.
Upon conclusion of the assembly, all objects and foreign matter (e.g. drilling chips, pins of blind rivets) must be removed from the roof.
Conformity of the construction style with the provisions of this General Building Inspectorate Approval must be certified by the commissioned company.

5 Provisions relating to utilisation, maintenance and servicing

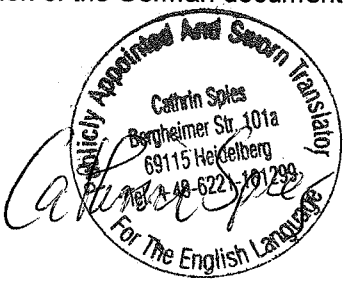
The profiled sheets of the finished roofing may be walked on for cleaning and maintenance purposes without taking any load-distributing measures if the limit spans according to Annex 10 are not exceeded.
Load-distributing measures, e.g. wooden planks of sorting class S10 of 4 x 24 cm cross section and > 3.0 m length are to be used if the span exceeds the afore-mentioned limit values.
The planks may be installed in spanning direction of the profiled boards or on the seams across the spanning direction.
Plastic lighting elements and profiled sheets according to Annex 1.4 must not be walked on.

Dr.-Ing Kathage

Certified
(signature, official seal)

In my capacity as a public translator for the English language, duly commissioned and sworn by the President of the Regional Court of Heidelberg (Landgericht Heidelberg), I hereby confirm that the foregoing is a true and complete translation of the German document submitted to me in the original.

Heidelberg, Germany
26 October 2005



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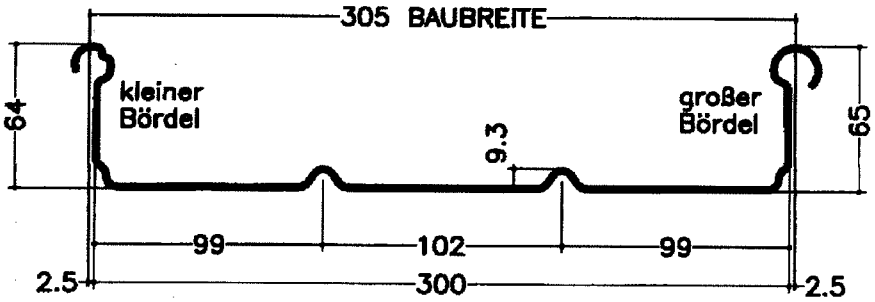
Kalzip 65/305



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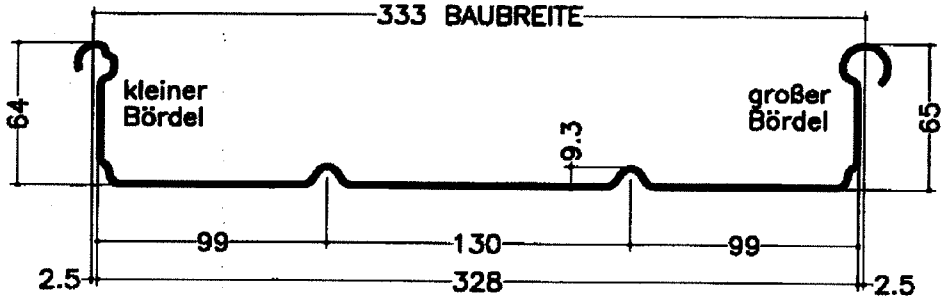

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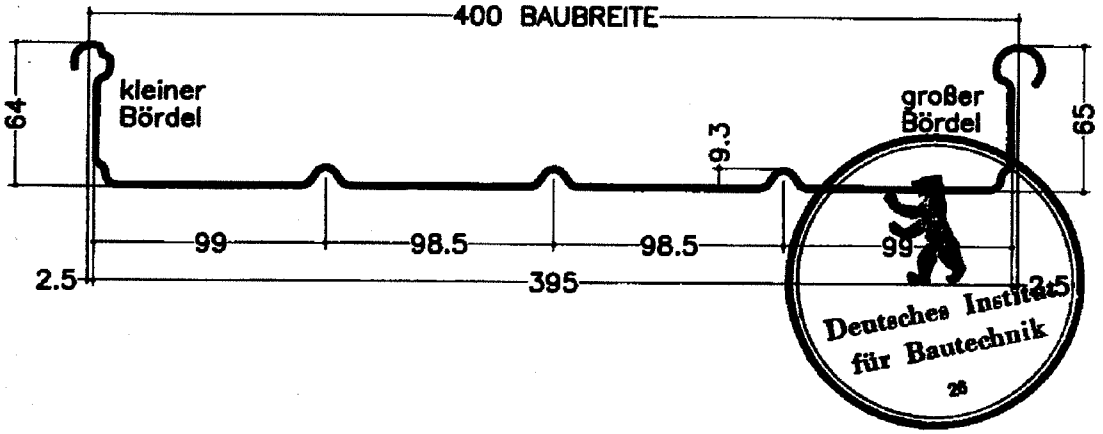

Note by the translator:
Baubreite = cover width kleiner Bördel = small head of seam großer Bördel = large head of seam

Kalzip Roof

Corus Bausysteme GmbH
Koblenz

Profile Dimensions

Kalzip 65/305/333/400

Annex 1.1 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

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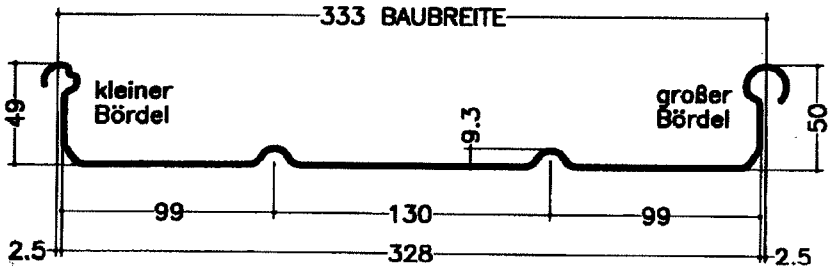

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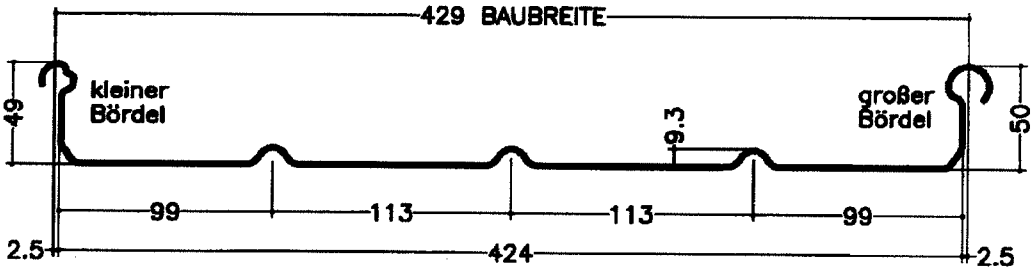

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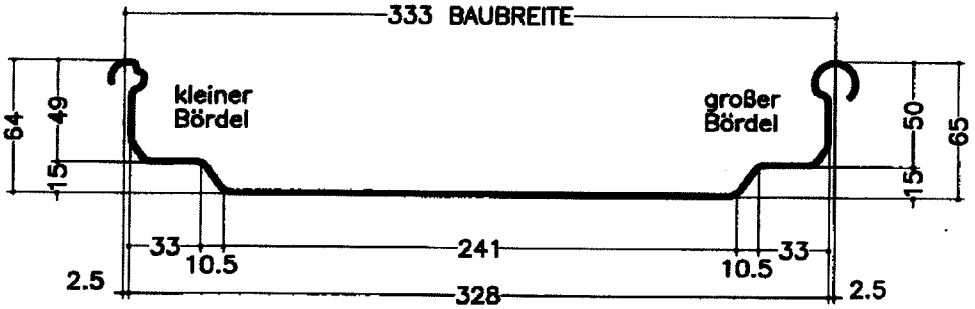

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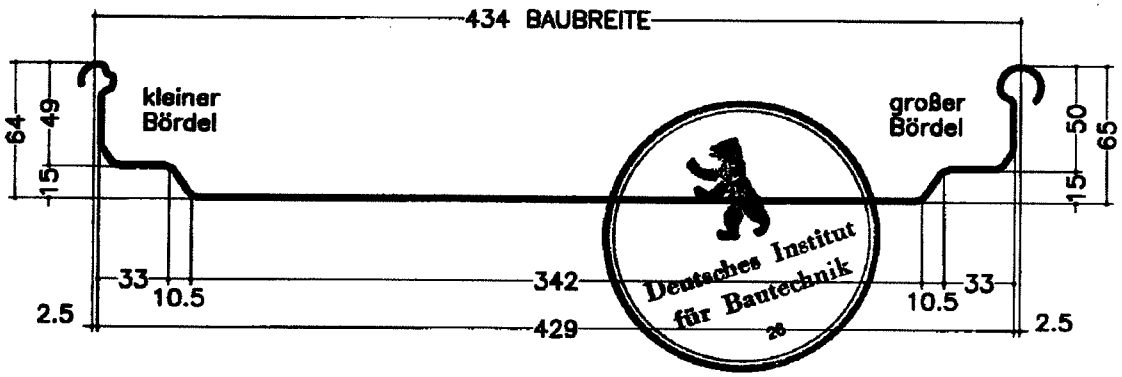

