Husemann & Hücking
Profile GmbH

Installation instructions of the Flood Protection System **WP WASTO**

General information

Please read this instruction carefully. The work steps and notes as described in the following are directly relevant for the successful use and associated protection of WP WASTO. Pay particular attention to the notes.

The flood protection system was designed to prevent the user from damage or to decrease the effects of damage in extreme events. The system was practically tested according to load capacity as well as tightness at the university of Siegen. We could not simulate all conceivable cases of disaster.

The system forms an unity with the building. The load capacity of the fixing points, as well as the possible heights in case of high water, need to be approved locally by a structural engineer. The user takes personal responsibility in deciding if the system is suitable for the individual case of application.

Warranty is limited to flawless material and professional manufacturing of the individual components but eliminated if the customer performs any changes, repairs or remedies defects of the system components. The individual components of the system are coordinated. For damages resulting from the use of other products any liability is rejected.

The manufacturers (Husemann & Hücking GmbH), retailers and fitters of WP WASTO accept no liability whatsoever for any damage or losses resulting from the effects of the hydrostatic forces described above. Similarly, the manufacturer cannot be made liable for any installation errors.

Due to different causes, especially in the case of extrem high waters, slight leaks can occur. No guarantee is given for complete damage prevention.

All information, constructions and illustrations in the technical documentation were compiled with greatest care and best knowledge. However, mistakes cannot be ruled out entirely. All illustrations and possible proposals (e.g. digressions) are non-binding.

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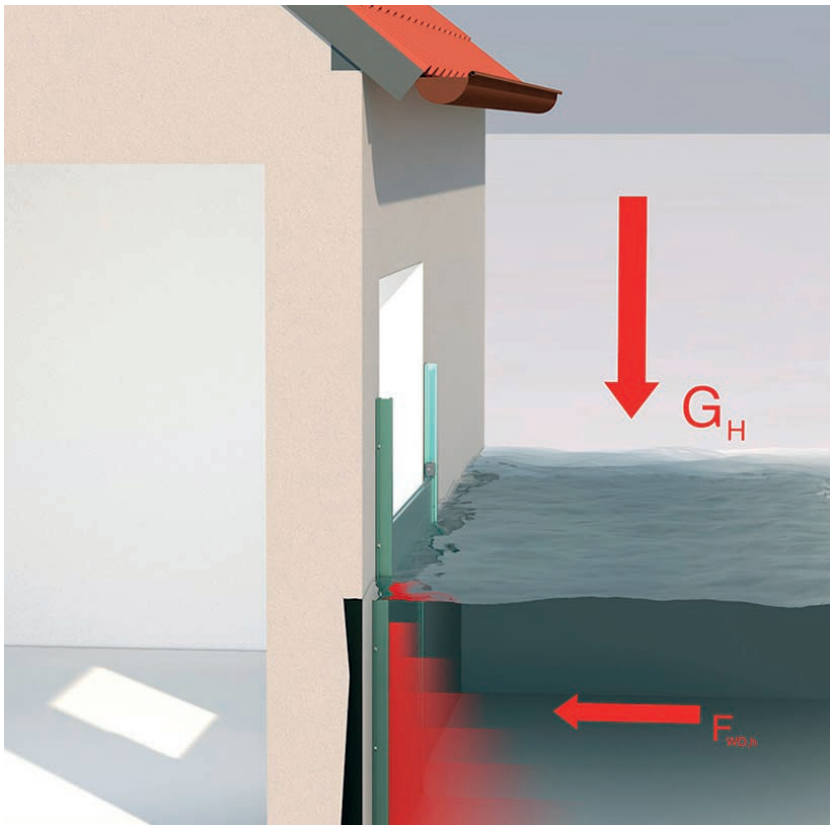
1. Prior to installation

1.1 Danger for buildings

Example:
Let's assume a building is standing 1.5 metres deep in the flood water of a river. The side of the building on which the water pressure is being exerted is L = 10m long.



The horizontal force being exerted on the wall works out as follows:

$$F_{WD,h} = \frac{1}{2} \cdot h^2 \cdot \rho \cdot g \cdot L \text{ (kN)}$$

h = Water height (m)

ρ = Water density = $1 \frac{t}{m^3}$

g = Gravitanional acceleration = $9{,}81 \frac{m}{s^2}$

L = Length of the wall on which the water pressure is exerted

Sample calculation: $F_{WD,h} = \frac{1}{2} \cdot (1{,}5\ m)^2 \cdot 1 \frac{t}{m^3} \cdot 9{,}81 \frac{m}{s^2} \cdot 10\ m = 111\ kN$

111kN equate to the gravitational force resulting from a mass of around 11,300kg (which equals the weight of 12 small cars being pressed against the 10m-long wall).

The question as to whether in the event of a flood a specific building is in danger due to lifting or horizontal water pressure, and when the building should be flooded, can only be answered by a structural engineer!

1.2 Base structure requirements

The condition of the base structure is very important in achieving a good seal. The straighter and flatter the surfaces are on which the WP WASTO is fitted, then generally the easier the installation and the smaller any subsequent leak of water. Small areas of unevenness in the floor or wall are evened out by a prestressing process within the sealant, however the form of the unevenness greatly reduces this sealing quality. Small areas of unevenness up to a depth of an approximate height of 2 mm can be easily compensated for by the seal. Sharp edged lumps and gaps (e.g. floor-tile joints, unevenness in external rendering, concrete noses) are not sealed off, even if heavy pressure is applied to the seal. To avoid more significant gaps in the seal, the base structure should be levelled out with an appropriate filler. To establish an ideal installation of the system, the maximum deviation of the base surface must not exceed $\Delta h = \pm 1{,}0$ mm.

