

Hoesch isowand integral®

Technical information



*El 30 also available with
concealed fastening*

A company
of ThyssenKrupp
Steel

ThyssenKrupp Bausysteme



ThyssenKrupp

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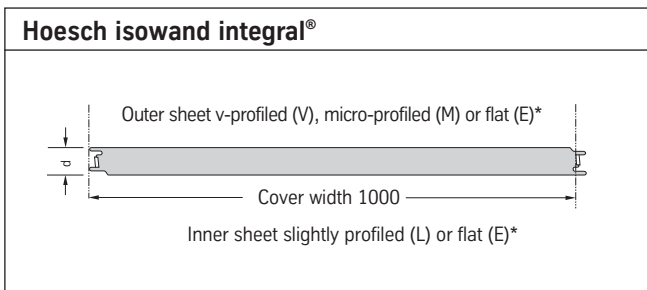
1. General

Hoesch isowand integral® is a modern sandwich panel for exacting industrial architecture. Worldwide, industrial buildings, production halls, administration and airport buildings, etc. are built using this product. The special joint geometry, designed with tongued and grooved joints on either side, enables the integral clip for fastening the panels to be accommodated in the supporting

structure in such a way as to be invisible from the outside. The GALFAN® metallic coating in combination with the coil-coating system PLADUR® protects the panels against corrosion. The excellent thermal insulation is achieved through the factory-applied layer of rigid polyurethane foam between the cover sheets. Innovation,

constant development and latest manufacturing technology are the basis for a high quality product which is described in detail in this brochure. A large variety of accessories also helps broaden the range of this product.

2. Standard designs



Panel thickness d mm	Material thickness cover sheets mm	Weight kg/m ²	Max. length supplied m	Thermal resistance R ¹⁾ m ² K/W	Heat transfer coefficient R ²⁾ m ² K/W	Thermal resistance U ¹⁾ W/(m ² K)	Heat transfer coefficient U ²⁾ W/(m ² K)	Heat transfer coefficient U ³⁾ W/(m ² K)
60	0.55	12.1	20	2.56	2.55	0.37	0.43	0.42
80		12.9		3.43	3.40	0.28	0.31	0.30
100		13.7		4.30	4.30	0.22	0.25	0.24
120		14.4		5.17	5.15	0.19	0.20	0.20

* not available in all colours joints acc. to prEN 14 509

1) calculating acc. to EN ISO 6946 2) calculating acc. to EN ISO 13 165 taking account of the 3) Like 2) but taking also account of the Clips (every second meter)

3. Special designs

Hoesch isowand integral® special designs on request					
Material of cover sheets	Position of steel sheet	Cover width / Profiling			Panel thickness d mm
		600	900	1200	
Steel coated, with protective film	outer sheet	E*	E*	E*	60
					80
Aluminium coated, with protective film	inner sheet				100
Stainless steel material no. 1.4301 surface 2B with protective film		E	E	E	120

* on request

4. Cover sheets

4.1 Standard material

The basic material is steel sheet of quality S320GD as per DIN 10147 with a thickness of 0.55 mm. (Other material thicknesses, see item 3).

4.2 Metallic layers

The corrosion protection of the panels corresponds to DIN 55928-8, i.e.:

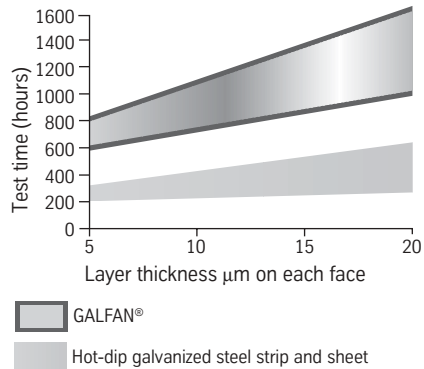
The cover sheets are made from steel provided with a metallic coating consisting of 95% zinc and 5% aluminium. Steel sheet with such a layer described as GALFAN® has a distinctly better anti-corrosion behaviour than that achieved by hot-dip galvanizing.

In the salt spray test and also in the Kesternich test the superiority of GALFAN® over hot-dip galvanized steel sheet is clearly demonstrated.

As a result of the special alloy composition, both the material forming properties and the adhesion of the subsequently applied plastic coating are improved.

Salt spray test DIN 50021 5 % NaCl

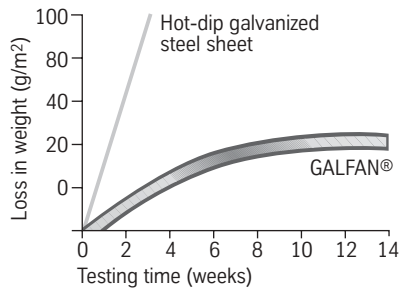
first occurrence of red rust



The salt spray test demonstrates that GALFAN® with a layer thickness of 20 µm (one face) is resistant for over 1600 hours before the formation of red rust.