Deutsches Institut für Bautechnik

Note by the translator:
Baubreite = cover width kleiner Bördel = small head of seam großer Bördel = large head of seam

Kalzip Roof

Profile Dimensions

Annex 1.2 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

Corus Bausysteme GmbH
Koblenz

Kalzip 50/333/429
Kalzip AF 65/333/434

Publicly Appointed And Sworn Translator
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299
For The English Language

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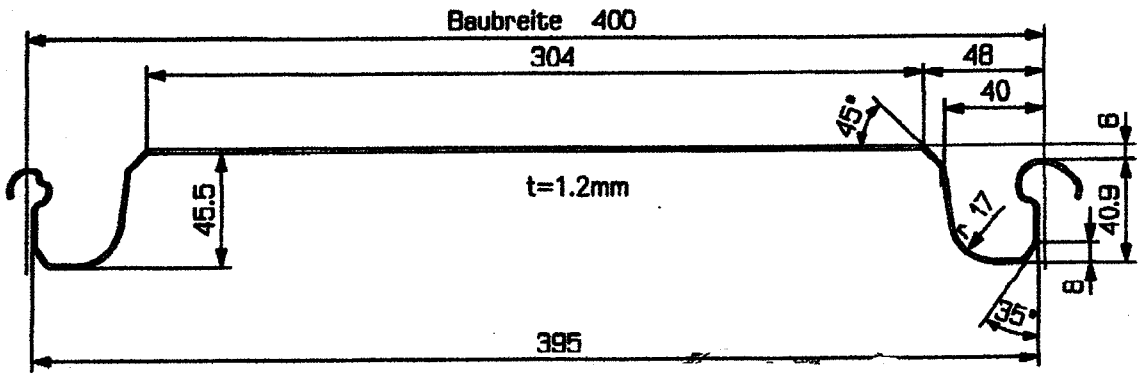

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Note by the translator: Baubreite = cover width

Kalzip Roof

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Profile Dimensions

Kalzip SR 45/400

Annex 1.4 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

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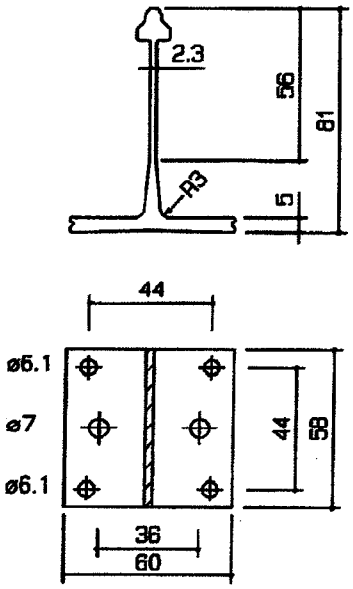

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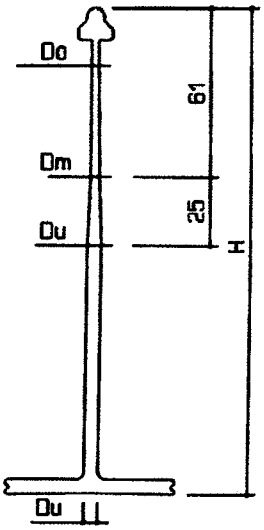
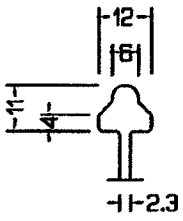
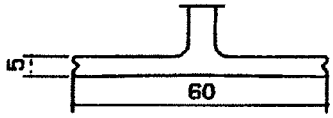


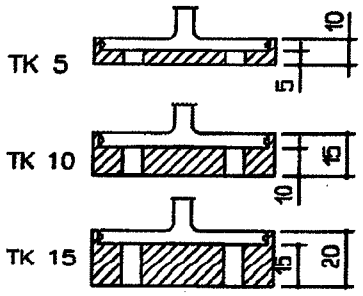
Klippkopf

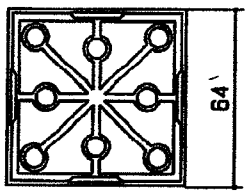


Klippfuß



Thermokappen





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Abmessungen Klipp Typ L10 - L150 mm

Typ	L10	L25	L40	L50	L60	L80	L90	L100	L110	L120	L130	L140	L150
H	66	81	96	106	116	136	146	156	166	176	186	196	206
Do	2.5	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Dm	3.0	2.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Du	3.0	6.2	3.3	3.3	3.6	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.3

Note by the translator:
Type = type bis = up to Klippkopf = clip head Klippfuß = clip base
Thermokappen = thermal barrier caps Abmessungen Klipp = clip dimensions

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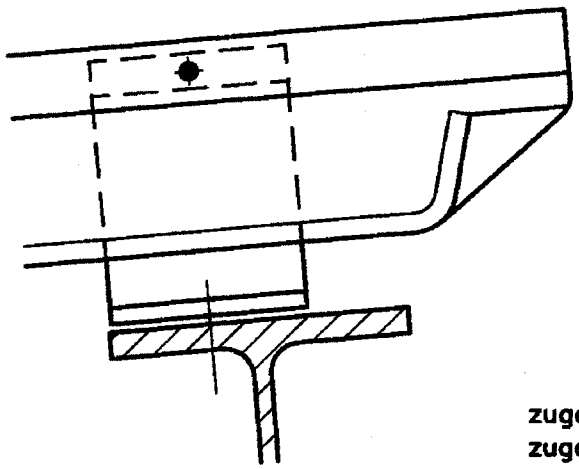
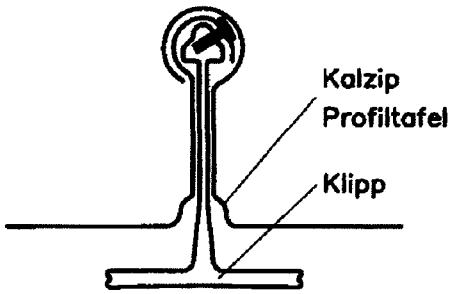
Clip Dimensions

Aluminium Standard Clip

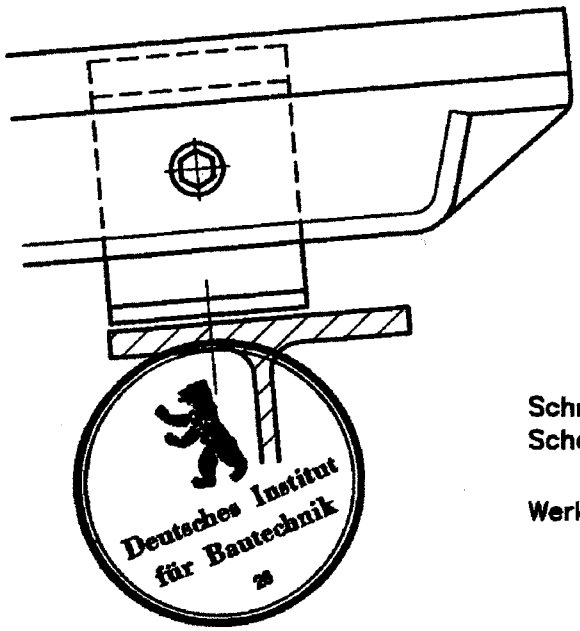
Publicly Appointed And Sworn Translator
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299
For The English Language

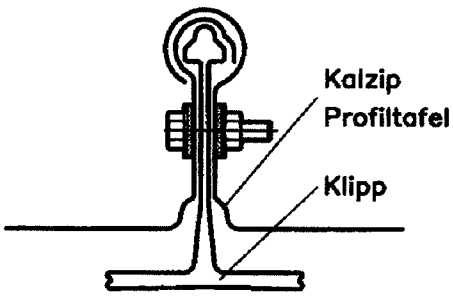
Annex 2 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005





zugelassener Blindniet ø4,8x11 oder
zugelassener Blindniet ø5x12
mit Kopfdurchmesser 8 bis 10 mm





Schraube M6x25 mit Mutter und
Scheibe mit aufvulkanisierter Dichtung

Werkstoff: nichtrostender Stahl

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Note by the translator:
Profiltafel = profiled sheet Klipp = clip zugelassener Blindniet = permissible blind rivet
oder = or mit Kopfdurchmesser 8 bis 10 mm = of 8 to 10 mm head diameter
Schraube M6x25 mit Mutter und Scheibe mit aufvulkanisierter Dichtung = M6x25 screw with nut and washer with vulcanised sealant Werkstoff: nichtrostender Stahl = material: stainless steel