1.3 WP WASTO installation options

The WP WASTO system has been tested for openings up to 4000 mm wide and max. water levels of 2000 mm. While planning the installation it should be defined whether the flood protection system ought to be installed **IN FRONT OF** or **WITHIN** the opening that is due to be protected. Another variation is the **BASEMENT INSTALLATION**.

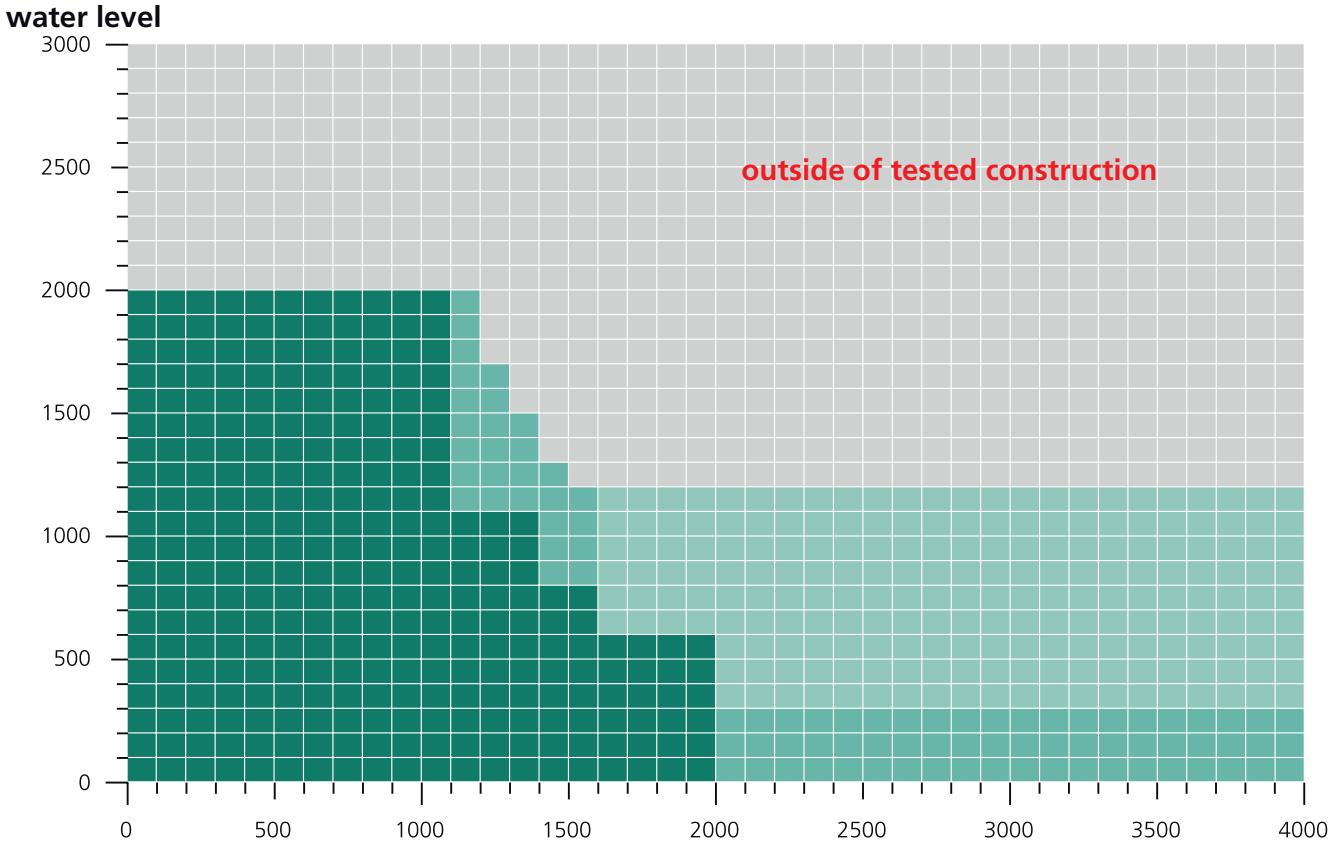
Installation **IN FRONT OF** the opening offers the advantage of an easier and more economical attachment of the individual components.

Installation **WITHIN** the opening is featured with a more filigreed appearance. This version requires higher demands on the connection (base structure, bolts, plugs) due to the occurring shear forces.

The **BASEMENT INSTALLATION** finds its application in special requirements such as a system solution on a building corner.

1.3.1 Installation **IN FRONT OF** the opening with toothed track **Art. Nr. 901200** (WP W03-01)

Permissable water levels and spans:

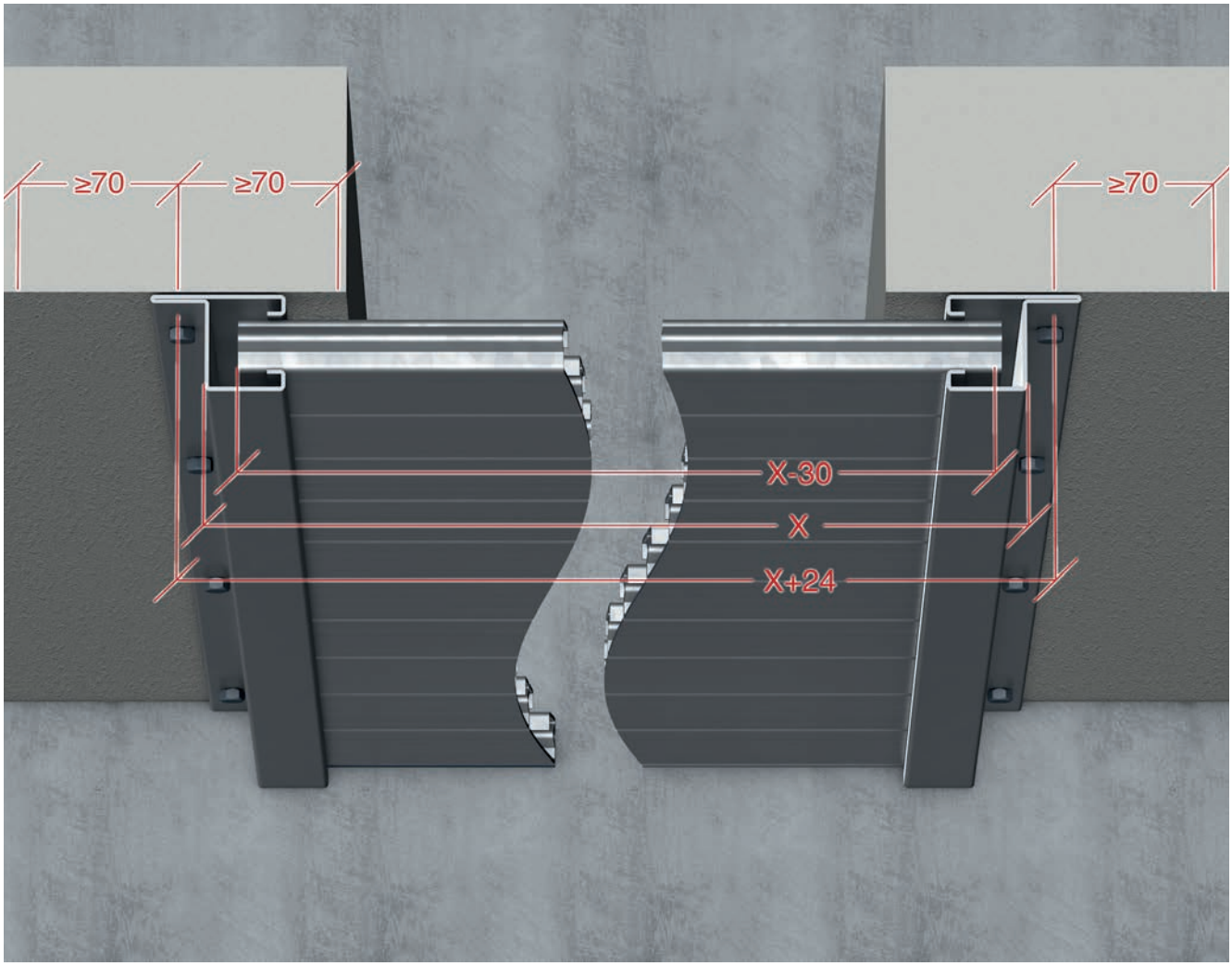


without strengthening section and medium post
with strengthening section
with strengthening section and medium post
outside the tested version, individual static calculation with strengthening section and medium post

Installation in front of the opening has the advantage that the fixing bolts do not come under strong stress from the pressure of the water. Force is exerted in the direction of the bolts' lengthways axis, which pushes the toothed tracks even more against the wall. Basic plastic rawlplugs in combination are all that is needed in this kind of installation. For a recurring assembly/disassembly of the ratched track we either recommend screw sleeves that are bonded into a wall or the specification of a structural engineer.

This type of installation is, however, only possible if the front edge of the floor protrudes at least 50 mm (the width of a toothed track) above the tracks' installation level, otherwise they would have no surface contact. For external installation the toothed track **901200** (WP W03-01) is provided.

System overview of the installation **IN FRONT OF** the opening (sectional view)