Kesternich test (humid SO₂ bearing atmosphere)

(93 -94% relative humidity and 100 ppm SO₂ at 35°C)



4.3 Standard coating systems for Hoesch isowand integral®

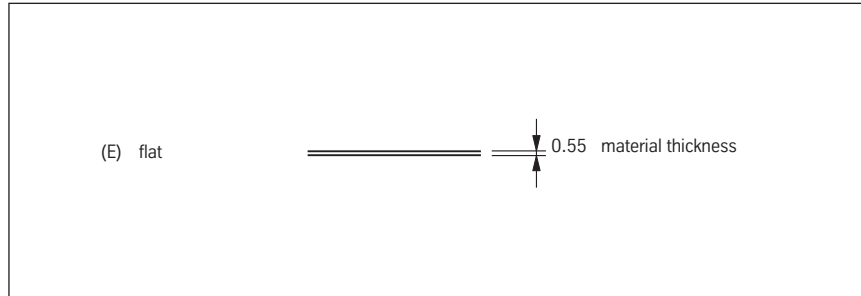
Abbreviated designation	Coating system	Nominal layer thickness (µm)	Corrosion protection class as per DIN 55928-8
PLATAL® PVDF	PVF Polyvinyl fluoride	25	III
PLADUR® SP	SP Polyester	25	III
PLADUR® DU	SP Polyester	15	II

Other coating systems or coating thicknesses are available upon request, depending on the quantity ordered.

4.4 Profiling of surfaces

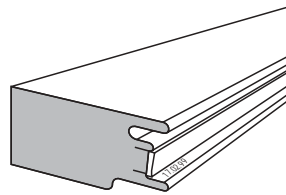
The outside steel face of Hoesch isowand integral® is provided with the characteristic flat outside steel face (E), which is standard design. V-profiled (V) and microprofiled (M) outside steel faces on request.

The inside steel face is available in slightly profiled (L) or flat (E) design. Special cover widths are only available in the flat design.



Note:

In the joint area of the outside sheet, the production date and the number of the applied foam system are marked.



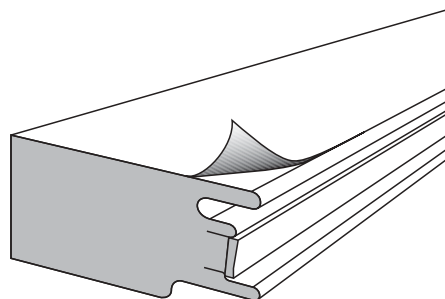
4.5 Protective film

In order to ensure the high quality level of Hoesch isowand integral®, the panels are generally supplied with a protective film on the outside steel face. This film protects the panels against dirt and general damage during production, transport, storage and installation.

Attention:

Building parts provided with protective film must be immediately installed.

The protective film must be pulled off during installation work or two weeks after delivery at the latest.