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Kalzip

Fixed Point Formations

Annex 3 to General
Building Inspectorate
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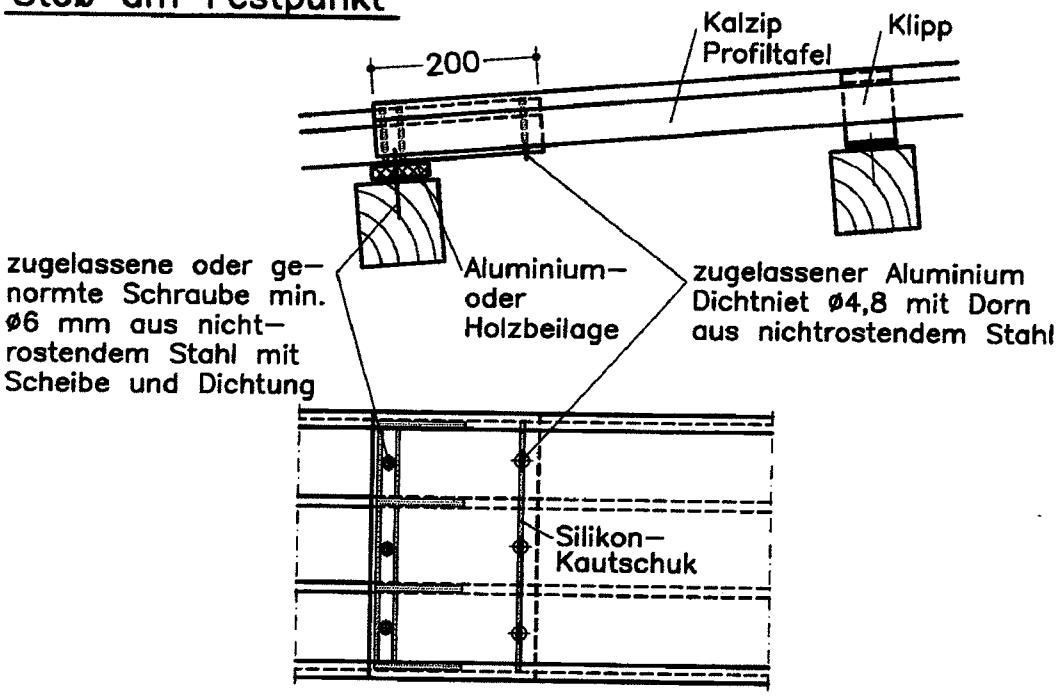
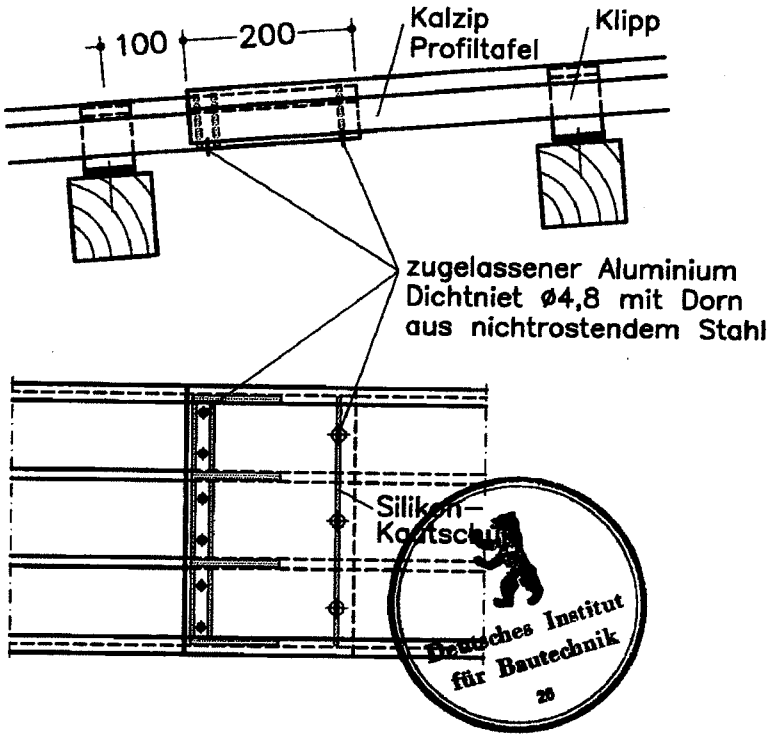
of 11 October 2005

Publicly Appointed And Sworn Translator For The English Language
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299

Stoß am Festpunkt



Stoß ohne Festpunkt



Note by the translator:
Stoß am Festpunkt = joint at fixed point Profiltafel = profiled sheet Klipp = clip
zugelassene oder genormte Schraube min. Ø6 mm aus nichtrostendem Stahl mit Scheibe und Dichtung = permissible or standard min. Ø6 mm screw made of stainless steel with washer and sealant
Aluminium- oder Holzbeilage = Aluminium or wooden shim
zugelassener Aluminium Dichtniet Ø4,8 mit Dorn aus nichtrostendem Stahl = permissible Aluminium Ø4.8 sealing rivet with pin made of stainless steel Silikon-Kautschuk = silicone rubber

Kalzip Roof

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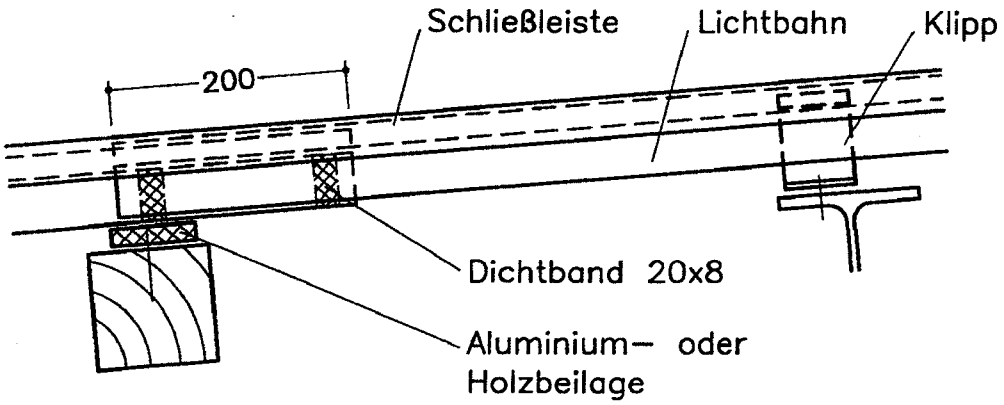
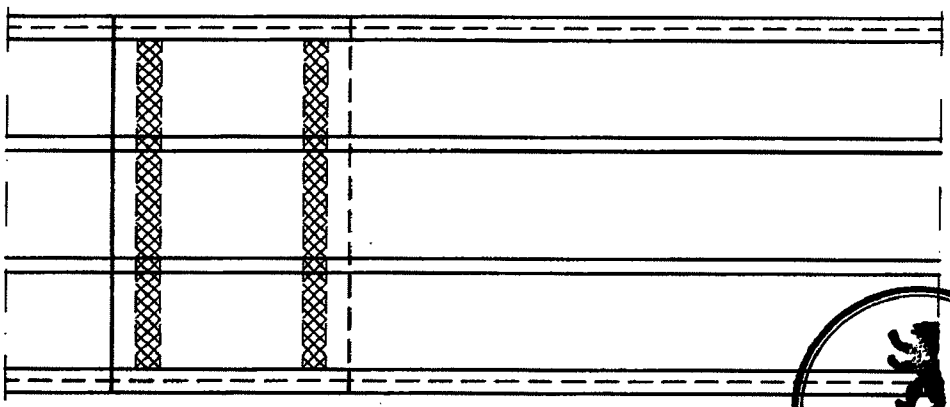
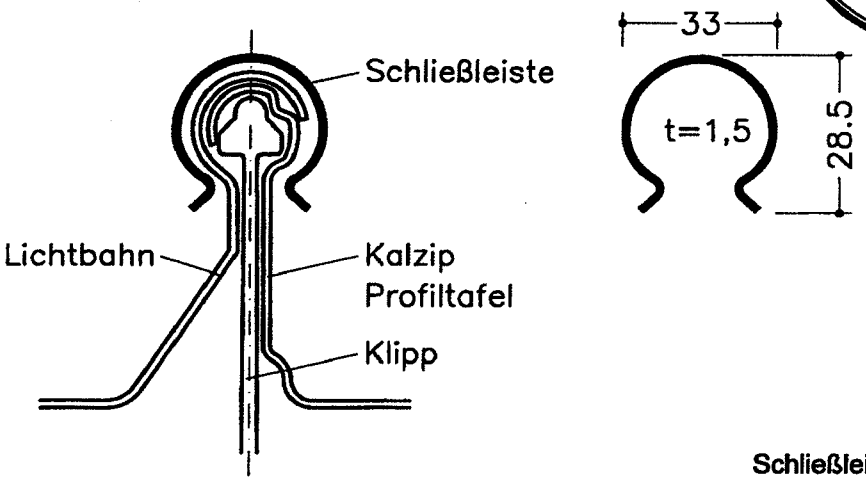
Joint Formations

Annex 4 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

LICHTBAHNSTOß







Schließleiste:

Werkstoff EN AW-6060

Note by the translator:
Lichtbahnstoß = lighting element joint Schließleiste = locking rail Lichtbahn = lighting element
Klipp = clip Dichtband = sealing tape Aluminium- oder Holzbeilage = Aluminium or wooden shim
Profiltafel = profiled sheet Werkstoff = material

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Plastic Lighting Elements

Joint Formation

Annex 5 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

Kalzip 65/305 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t	g	$J_{ef,k}$	$M_{F,k}$	$R_{A,K}$	$M^0_{B,k}$	$R^0_{B,k}$	max $M_{B,k}$	max $R_{B,k}$
mm	kN/m²	cm^4/m	kN/m	kN/m	kNm/m	kN/m	kNm/m	kN/m
0.7	0.0296	51.3	1.20	8.34	1.57	853	1.56	17.1
0.8	0.0339	58.6	1.57	10.9	2.05	1115	2.03	22.3
0.9	0.0381	65.9	2.03	14.2	2.51	707	2.46	26.1
1.0	0.0423	73.2	2.48	17.5	2.98	299	2.89	29.9
1.2	0.0508	87.9	2.93	20.0	3.58	426	3.50	36.5
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip 65/305 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t	$J_{ef,k}$	$M_{F,k}$	$R_{A,K}$	$M^0_{B,k}$	$R^0_{B,k}$	max $M_{B,k}$	max $R_{B,k}$
mm	cm^4/m	kN/m	kN/m	kN/m/m	kN/m	kN/m/m	kN/m
0.7	33.8	1.33	11.1	1.28	18.8	1.01	6.50
0.8	44.2	1.73	14.5	1.67	24.6	1.32	8.49
0.9	55.7	2.32	18.3	2.19	59.0	1.90	11.8
1.0	67.2	2.91	22.1	2.70	93.4	2.47	15.1
1.2	82.8	3.45	26.2	3.27	247	3.15	17.6
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

(official seal)

Kalzip Roof

Corus Bausysteme GmbH
Koblenz

Moments and Reaction Forces
at Intermediate Supports
Characteristic Resistance Values
and Partial Safety Factors γ_M
Kalzip 65/305

Annex 6.1 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

Kalzip 65/333 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
0.7	0.0287	48.2	1.14	7.97	1.49	806	1.48	16.2
0.8	0.0328	55.1	1.48	10.4	1.95	1052	1.94	21.1
0.9	0.0369	61.9	1.91	13.5	2.40	667	2.35	24.6
1.0	0.0410	68.8	2.34	16.7	2.84	282	2.75	28.2
1.2	0.0492	82.6	2.76	19.1	3.42	402	3.34	34.4
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip 65/333 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kN/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kN/m/m	max $R_{B,k}$ kN/m
0.7	31.9	1.25	10.4	1.23	17.7	0.971	6.14
0.8	41.7	1.64	13.6	1.60	23.2	1.27	8.02
0.9	52.6	2.19	17.2	2.10	55.7	1.82	11.1
1.0	63.5	2.75	20.8	2.59	88.2	2.36	14.2
1.2	78.2	3.25	24.7	3.13	233	3.02	16.7
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

(official seal)

Kalzip 65/400 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t	g	$J_{ef,k}$	$M_{F,k}$	$R_{A,K}$	$M^0_{B,k}$	$R^0_{B,k}$	max $M_{B,k}$	max $R_{B,k}$
mm	kN/m²	cm^4/m	kN/m	kN/m	kNm/m	kN/m	kNm/m	kN/m
0.7	0.0274	41.9	0.974	7.07	1.32	691	1.31	13.9
0.8	0.0313	47.9	1.27	9.23	1.73	903	1.71	18.1
0.9	0.0352	53.9	1.64	12.0	2.12	572	2.07	21.1
1.0	0.0392	59.9	2.01	14.8	2.51	242	2.43	24.2
1.2	0.0470	71.9	2.37	17.0	3.02	345	2.95	29.6
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip 65/400 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t	$J_{ef,k}$	$M_{F,k}$	$R_{A,K}$	$M^0_{B,k}$	$R^0_{B,k}$	max $M_{B,k}$	max $R_{B,k}$
mm	cm^4/m	kN/m	kN/m	kN/m/m	kN/m	kN/m/m	kN/m
0.7	27.4	1.08	8.96	1.10	15.2	0.870	5.27
0.8	35.8	1.41	11.7	1.43	19.9	1.14	6.88
0.9	45.1	1.88	14.8	1.88	47.8	1.63	9.54
1.0	54.4	2.36	17.9	2.32	75.6	2.12	12.2
1.2	67.1	2.79	21.2	2.81	200	2.70	14.3
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

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Kalzip 50/333 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
0.7	0.0271	26.3	1.04	6.61	0.992	58.7	0.905	11.5
0.8	0.0310	30.0	1.35	8.63	1.30	76.7	1.18	15.0
0.9	0.0349	33.8	1.63	10.2	1.60	82.7	1.46	15.0
1.0	0.0388	37.5	1.90	11.8	1.91	88.7	1.73	15.1
1.2	0.0465	45.0	2.31	13.3	-	-	1.96	18.7
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip 50/333 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m/m	max $R_{B,k}$ kN/m
0.7	15.9	0.828	9.78	-	-	0.815	7.57
0.8	20.8	1.08	12.8	-	-	1.06	9.89
0.9	22.7	1.32	14.0	1.49	49.5	1.44	10.7
1.0	24.6	1.56	15.2	1.91	131	1.82	11.6
1.2	35.0	2.12	19.6	2.70	37.3	2.24	15.7
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

(official seal)

Kalzip 50/429 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
0.7	0.0256	21.6	0,848	5.59	0.944	48.0	0.861	9.37
0.8	0.0292	24.7	1.11	7.30	1.23	62.7	1.13	12.2
0.9	0.0329	27.8	1.33	8.65	1.52	67.7	1.39	12.3
1.0	0.0365	30.8	1.56	10.0	1.82	72.6	1.65	12.4
1.2	0.0438	36.9	1.89	11.2	-	-	1.87	15.3
	γ_M = 1.0	γ_M = 1.1						

Kalzip 50/429 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kN/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kN/m/m	max $R_{B,k}$ kN/m
0.7	13.5	0.678	8.00	-	-	0.667	6.20
0.8	17.7	0.885	10.5	-	-	0.871	8.09
0.9	19.3	1.08	11.4	1.22	40.5	1.18	8.80
1.0	20.9	1.28	12.4	1.56	107	1.49	9.50
1.2	29.8	1.74	16.1	2.21	30.5	1.83	12.8
	γ_M = 1.0	γ_M = 1.1					

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Kalzip Roof

Corus Bausysteme GmbH
Koblenz

Moments and Reaction Forces
at Intermediate Supports
Characteristic Resistance Values
and Partial Safety Factors
Kalzip 50/429

Annex 6.5 to General
Building Inspectorate
Approval No. Z-14.1-181
11 October 2005

Kalzip AF 65/333 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
0.7	0.0271	48.0	1.47	11.1	1.34	47.7	1.21	11.4
0.8	0.0310	54.8	1.93	14.5	1.75	62.3	1.58	14.8
0.9	0.0349	61.7	2.39	15.6	2.35	46.5	1.93	15.4
1.0	0.0388	68.5	2.85	16.6	2.96	30.7	2.27	15.9
1.2	0.0465	82.2	3.45	19.6	3.37	33.5	2.64	17.7
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip AF 65/333 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kN/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kN/m/m	max $R_{B,k}$ kN/m
0.7	21.6	0.964	9.98	1.09	18.5	0.909	5.21
0.8	28.2	1.26	13.0	1.42	24.2	1.19	6.81
0.9	36.5	1.62	13.6	1.90	29.0	1.49	8.11
1.0	44.7	1.98	14.1	2.37	33.8	1.80	9.42
1.2	47.6	2.48	15.2	3.33	43.4	2.80	12.0
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

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Kalzip AF 65/434 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
0.7	0.0253	40.5	1.20	9.04	1.13	38.7	1.03	9.23
0.8	0.0289	46.5	1.56	11.8	1.48	50.6	1.34	12.1
0.9	0.0325	52.1	1.94	12.6	1.99	37.7	1.63	12.5
1.0	0.0361	57.8	2.31	13.5	2.50	24.9	1.92	12.9
1.2	0.0433	69.4	2.80	15.9	2.85	27.2	2.23	14.4
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip AF 65/434 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kN/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kN/m/m	max $R_{B,k}$ kN/m
0.7	18.0	0.783	8.10	0.881	15.0	0.738	4.23
0.8	23.5	1.02	10.6	1.15	19.6	0.964	5.53
0.9	30.4	1.32	11.0	1.54	23.5	1.21	6.59
1.0	37.3	1.61	11.5	1.93	27.4	1.46	7.65
1.2	39.7	2.01	12.3	2.70	35.2	2.27	9.76
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

(official seal)