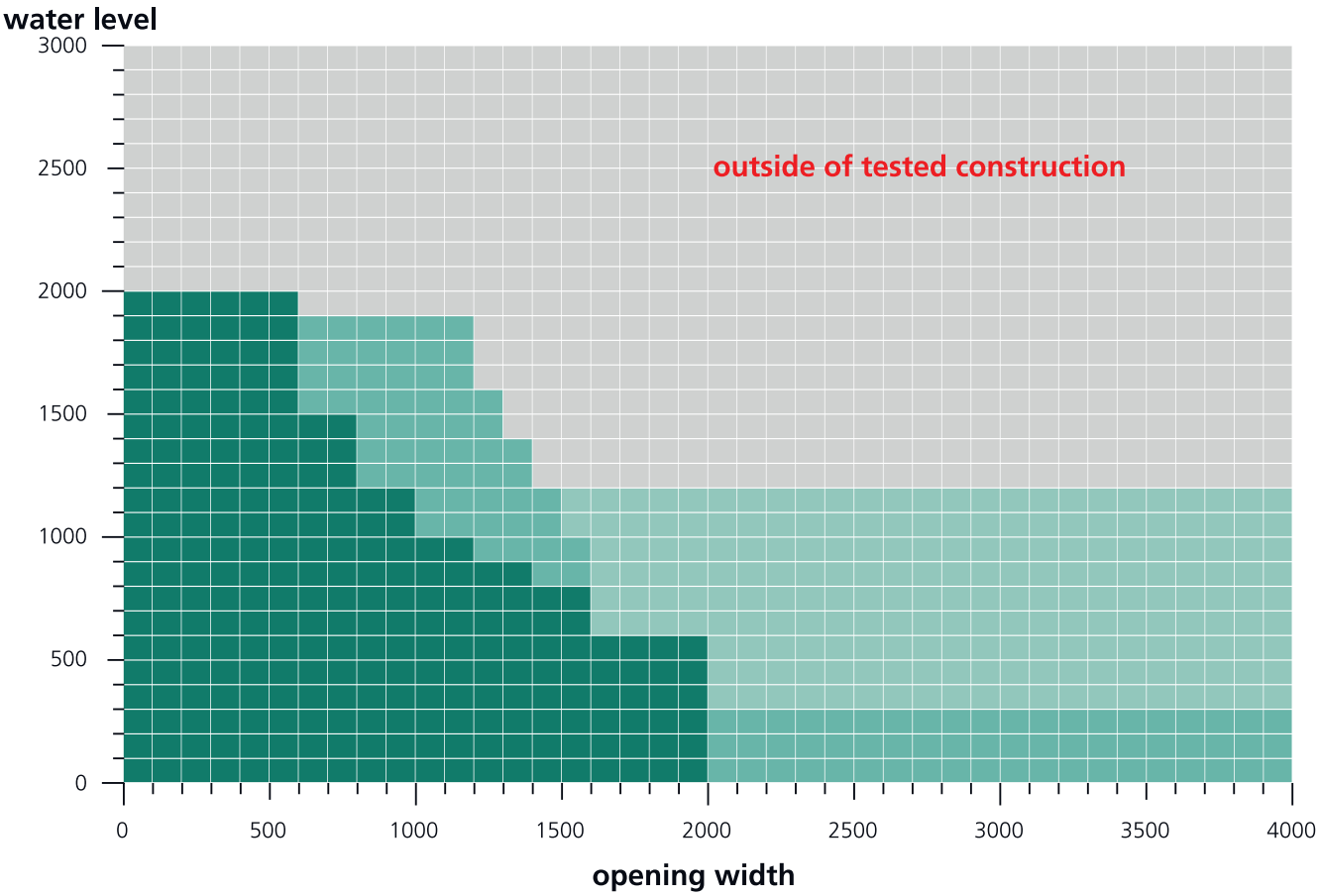
Water side

Cutting of the individual components:

Toothed track	(Art. Nr. 901200)	= Water level + 190 mm (safety)
Track seal	(Art.Nr. 905206)	= **Toothed track** + 60 mm
Slat	(Art. Nr. 901202)	= External dimension toothed track (X) - 30 mm
Slat seal	(Art. Nr. 905202)	= **Slat** +1%
Strengthening section	(Art. Nr. 901203)	= **Slat** - 200 mm
Bottom seal	(Art. Nr. 901208)	= **Slat** + 24 mm

1.3.2 Installation **WITHIN** the opening with toothed track **Art. Nr. 901201** (WP W03-02)

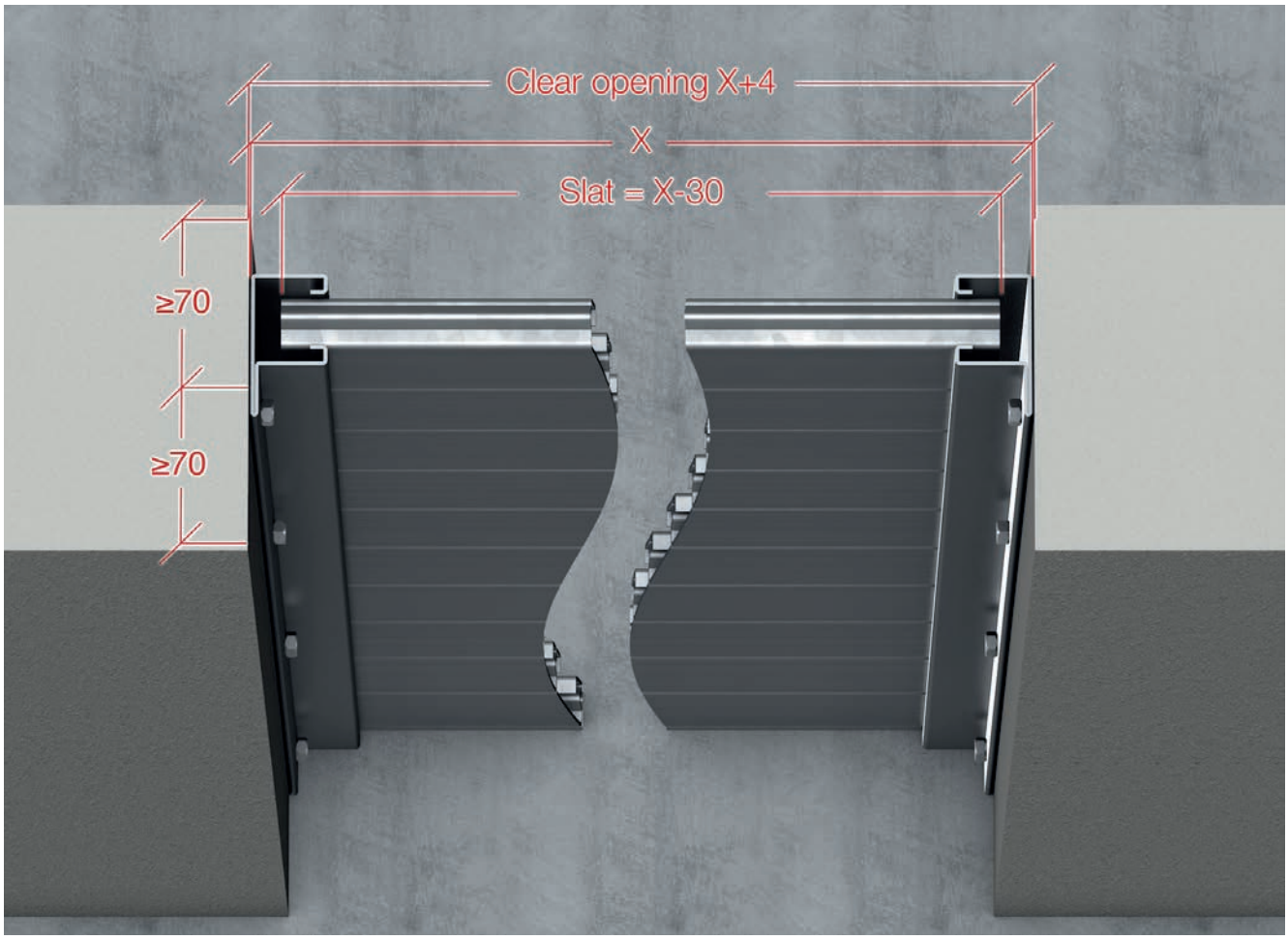
Permissable c



without strengthening section and medium post
with strengthening section
with strengthening section and medium post
outside the tested version, individual static calculation with strengthening section and medium post