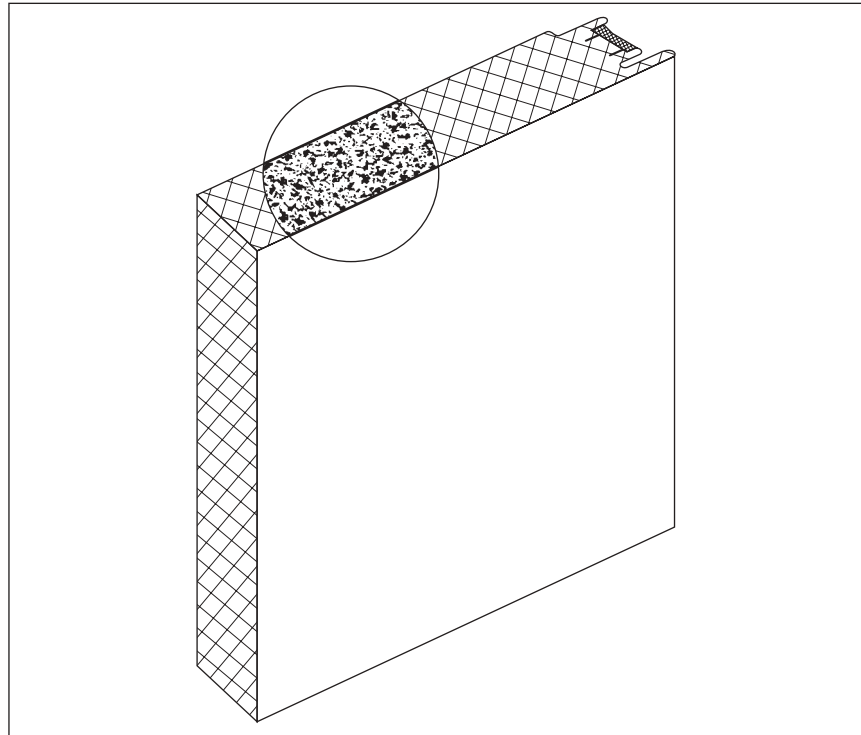


5. Insulating core

The insulating core of closed-cell HCFC-free polyurethane rigid foam with its excellent thermal insulation connects the steel cover sheets so as to be shear resistant. Its high resistance to compression is responsible for the high rigidity and outstanding load-bearing capacity of the panels.

PUR rigid foam is to a large extent resistant to the most generally used chemicals. PUR reacts chemically neutral towards other materials, and it does not contain substances which promote corrosion. Its resistance to fungi and microbes guarantees resistance to rotting and decay.

When the panels are intended for use in special applications or at customer's request, the core may be made from polyisocyanurate (PIR).



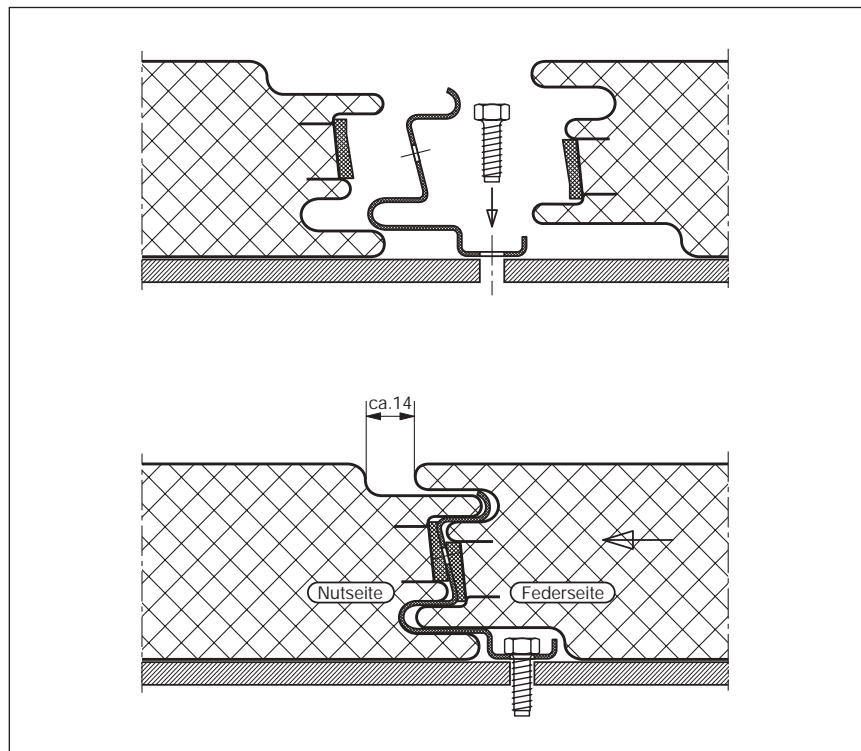
6. Element joint

The joint geometry, designed with tongued and grooved joints on either side, is a special feature of Hoesch isowand integral®.

It enables the integral clips (see item 8) for fastening the panels to the supporting structure to be invisible from the outside.

Self adhesive sealing strips on both sides applied during production ensure an excellent tightness of the joint against air and rain, provided that the correct cover width and consequently joint width is adhered to.

The special joint geometry also contributes to the good fire resistant behaviour of Hoesch isowand integral® (see also item 10).



7. Joint tightness

In addition to the heat transfer coefficient, the tightness of the joints of wall panels is becoming increasingly important (see regulations on thermal insulation). The joint permeability coefficient *a* indicates the permeability of the longitudinal joint.

With sealing strips provided on both sides, Hoesch isowand integral® achieves a joint permeability coefficient of

$$a = 0.037 \text{ m}^3/\text{h} \cdot \text{m} \cdot \text{daPa}^{0.8}$$

Resistance to driving rain has also been tested. Provided that the installation is

correct, no water ingress through the joint occurs with a test pressure difference of 600 Pa.

A test certificate issued by the Fraunhofer Institut Bauphysik, Stuttgart is available (in German language).