Kalzip SR 45/400 Characteristic Values for Downward Load								
Sheet thickness	Dead load	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	g kN/m²	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kNm/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kNm/m	max $R_{B,k}$ kN/m
1.2	0.0466	24.1	1.70	6.93	3.46	34.6	2.70	13.8
	$\gamma_M = 1.0$	$\gamma_M = 1.1$						

Kalzip SR 45/400 Characteristic Values for Uplift Load							
Sheet thickness	Moment of inertia	Field moment	End support reaction	Moments and reaction forces at intermediate supports $M/M^0_{B,k} + R/R^0_{B,k} \leq 1$			
t mm	$J_{ef,k}$ cm⁴/m	$M_{F,k}$ kN/m	$R_{A,K}$ kN/m	$M^0_{B,k}$ kN/m/m	$R^0_{B,k}$ kN/m	max $M_{B,k}$ kN/m/m	max $R_{B,k}$ kN/m
1.2	29.5	2.09	4.30	3.26	14.2	1.97	8.59
	$\gamma_M = 1.0$	$\gamma_M = 1.1$					

Characteristic Securing Forces for Clips in Head of Seam in kN/Clip		
Sheet Thickness mm	End or intermediate support	
	Standard clip according to Annex 2	Plastic clip E according to Annex 14.1
1.2	3.35	1.80
$\gamma_M = 1.33$		

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Publicly Appointed And Sworn Translator For The English Language
...rin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299

Characteristic Resistance Values of Clips Under Pressure Load in kN/Clip	
Type of clip	End or intermediate support
L10	5.89
L25	5.89
L40	5.89
L50	5.89
L60	5.87
L80	5.67
L90	5.49
L100	5.26
L110	4.98
L120	4.65
L130	4.27
L140	3.84
L150	3.36
$\gamma_M = 1.1$	

Characteristic Securing Forces for Clips in Head of Seam in kN/Clip				
Sheet Thickness mm	End or intermediate support			
	Kalzip 65	Kalzip 50	Kalzip AF 65	Mixed stems Aluminium/ Plastic lighting elements
0.7	2.60	2.10	1.55	-
0.8	3.40	2.75	2.00	1.77
0.9	5.05	3.80	2.95	1.77
1.0	6.65	4.85	3.95	1.77
1.2	8.55	5.25	4.80	1.77
$\gamma_M = 1.33$				

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Reduction of Characteristic Values and Moments of Inertia according to Annex 6 when using Plastic Lighting Elements				
	4 Alumin. profiled sheets 1 plastic lighting element	3 Alumin. profiled sheets 1 plastic lighting element	Sheet thickness mm	$J_{ef,k}$
Downward load	10%	12%	0.8 0.9 1.0 1.2	20%
Uplift load	20%	25%		
Kalzip 0.7 mm not in connection with plastic lighting elements. When using more than 4 profiled sheets, the excessive profiled sheets between the plastic lighting elements can be measured according to Annex 6. Use of plastic lighting elements for sheets ≤ Kalzip 65/400, Kalzip 50/429 and Kalzip AF 65/434				

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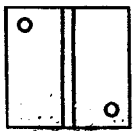
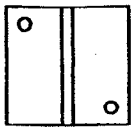
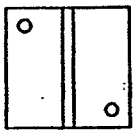
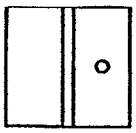
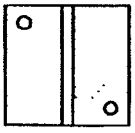
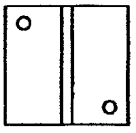
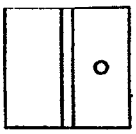
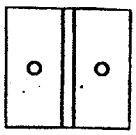
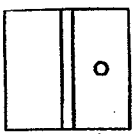
Line	Substructure	Flange Thickness mm	Fixing Diagram	Fixing Element	Drill Hole ∅ mm	F_k kN/Clip
1	Aluminium $R_{P0.2}$ > 200 N/mm²	0.8 1.0 1.1 1.2		Permissible special butt blind rivet ∅ 5 mm	5.5	1.60 2.51 2.76 3.00
2	Aluminium $R_m \geq 225$ N/mm² 1)	0.9 1.0 1.2 ≥ 1.8		Drilling screw SFS SDK2-S-377-6.0 x L according to Annex 11	-	1.55 1.90 2.70 5.10
3		≥ 2.0 (3.2 max.)		Drilling screw SFS SDK3-S-377-6.0 x L according to Annex 11	-	4.10
4	Aluminium EN AW-6060 T6	2.0		Permissible special butt blind rivet ∅ 5 mm	5.5	2.46
5		2.5 3.0		Permissible thread-forming screw ∅ 6.3 mm	5.0 5.0	1.04 1.20
6	Steel trapezoidal sheet	0.75		Permissible special butt blind rivet ∅ 5 mm	5.5	2.46
7	Steel trapezoidal sheet	0.75 0.88 1.00 1.25		Drilling screw SFS SDK2-S-377-6.0 x L according to Annex 11	-	2.10 2.90 3.75 5.00
8	Steel S 235	1.30 1.50 ≥ 2.00 (3.2 max.)		Drilling screw SFS SDK3-S-377-6.0 x L according to Annex 11		2.79 4.27 7.23
9	Steel S 235	1.5 2.0 2.5		Permissible thread-forming screw ∅ 6.3 mm	5.0 5.3 5.3	1.78 2.46 3.16
10		4.0			5.3	10.82
11		5.5			5.5	6.20
		γ_M = 1.33				

1) In case of Aluminium substructures of values $R_{m,min}$ < 225 N/mm² the characteristic values must be reduced in relation to the respective tensile strengths.

Kalzip Roof

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Characteristic Resistance Values for Joining of Clips with the Substructure and Partial Safety Factors **Metal Substructure**

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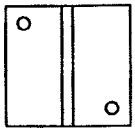
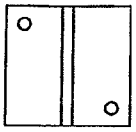
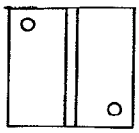
Annex 9.1 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

Line	Substructure	Fixing Diagram	Fixing Element	Efficient Screw-in Depth	F_k kN/Clip
1	Coniferous wood of sorting class S10		Drilling screw SFS SDK2-S-377-6.0 x L according to Annex 11	23 (30 mm incl. drill bit)	3.44
2				23 (40 mm incl. drill bit)	4.98
3	Flat particle board 19 mm nominal thickness		Drilling screw SFS SDK2-S-377-6.0 x L according to Annex 11	The thread must penetrate the entire board thickness.	2.25
4	OSB board 18 mm nominal thickness		Drilling screw SFS SDK2-S-377-6.0 x L according to Annex 11		2.64
5	Wood	See section 3.4.2 for fixing elements not listed.			
$\gamma_M = 1.33$					

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Characteristic Resistance Values for Joining of Clips with the Substructure and Partial Safety Factor γ_M
Wooden Substructure

Annex 9.2 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

(Certified translation of the German original version not examined by the Deutsche Institut für Bautechnik)

Walkability during Assembly

Profiled sheets in the assembly area which are mechanically zipped on at least one side may be walked on without taking any load-distributing measures up to the following spans:							
Sheet thickness	**Kalzip**						
	65/305	**65/333**	**65/400**	**50/333**	**50/429**	**AF 65/333**	**AF 65/343**
t	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}
mm	m	m	m	m	m	m	m
0.7	1.65	1.65	1.85	1.60	1.60	2.00	2.00
0.8	2.15	2.15	2.40	2.10	2.00	2.60	2.60
0.9	2.25	2.25	2.70	2.15	2.05	2.70	2.70
1.0	2.40	2.40	2.70	2.20	2.10	2.80	2.80
1.2	2.80	2.80	2.70	2.30	2.20	3.00	3.10

Walkability after Assembly

Mechanically zipped profiled sheets may be walked on without taking any load-distributing measures up to the following spans:							
Sheet thickness	**Kalzip**						
	65/305	**65/333**	**65/400**	**50/333**	**50/429**	**AF 65/333**	**AF 65/343**
t	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}	l_{gr}
mm	m	m	m	m	m	m	m
0.7	2.20	2.20	2.30	1.90	1.90	2.20	2.65
0.8	2.90	2.90	3.00	2.50	2.50	2.90	3.50
0.9	3.35	3.35	3.40	2.65	2.60	3.20	3.55
1.0	3.80	3.80	3.80	2.80	2.70	3.50	3.60
1.2	3.80	3.80	3.80	3.00	2.90	3.50	3.60

Individual, unzipped profiled sheets and plastic lighting elements must not be walked on.