If the front edge of the floor ends flush with the opening to be protected, or other object-related reasons that prevent WP WASTO from being installed in front of the opening to be protected, the system can be installed **WITHIN** the opening. The through congestion emerged water pressure, stresses the connection also onto the shearing forces, which leads to higher demands on the connection. For such fittings, you should therefore use fixing elements appropriate to the base they are being fixed to (e.g. concrete, wall tiling, natural stone etc.). If you are in any doubt about what fixing elements to use, it is advisable to give us a call.

System overview of the installation **WITHIN** the opening (sectional view)



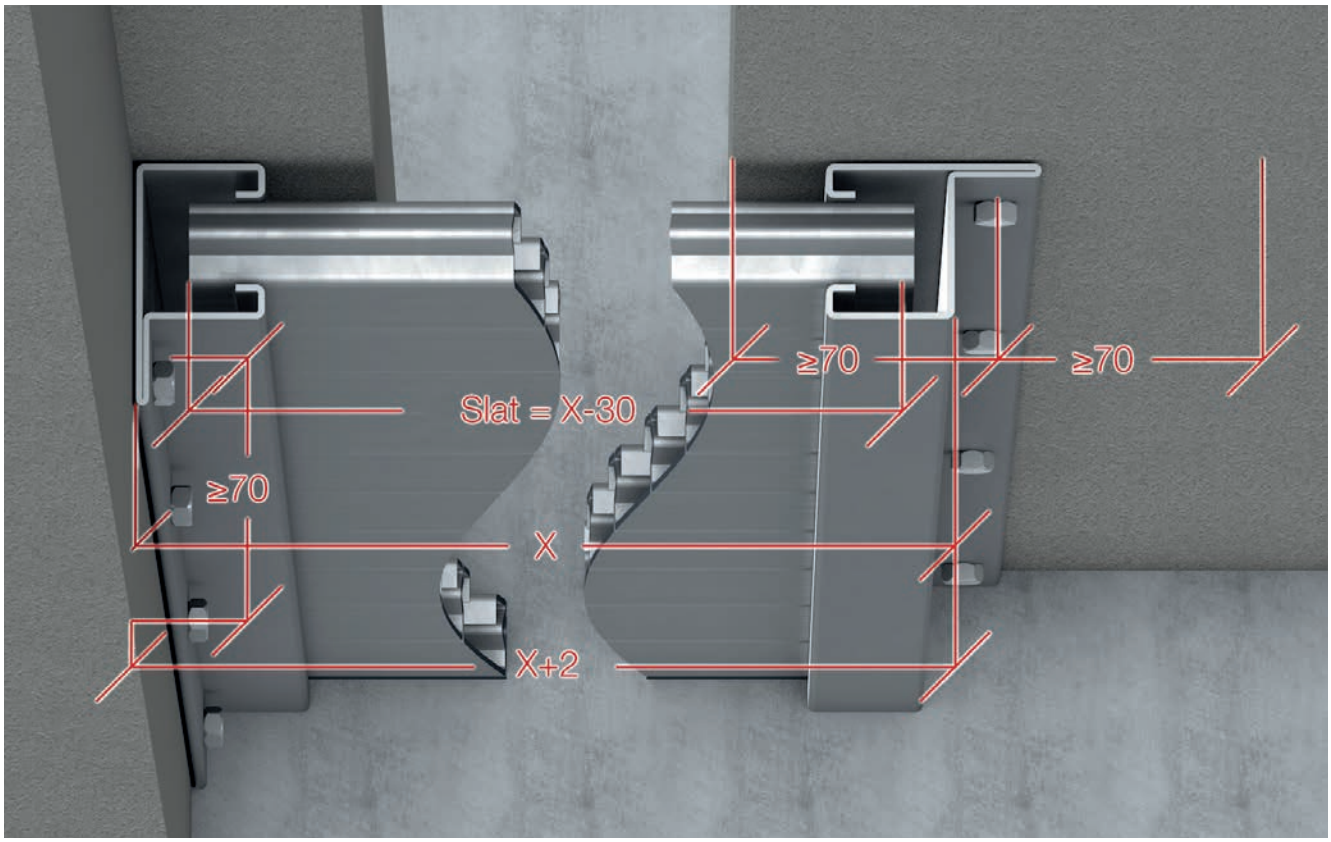
Water side

Cutting of the individual components:

Toothed track	(Art. Nr. 901201)	= Clear height + 10 mm
Track seal	(Art.Nr. 905206)	= **Toothed track** + 60 mm
Slat	(Art. Nr. 901202)	= External dimension toothed track (X) - 30 mm
Slat seal	(Art. Nr. 905202)	= **Slat** +1%
Strengthening section	(Art. Nr. 901203)	= **Slat** - 200 mm
Bottom seal	(Art. Nr. 901208)	= **Slat** + 24 mm

1.3.3 Basement installation

Due to different building properties it's not always possible to use the same track type. Therefore the **basement installation** usually finds it's application in basement accesses.
For this a support rail **901200** (WP W03-01) and **901201** (WP W03-02) is required each.



In this application **the limit values for indoor use** must be observed statically.