8. Fastening

Integral clips are used to fasten Hoesch isowand integral® panels to the supporting structure in such a way as to be invisible from the outside. The clips are

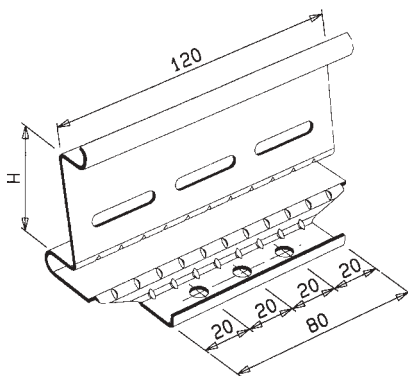
designed to suit the joint geometry. Using these clips, both the inside and the outside steel sheet are safely secured against wind uplift forces.

A structural analysis is required in each individual case.

Material: steel, hot-dip galvanized
 Oberfläche: coating at the manufacturer's option (corrosion protection class III)

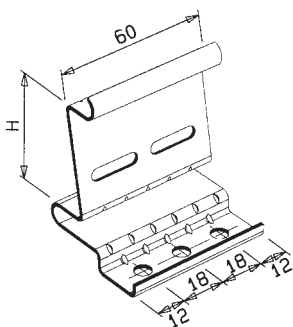
Integral clip for end and intermediate supports (standard applications)

Part no.	Panel thickness <i>d</i> mm	Dimension <i>H</i> mm
Z43-011	60	27
Z43-017	80	47
Z43-018	100	67
Z43-098	120	87



Integral clip for end supports (custom solution)

Part no.	Panel thickness <i>d</i> mm	Dimension <i>H</i> mm
Z43-012	60	27
Z43-016	80	47
Z43-019	100	67
Z43-099	120	87



9. Compensation joint

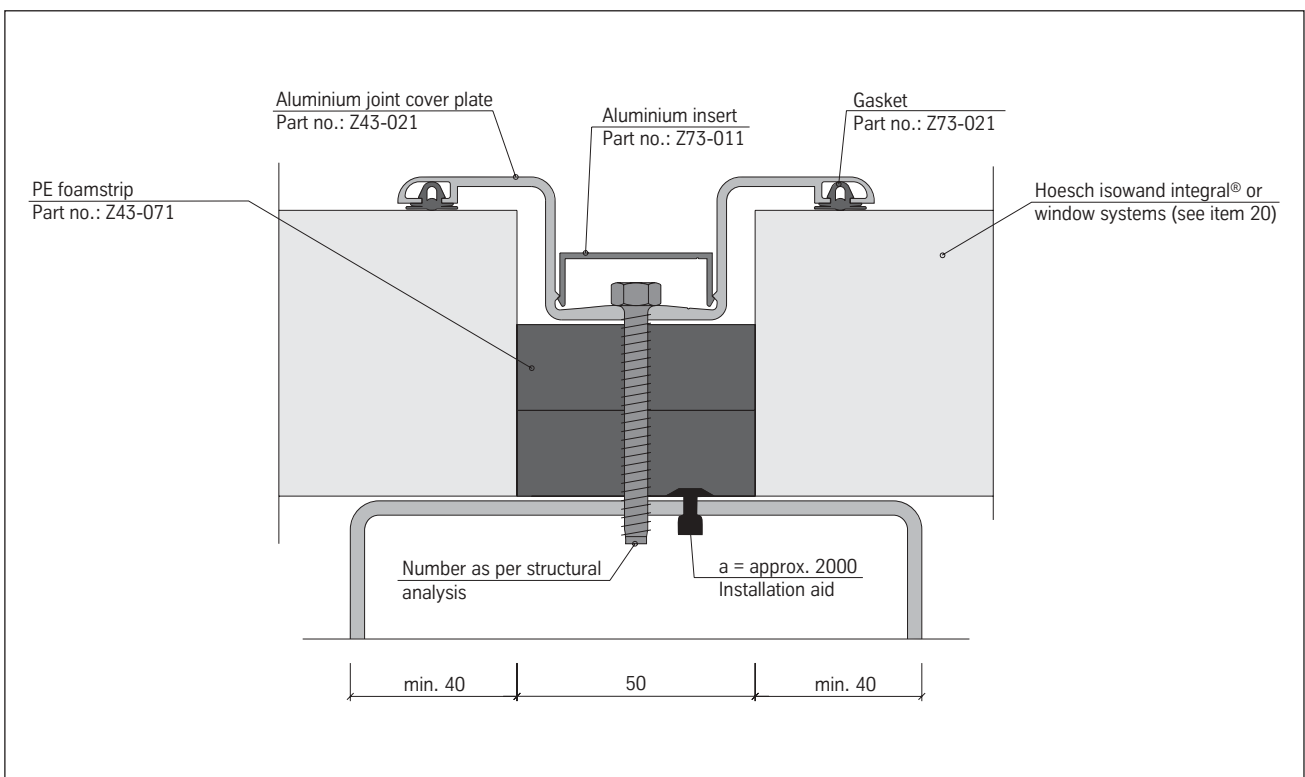
Depending on the method of installation (vertical / horizontal), 50 mm wide joints are provided in the transition area between corner and wall panels and in the area of supports or in the parapet area. These joints are provided with a PE

foam strip to make them tight against air and rain and to ensure the level of thermal insulation.