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Kalzip Roof

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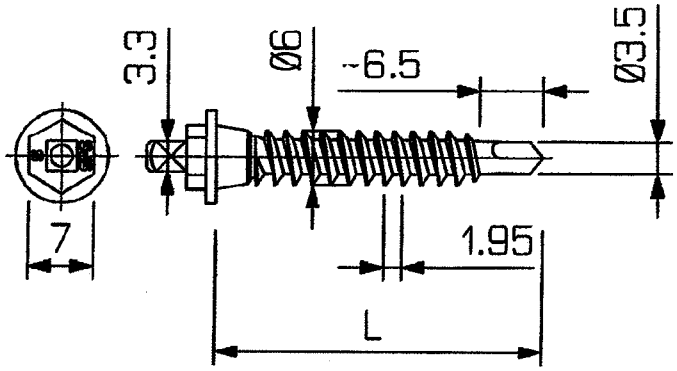
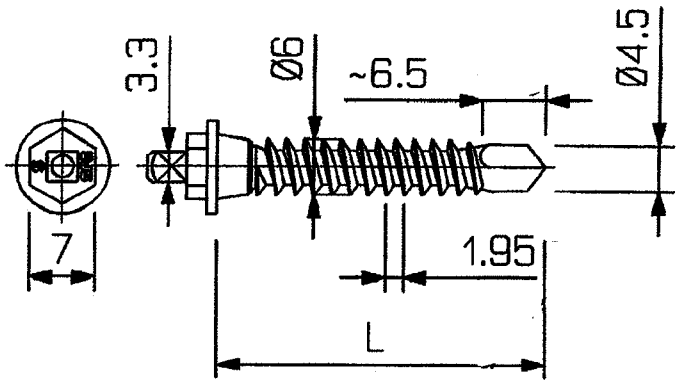
Walkability

Annex 10.1 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

SFS SDK2-S-377-6.0 x L



SFS SDK3-S-377-6.0 x L



(official seal)

Available screw lengths		
Screw	L in mm	
SDK2	35	45
SDK3	30	45

Kalzip Roof

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Drilling Screws
SFS SDK2-S-377-6.0xL
SFS SDK3-S-377-6.0xL

Annex 11 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

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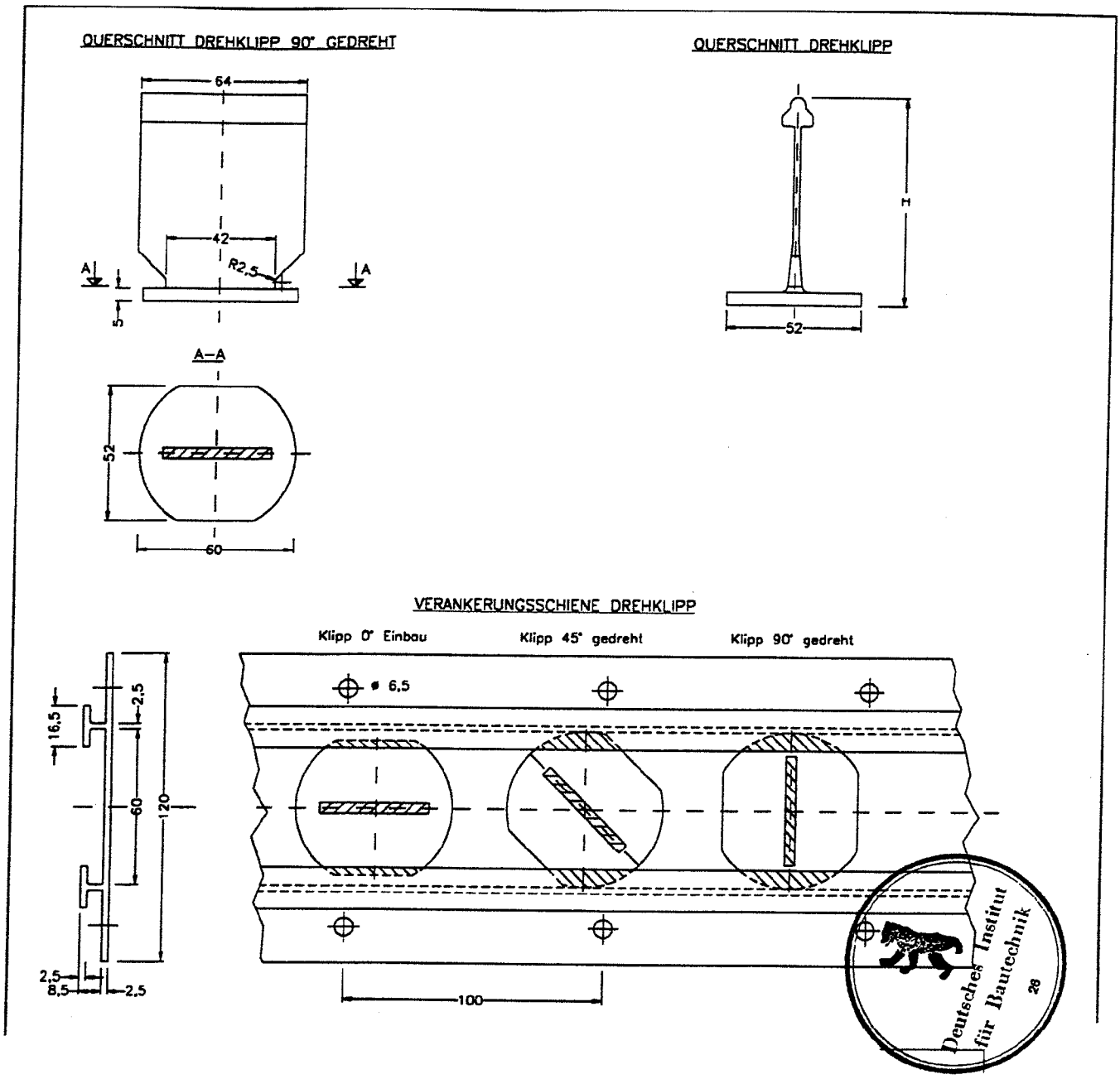


Characteristic Resistance Values of Rotating Clips and Rotating Clip Rail under Tension Load		
Securing forces for clips on rail	3.1 kN/clip	$\gamma M = 1.1$
Admissible Bending Moment at Tensile Clip Force Fz = $\Upsilon \cdot F$		
Fz in kN	M_k in kNm	
0.0	0.218	$\gamma M = 1.1$
2.0	0.206	
3.1	0.199	

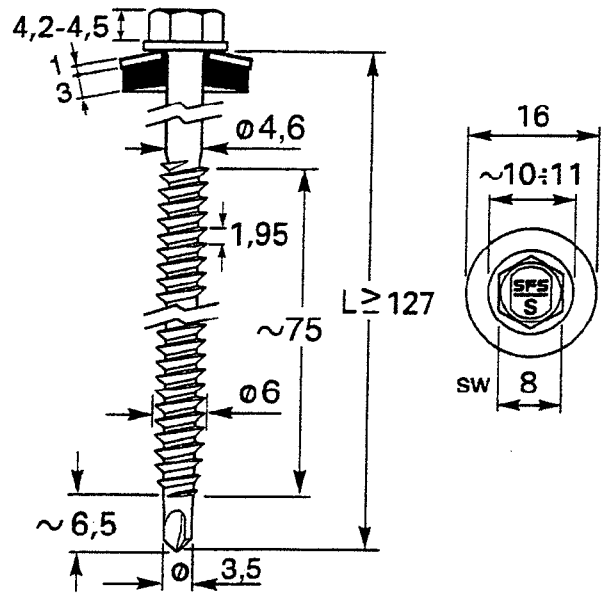
For clip dimensions and securing forces of clips in head seams not listed above, see Annexes 2 and 7.
The positioning of holes in the rail can be staggered on request.

Note by the translator:
Querschnitt Drehklipp 90° gedreht = cross section of rotating clip swivelled by 90° Querschnitt Drehklipp = cross section of rotating clip Verankerungsschiene Drehklipp = anchorage rail for rotating clip Klipp 0° Einbau = clip 0° installation Klipp 45° gedreht = clip swivelled by 45° Klipp 90° gedreht = clip swivelled by 90°

Kalzip Roof
Steel
Corus Bausysteme GmbH
Koblenz

Rotating Clip
Rotating Clip Rail

Annex 12 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005



Line	Characteristic Pull-out Force Values from Steel Substructures in kN/screw			
	t_H in mm	Steel S280 ($R_{m,min}$ = 360 N/mm²)	Steel S320 ($R_{m,min}$ = 390 N/mm²)	Steel S350 ($R_{m,min}$ = 420 N/mm²)
1	0.88	1.47	1.59	1.66
2	1.00	1.88	2.04	2.08
3	1.13	2.19	2.37	2.50
4	1.25	2.50	2.71	2.92
γ_M = 1.33				

Line	Characteristic Pull-out Force Values from Wooden Substructures		
	Substructure	**Efficient Screw-in Depth**	**F_k kN/screw**
1	Coniferous Wood SK S10	23 mm (30 mm incl. drill bit)	1.72
2	Coniferous Wood SK S10	68 mm (75 mm incl. drill bit)	5.2
3	Flat Particle Board 19 mm nominal thickness	The thread must penetrate the entire board thickness.	1.13
4	OSB Board 18 mm nominal thickness		1.32
5	Wood	See section 3.4.2 for fixing elements not listed.	
γ_M = 1.33			