System notes:
For all installation variations the bolts' edge distance has to be at least 70 mm (see illustrations).
When cutting the toothed tracks, make sure that the lower slot is about 70 mm from the floor. This ensures that a sufficient pressure is exerted on the foot of the seal.
In the indoor installation of the flood protection system, the bolts mandatorily need to be applied on the water side.
To insert the top 4 slats in the indoor installation, they need to be cut to X-44 mm.
If the system is exclusively used as burglary protection we suggest applying the fitting of the toothed tracks on the inside of the wall opening.

1.4 Slats with strengthening section

In more than 80 percent of cases the own static will suffice to ward off endangerment.

With high water levels and/or spans an additional static strengthening is necessary. The strengthening section no. **901203** (WP W03-04) is screwed, with customary bolts of strength class 8.8, onto the respective slat. It is adequate to screw the sections on using every fourth top and bottom hole of the strengthening section. The distance of the strengthening section from the edge of the slat should always be the same so that the strengthening section's elongated holes are available if needed for further fixing options.

Slats with and without strengthening section

1.5 Application medium post for larger spans

For building openings with widths of over 2000 mm we recommend the use of central post 901204 (WP W09-06). The system extended around the central post was tested for wingspans up to 4000 mm and a water level of 1200 mm. For larger dimensions, the calculation of an individual statics is absolutely necessary.

On the inside of the system the center post is mounted flush on the slat level or the strengthening section. With a telescopic ratchet mechanism to depress the slats in the vertical direction, an additional strain is achieved in the system center. Additionally, the post fixed to the ground can better absorb horizontal compressive forces and deflections for large spans.

Previously, the included ground socket has to be anchored into the ground permanently. The 1750 mm long medium post is recessed by 250 mm into the ground socket and secured by a locking pin.

2. System installation

2.1 Fixing the toothed tracks

After carefully preparing the base surface, you can fix the toothed tracks to the wall. Before applying the seal to the tracks, the toothed track can be used for marking the drill holes. In this way, you ensure that when the installation is complete the sealed surface between the end of the toothed tracks and the floor will have adequate tension ('contact pressure').
It is important to ensure that the toothed tracks are fitted as parallel as possible to each other to achieve ideal density.

Simple use of the toothed track as a drill hole template

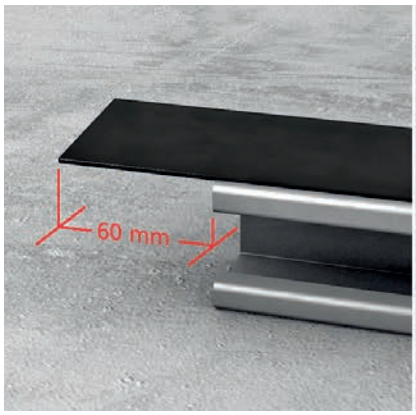
2.2 Permanent installation

In case of permanent attachment of the toothed tracks to the building, we suggest in addition to the tooth rail seal **905206** (WP W13-01Z), the use of a permanently-elastic sealant (follow the manufacturer's instructions regarding external use, weather conditions and surface preparation). The permanently-elastic sealant is applied extensively between wall, floor area and toothed track. After fitting the toothed tracks, one or two slats should be inserted and clamped with the clamps. Now the edge and base area of the toothed track are carefully sealed with the permanently-elastic sealant. The tension of the system should only be disengaged after the sealant has hardened completely.

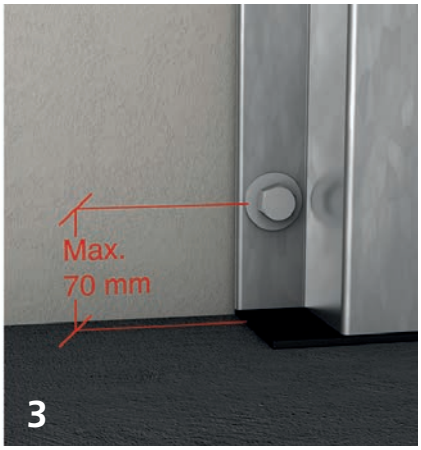
2.3 Installation of the toothed tracks

Note:
The processing of the system seals should only occur at temperatures of around +10°C otherwise the adhesive may not develop its full adhesion and will only stick limitedly to the slats or tracks.

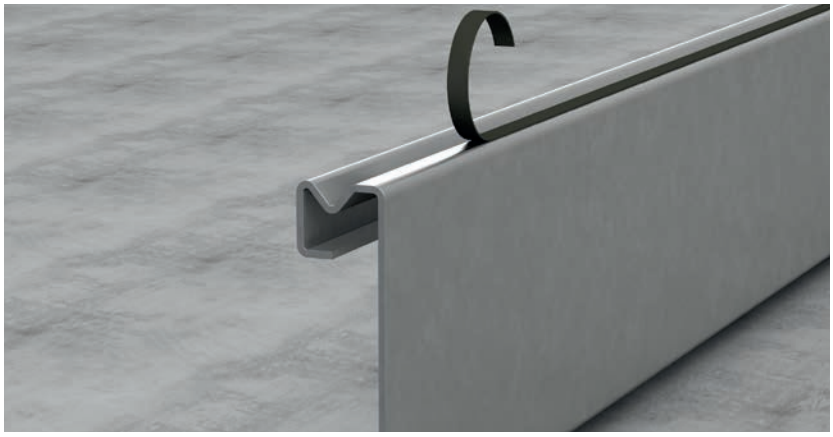
1. Clear adhesive surface with suitable detergents from dirt and grease.
2. The track seal closes both the gap the between the track and the wall and between the end of the track and the floor. Therefore the track seal has to overlap by about 60 mm to seal the bottom of the track. Apply sealing slightly compressed.
3. Remove seal in bolting area, e.g. with a punch.
4. Adhesive bonding of track seal no. **905206**



5. Apply the track, making sure that the front of the track at the bottom is pressing on the overlapping part of the seal. Fit the bolts, afterwards.