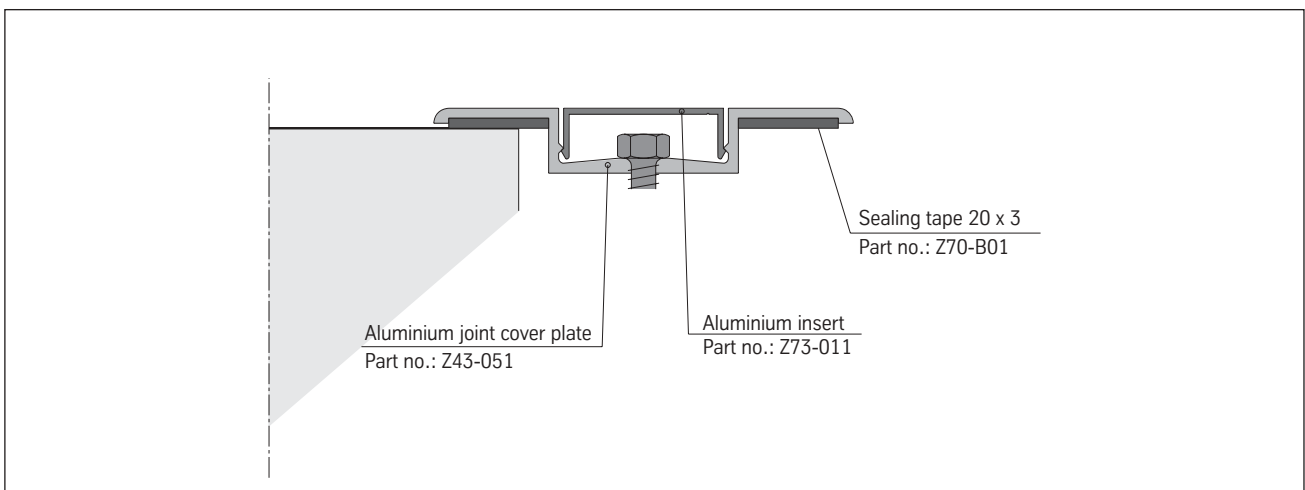
The joints are covered by two-piece aluminium cover ledges of different types though equivalent function, which are

provided with either gaskets or sealing tape on both sides.

Aluminium joint cover plates and inserts are available in a powder-coated or spray-coated version. Colours on request.



Alternative



10. Fire protection

Buildings provided with sandwich panels consisting of steel faces and a polyurethane core are often considered as an increased fire hazard. This incorrect assumption may lead to misunderstandings and should be rectified by quoting the following:

On the one hand, behaviour in fire is categorised by the building material class. Elements having a PUR core are classified as B-s3, d0 (flame resistant), according to the European rule EN 13501-1. The behaviour of elements with PIR-core in fire is even slightly better.

The plastic coating on the steel faces with a max. thickness of 50 µm has no influence on the properties of the steel cover sheet. The cover sheets alone have been tested with the result 'inflammable' as building materials class 'A'.

According to DIN 18230-1, the theoretical fire load q_R of the steel PUR sandwich panel is approx. 3-4 kWh/m². This low value is a result of the low specific density of the core layer, which contributes to the second characteristic in the case of fire, i.e. the fire resistance class according to EN 13501-2. In this category, the PIR-version of this sandwich panels with an overall thickness of 100 mm have been classified EI 30.

In addition to these European classifications, Hoesch isowand integral® has been successfully submitted to country-

specific tests. These tests were carried out by well established institutes.

The tests to BS 476 part 6 and 7 were conducted by WARRINGTONFIRE in Ghent and Warrington. These tests were passed by Hoesch isowand integral® and it was awarded test certificates class 1 and class 0.

BRE in Watford was entrusted with carrying out and auditing the tests as per LPCB 1181. As the wall elements' contribution to maintaining a fire is insignificant and they do not contribute to its spread, isowand integral passed the fire test at the first attempt. All these positive properties have been confirmed by the issue of certificate no. 651a and by the listing of the sandwich elements in the 'Red Book'. Thus, building owners in Great Britain can be sure of using the appropriate product, which is rewarded by the insurance companies.