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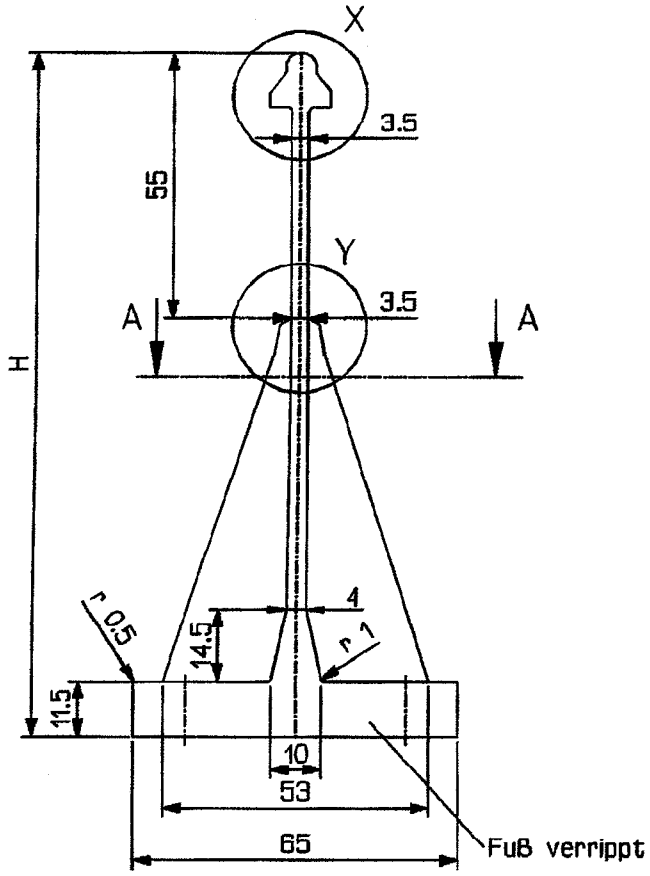
Characteristic Values of Pull-out Forces for Joining with the Substructure and Partial Safety Factors γ_M
Drilling Screw SFS SD2-S-6.0x...

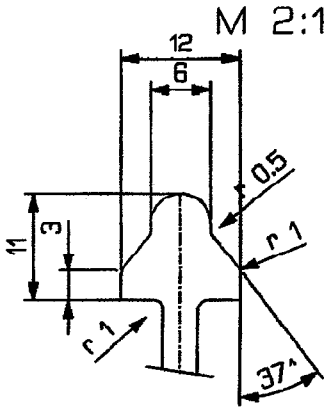
Annex 13 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

(Certified translation of the German original version not examined by the Deutsche Institut für Bautechnik)



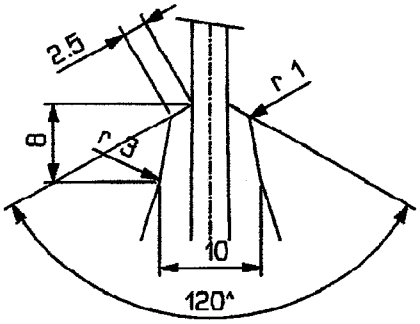
Detail X

M 2:1

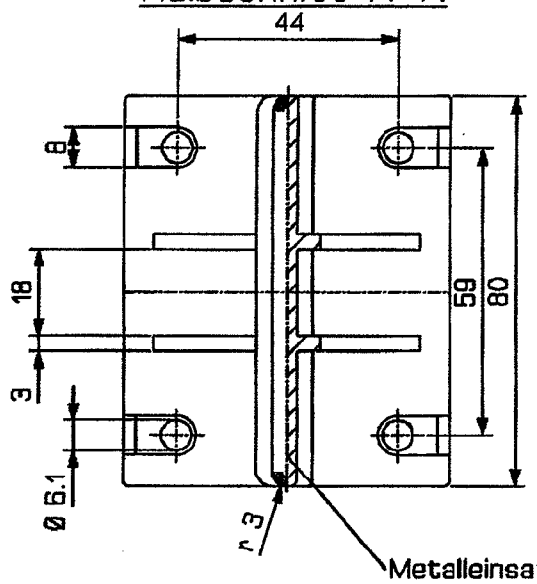


Detail Y

M 2:1



Halbschnitt A-A



Klipphöhen H in mm	
Typ	H
E40	101
E60	121
E80	141
E100	161
E120	181
E140	201
E160	221
E180	241

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Note by the translator:
Fuß verrippt = ribbed base Halbschnitt A-A = cross section A-A Klipphöhen H in mm = clip heights H in mm
Metalleinsatz = metal insert Form und Abmessungen beim DIBt hinterlegt = shape and dimensions at DIBt

Kalzip Roof

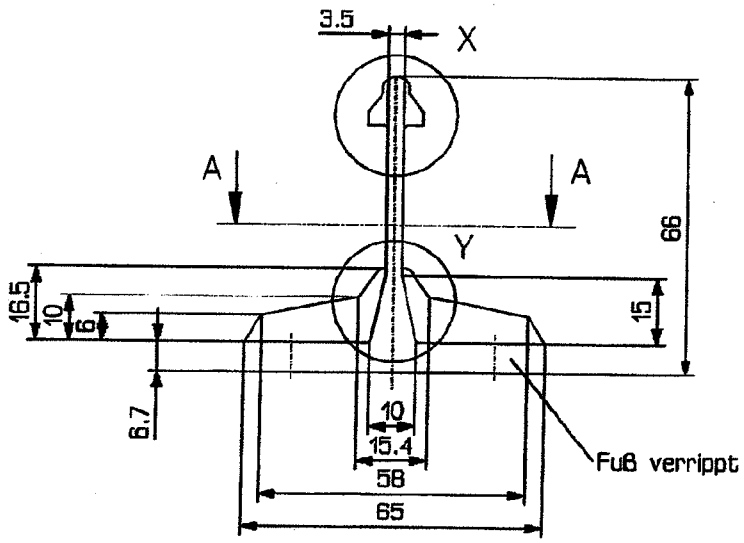
Corus Bausysteme GmbH
Koblenz

Plastic Clip E
Dimensions

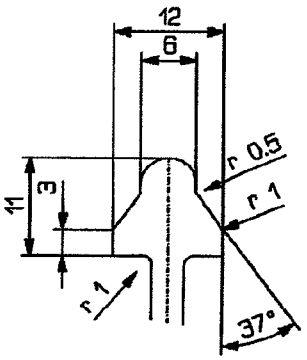
Publicly Appointed And Sworn Translator
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299
For The English Language

Annex 14.1 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

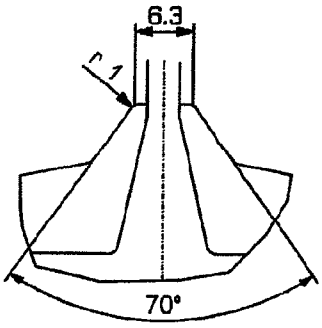
(Certified translation of the German original version not examined by the Deutsche Institut für Bautechnik)



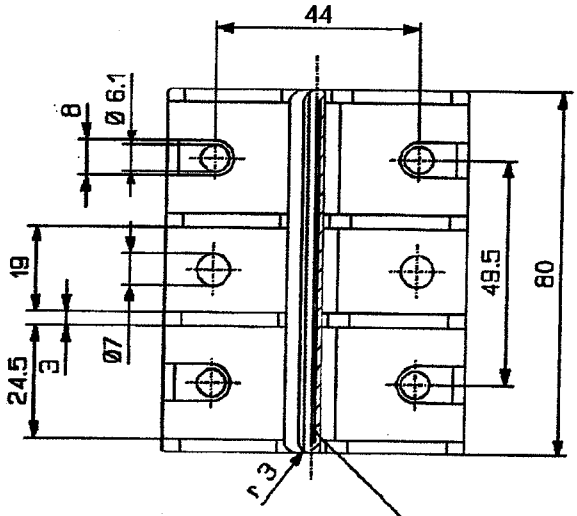
Detail X



Detail Y



Halbschnitt A-A



Deutsches Institut für Bautechnik 26

Note by the translator:
Fuß verrippt = ribbed base Halbschnitt A-A = cross section A-A Klipphöhen H in mm = clip heights H in mm
Metalleinsatz = metal insert Form und Abmessungen beim DIBt hinterlegt = shape and dimensions at DIBt