2.4 Preparation of the toothed tracks



The slat seal no. **905202** (WP W03-10Z) should be sticked on the bottom side of each slat.

Clear adhesive surface with suitable detergents from dirt and grease.

Apply sealing slightly compressed to achieve an optimal adhesion and tightness.

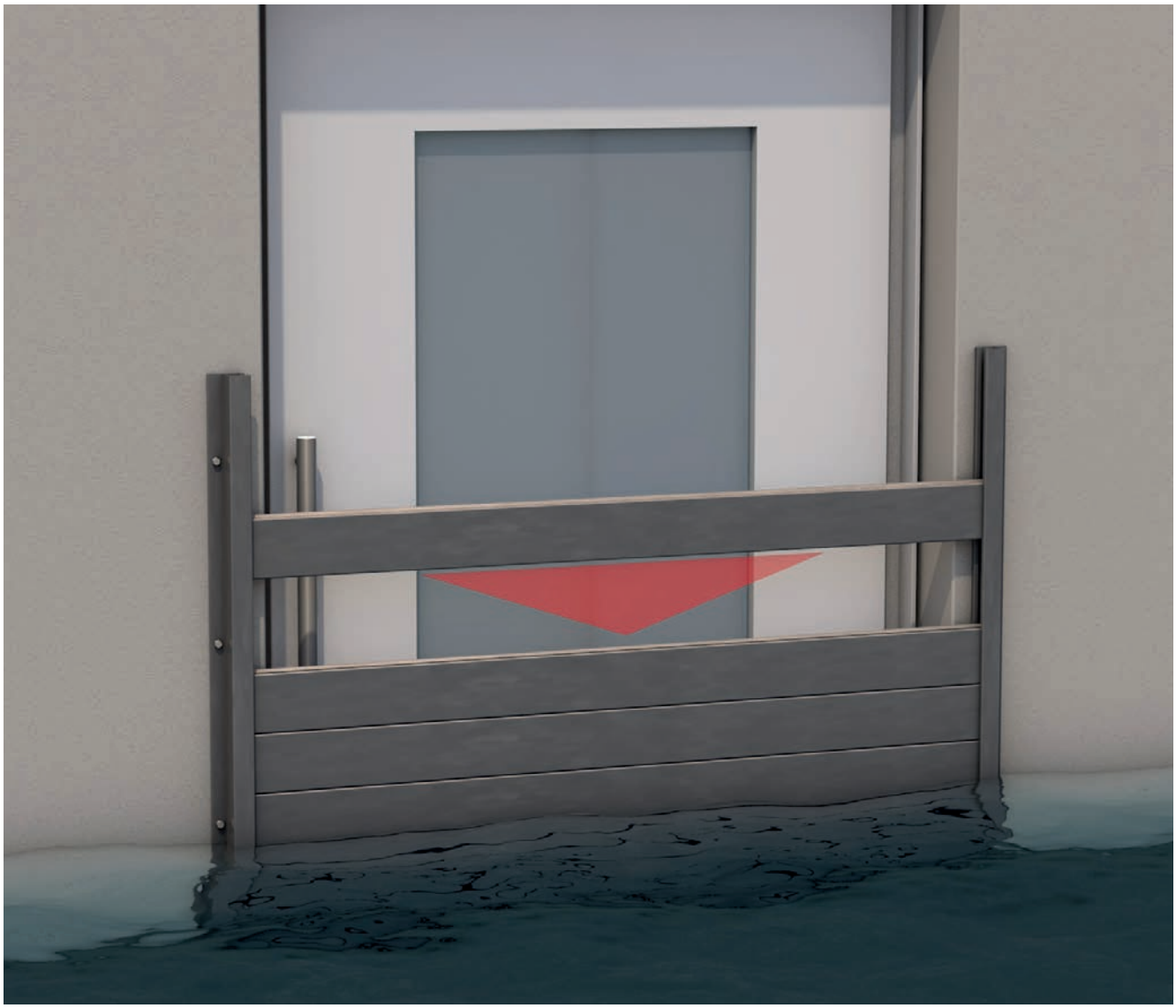
Before inserting the first slat, the bottom seal track no. **901208** (WP W08-06) has to be applied.

The bottom seal track can either be used individually or permanently attached to the bottom slat.

Fixing recommendation (not part of delivered bottom seal tracks):

1. The protruding bottom seal track is cut at both ends so two metal flags remain (each side 12 mm longer than the slat).
2. The metal flags are folded at each end to achieve a solid conjunction with the upper slat.

Installation tip:
Clearly mark the bottom slat unit assembled of the bottom seal track and slat to provide a faster installation in case of high water!



2.5 Inserting the slats into the toothed tracks

Once you processed and attached all the seals correctly, the installation of the slats can begin. The slats are applied centered on the tracks with the smooth side outwards, so the slats sit flushed on the side of defense.

After inserting all the slats required in a case of defense, the clamps no. **905200** need to be installed in the tracks. The vertical bolt should be on the water side of the flood protection system (see dotted line in illustration).

The bottom of the clamp should rest on top of the top slat. Using the Allen key, then tighten the horizontal clamping bolts 'hand tight' (on both sides) so the teeth completely interlock with each other.

After that, alternately screw down the vertical clamping bolts until the slats are compressed to a unit.

Note:
Depending on the height of the 'stack' of slats, this will be compressed by between 5 to 25mm as the clamping bolts are tightened. When this is done, the individual slats will have been firmly pressed together and initial pressure applied to the bottom seal.