Another important test was passed in the United States of America. The Southwest Research Institute in San Antonio, Texas conducted a fire test in accordance with UBC 26.9 (Uniform Building Code). Hoesch isowand integral® passed this test at the first attempt which has been confirmed in report no. 01.11811.01.108.

Acceptance of these tests in countries which are beyond the scope of this standard is evidence of the high value

of the tests which have been passed. All these a.m. experiences and findings which are not only based on theoretical considerations, but above all from a series of actual cases of fire can be summarized:

- According to DIN 18230, Hoesch isowand integral® features very positive theoretical values with respect to fire load q_R . This is due to the use of a foam material with a relatively low specific density. Thus, the contribution to the overall heat balance of a fire is very low.
- The results obtained from standardized small-scale tests for determining the combustibility are fully confirmed by the defensive behaviour of the panels in practical applications.
- The panels do not contribute to maintaining a fire. They are damaged if a fire load is applied in their immediate vicinity and they are self-extinguishing once the fire load is removed.
- They neither contribute to an increase in the fire load usually present in a building nor to its spread.

When compared with the toxicity of fumes produced by conventional materials, e.g. pine wood, the toxicity of fumes emerging from PUR rigid foam is considered to be clearly lower.

An acute risk to humans is not to be assumed, when using the Hoesch isowand integral®.



LPC Test



UBC Test

Fire protection



11. Sound Insulation

Hoesch isowand integral® panels, regardless of their thickness achieve, a noise reduction index R'w = 25 dB, in accordance with test certificate no. 42 0891276-3 dated March 10, 1977 issued by the State Material Testing Institute Nordrhein-Westfalen, Dortmund.

In comparison to other building components of similar weight, this value, related to the mass per unit area, is quite favorable.

12. Approval Z-10.4-345

Up to now, Hoesch isowand integral® has been covered by approval no. Z-10.4-345 issued by DIBt Berlin (German Institute for Constructional Engineering).

From now on, it will also be covered under in the scope of DIN EN 14 509.

13. Quality assurance



13.1 External inspection

Regular external inspection, as stipulated in the approval requirements, is carried out by an accredited material testing body. Therefore, Hoesch isowand integral® may be provided with the mark of conformity.

13.2 Internal Quality control

In addition to regular external inspection the approval requirements impose internal quality control by applying the

procedure described above. In-house control includes checking of raw materials, production cycles and finished products. The results must be recorded and presented to the inspecting body on request.

13.3 Procedure as per DIN EN 14 509

Following the introduction of DIN EN 1 509, the Ü mark of conformity will be replaced by a CE mark. The corresponding specifications are being prepared by the European EPAQ Association.

14. Structural analysis

14.1 Classification of colours

Due to their good insulation properties, temperature differences are likely to occur under normal conditions between the inner and the outer sheet, which may lead to deformation and the generation of internal stresses. Loads result-

ing from these temperature differences (caused e.g. by direct sun radiation) must be taken into account in the structural analysis. The effects of various colours on the temperature of the outer steel sheet have been determined

taking account of the related brightness ranges and temperature differences between the inner and the outer sheet.

PLADUR® lacquer system

RAL	Colour	Colour group
1000	green beige	II
1002	sand yellow	II
1006	maize yellow	II
1015	light ivory	I
1020	olive yellow	II
2002	vermillion	III
5007	brilliant blue	III
5012	light blue	II
6003	olive green	III
6011	reseda green	II
6019	pastel green	I
6020	chrome green	III
7016	anthracite grey	III
7035	light grey	I
8004	copper brown	III
8011	nut brown	III
9001	creame white	I
9002	grey white	I
9006	silver metallic	II
9010	white	I
	gold metallic	II
	copper metallic	II

Other colours are to be classified accordingly. In case of doubt, please ask your sales contact in our company.

The temperatures for the outside steel face are taken from the approval, chapter 3.5 They apply to the climatic conditions prevailing in the Federal Republic of Germany and in Central Europe. Unless otherwise stated this data is the basis for the design tables mentioned in paragraph 14.2 in the tables.