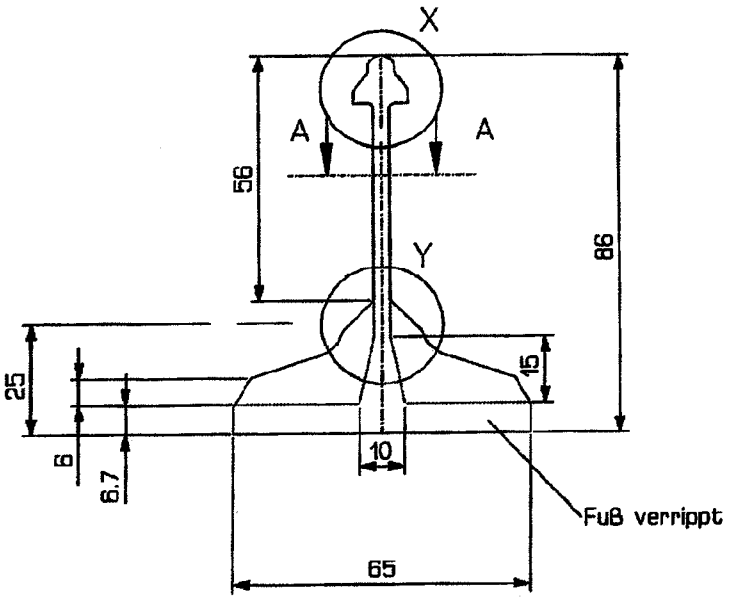
Kalzip Roof

Corus Bausysteme GmbH
Koblenz

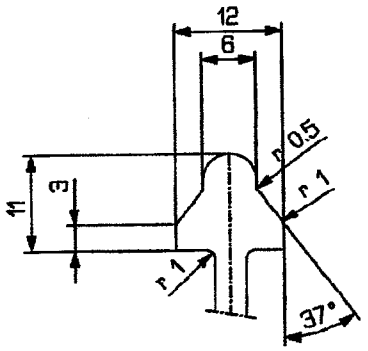
Plastic Clip E10
Dimensions

Publicly Appointed And Sworn Translator
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49-6221-161299
For The English Language

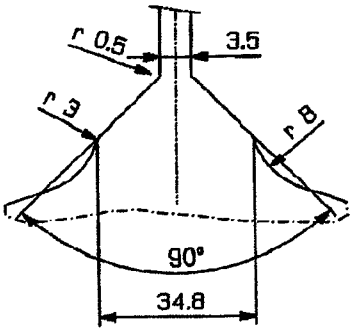
Annex 14.2 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005



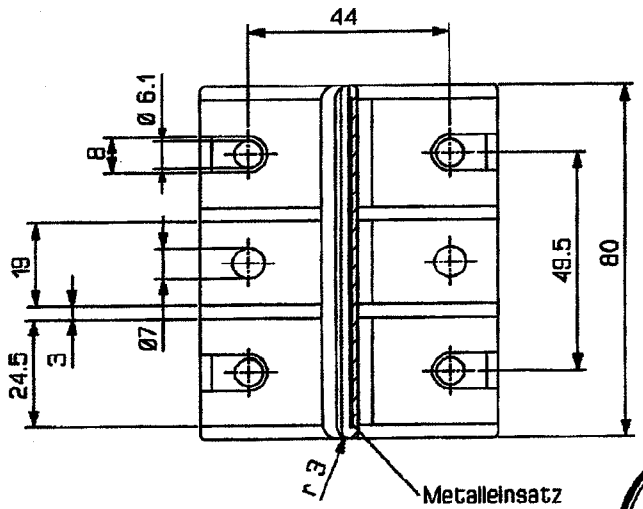
Detail X



Detail Y



Halbschnitt A-A



Note by the translator:
Fuß verrippt = ribbed base Halbschnitt A-A = cross section A-A Klipphöhen H in mm = clip heights H in mm
Metalleinsatz = metal insert Form und Abmessungen beim DIBt hinterlegt = shape and dimensions at DIBt

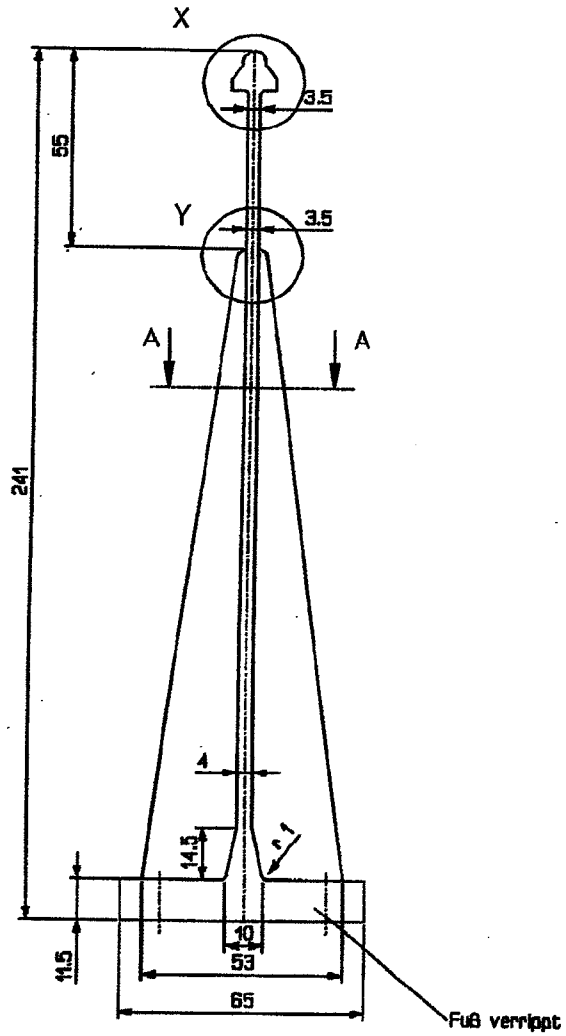
Kalzip Roof

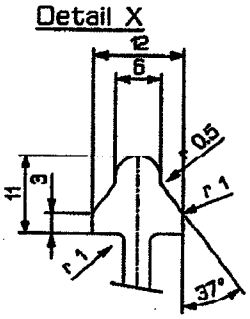
Corus Bausysteme GmbH
Koblenz

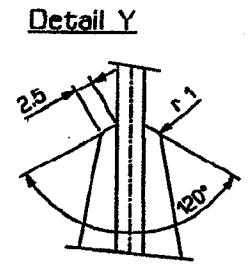
Plastic Clip E25
Dimensions

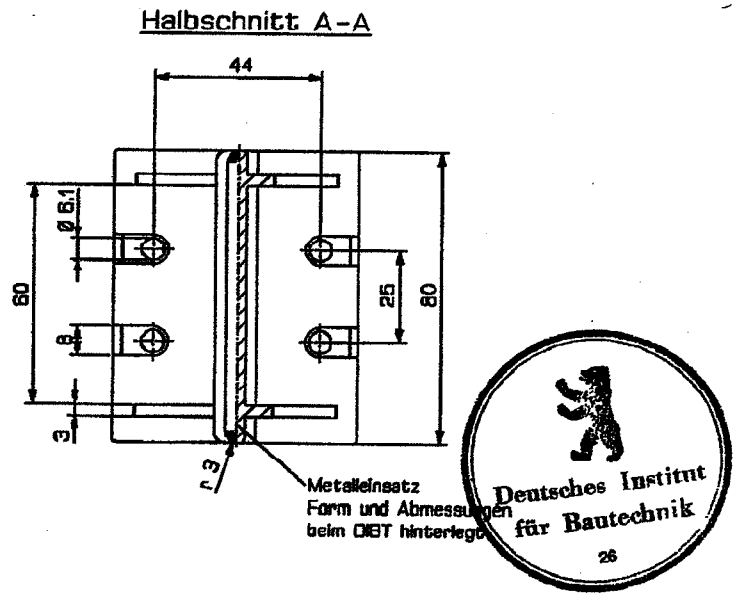
Annex 14.3 to General
Building Inspectorate
Approval No. Z-14.1-181
of 11 October 2005

(Certified translation of the German original version not examined by the Deutsche Institut für Bautechnik)









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Kalzip Roof

Corus Bausysteme GmbH
Koblenz

Plastic Clip E180(E)
Dimensions

Annex 14.4 to General
Building Inspectorate
Approval No. Z-14.1-181
of 1 October 2005

Characteristic Resistance Values of Plastic Clips under Pressure Load in kN/Clip	
Type of clip	End or intermediate support
E 100 to E180 / E 180(E)	1.73
$\gamma_M = 1.1$	

Characteristic Securing Forces for Plastic Clips E in head of seam in kN/Clip			
Sheet Thickness mm	End or intermediate support		
	Kalzip 65	Kalzip 50	Kalzip AF 65
0.7	1.60	1.40	1.60
0.8	2.10	1.80	2.10
0.9	2.90	2.60	3.05
1.0	3.70	3.35	4.00
1.2	4.95	4.95	5.15
$\gamma_M = 1.33$			

(official seal)

Kalzip Roof

Corus Bausysteme GmbH
Koblenz

Characteristic Resistance Values for **Plastic Clips E**
Partial Safety Factors γ_M
Kalzip 65, Kalzip 50, Kalzip AF 65

Annex 14.5 to General Building Inspectorate Approval No. Z-14.1-181 of 11 October 2005

In my capacity as a public translator for the English language, duly commissioned and sworn by the President of the Regional Court of Heidelberg (Landgericht Heidelberg), I hereby confirm that the foregoing is a true and complete translation of the German document submitted to me in the original.

Heidelberg, Germany
26 October 2005

Publicly Appointed and Sworn Translator for The English Language
Cathrin Spies
Bergheimer Str. 101a
69115 Heidelberg
Tel. +49/6221-16 299