Explanations:

Colour group	Brightness values H	Temperature		S _a
		outer steel face	inner steel face	
I	90–75%	55 °C	25 °C	30 °C
II	74–40%	65 °C	25 °C	40 °C
III	39–8%	80 °C	25 °C	55 °C

14.2 Load span tables

The load span tables can be downloaded from our website www.tks-bau.de. These tables are only valid in their latest version and under the conditions mentioned. If in the case of a specific

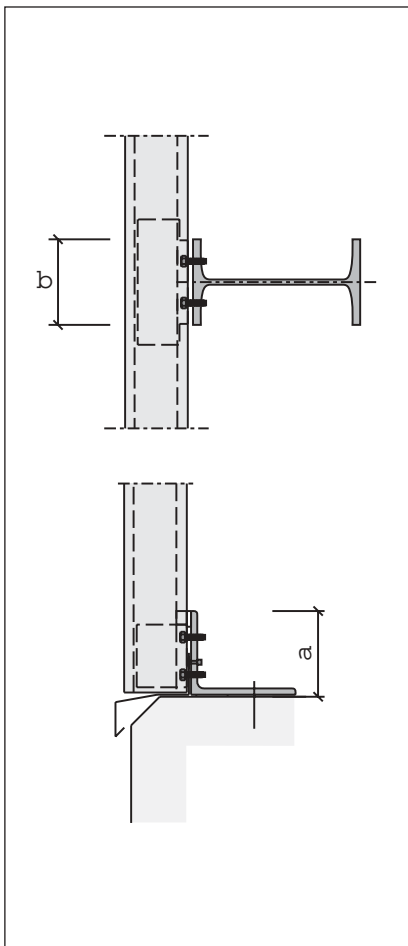
project, the obtained values deviate from those specified in the tables, it is recommended that ThyssenKrupp Bausysteme is contacted.

In any case, these tables are only for preliminary design. Preparation of a structural analysis for the specific building project is indispensable.

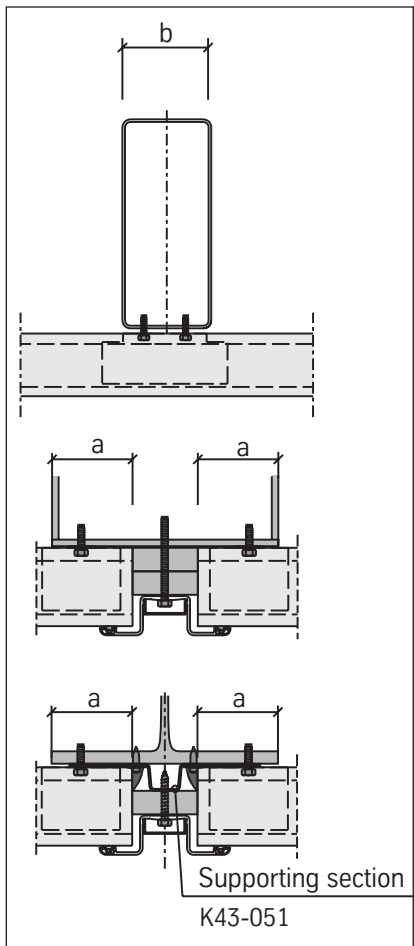
15. Widths of supports

The reference tables quote the support widths applicable for dimensioning.

Vertical laying



Horizontal laying



The dimension 'a' refers to the end support, the dimension 'b' to the width of the intermediate supports which must be observed to achieve the maximum permissible widths of support.

In order to avoid drilling holes in the area of the support webs, use an additional supporting section (part no. K43-051).

16. Flashings

For completing a building with Hoesch isowand integral®, standard flashings are available. For production reasons, these folded parts are made from flat steel sheet without micro- or V-profiling. These flashings are provided with the

coil-coating system PLADUR®, adapted to match the remaining building components. Please refer to the flashing catalogue, info 5.1.1.. Cover plates and other products, e. g. made from aluminium, can be provided

with a powder coating. Such a powder coating may give rise to differences compared with the gloss grade of the surface of Hoesch isowand integral®. It is therefore recommended that a contrasting colour is selected for these products.

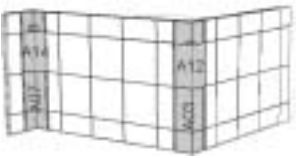
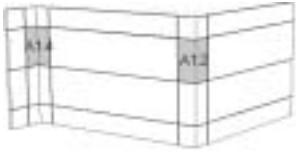
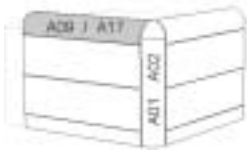
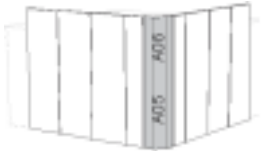
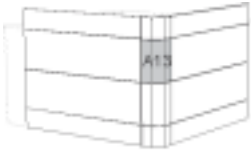
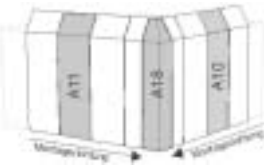
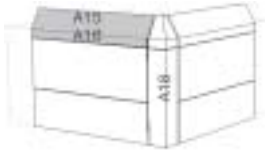
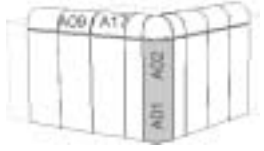
17. Special elements

Hoesch isowand integral® is supplemented by an extensive range of special elements.

These corner and parapet elements are made from material similar to that of the wall panels.

This ensures that the coating system and the colour are always well matched.

Overview of special elements

Vertical laying	Horizontal laying	Vertical and horizontal laying
		
		
		
		

For exact dimensions and drawings for ordering, see info sheet no. 5.2.1 'Sandwich, corner and parapet elements. Technical information'.

18. Proposed designs

The proposals made by ThyssenKrupp Bausysteme show designs that represent the current state of the art, which are secured by works standards and which are continuously being supplemented or improved.

They can be found on our website www.tks-bau.com, where they can be downloaded in the PDF, DWG or DXF format. Sectional drawings of Hoesch

isowand integral® can also be downloaded for integration into your own drawings.

The requirements imposed by the structural analyses, by building physics and the installation technique have been taken into account. These proposals will serve as guidelines to architects and planners but give sufficient

latitude for their own ideas. Application of these proposals does not give rise to any enforceable claims. Dimensions are based on the standard module of 1000 mm.

We reserve the right to make modifications as a result of technical improvements.

19. Installation recommendations

ThyssenKrupp Bausysteme produce their isowand® integral elements with the utmost care, applying extremely thorough quality controls (see item 13). These recommendations, which can

also be downloaded (www.tks-bau.com) and which reflect our many years of experience, will ensure that the products are also handled with care when they are on site.



20. Window system

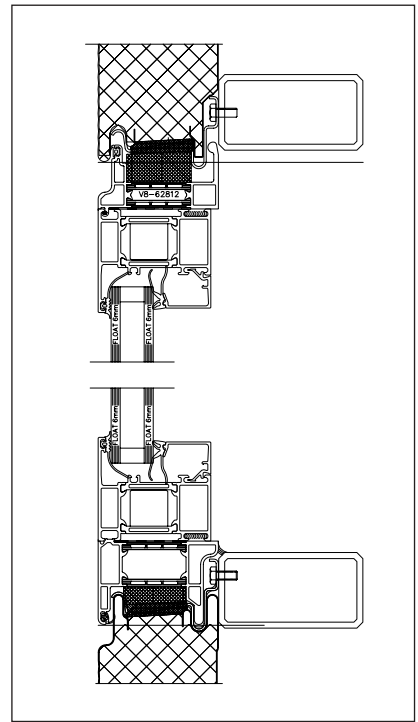
The visually pleasing façade system Hoesch isowand integral® is complemented by an aluminium window system. This window system assumes the elegance of the joint geometry of the sandwich element and continues it along the window.

The aluminium profile consists of two half shells which are connected by thermally separating plastic webs. This

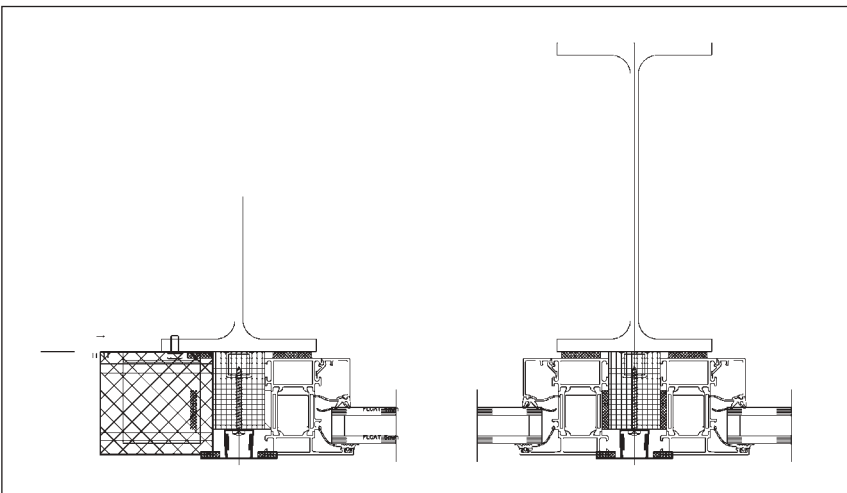
ensures that efficient thermal insulation exists between the inner and the outer sheet also in this area. The profile system is used to produce complete window systems, in the case of horizontal laying of Hoesch isowand integral® elements.

The window system was developed in cooperation with a leading manufacturer on the international market for windows.

For further information on this product, please see the brochure 'Windows for Hoesch isowand integral®' in our information bulletin no. 2.5.2.



Vertical view



Horizontal view

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