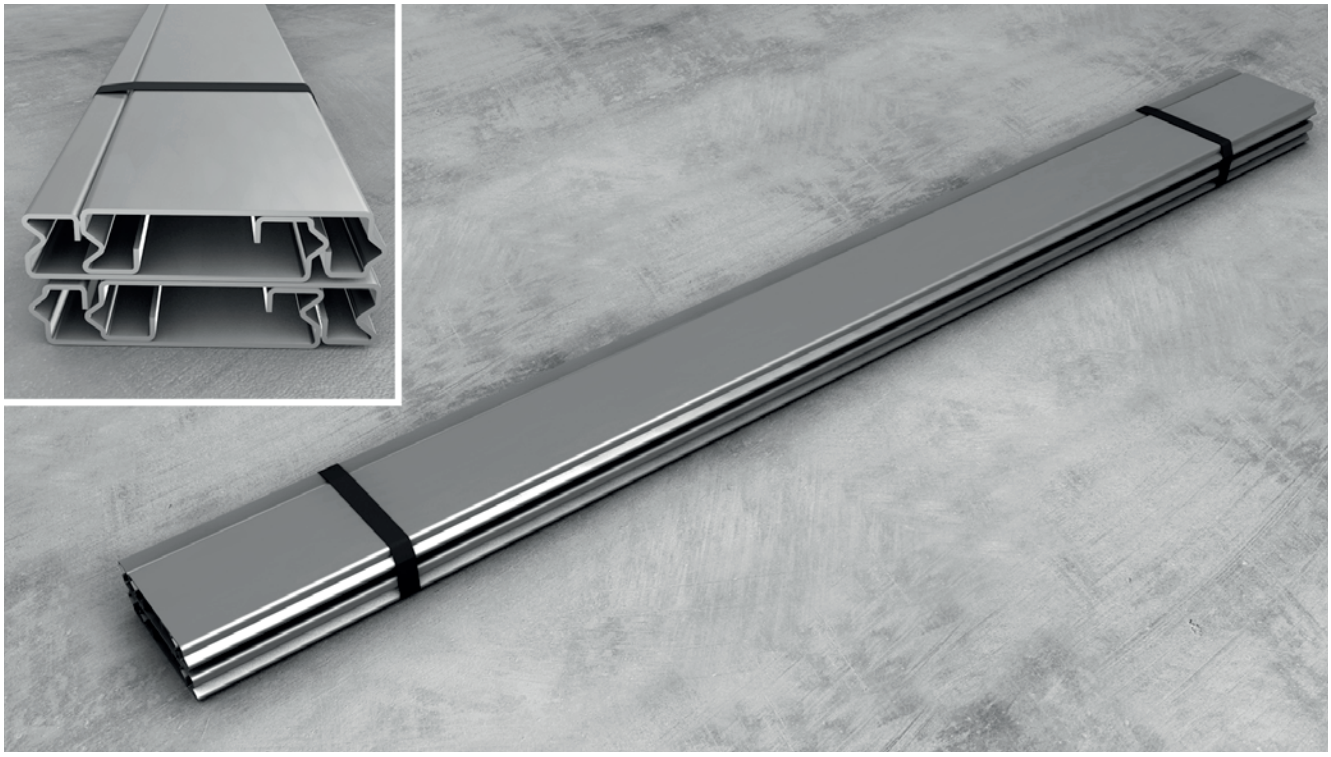
2.6 Sealing off the vertical slat joints

Finally, the vertical joints between the slats and the side tracks have to be sealed off with the closing seal no. **905205** (WP W11-01Z). In the event of disaster a silicone sealant can also be used in self-responsibility of the operator.

Note:
In contrast to sealing tape, silicon must not be subjected to water pressure – depending on the temperature – for up to one or two hours after application. Otherwise there is a risk that the still soft silicon will be pushed through the joints by the pressure of the water and that the seal will fail.

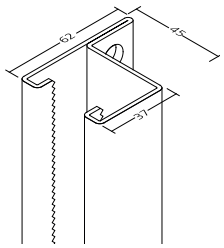
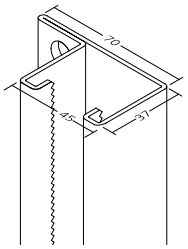
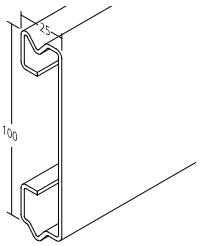
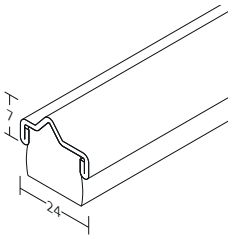
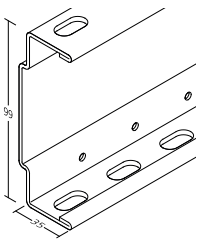
2.7 Storage and care

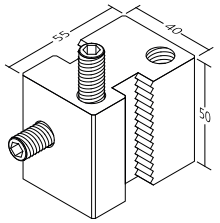
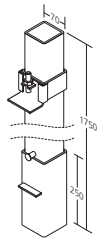
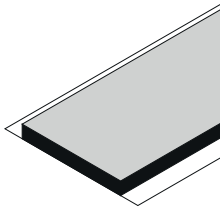
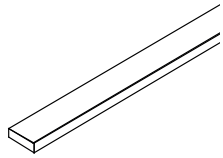
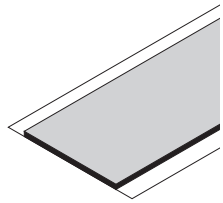
Following a flood, any physical impact has to be removed from the slats and c-tracks. With greatest consideration for other system components, detergents that could restrict properties of the seal must not be employed. If dismantling, installation or maintenance caused impairment to the seals, they need to be checked for integrity and if necessary replaced.



Note:
The slats should be stored somewhere dry and dark but not too hot because high humidity and high temperatures can negatively affect the durable functioning of the sealing components. You should ensure that when stored the slat seals can fully expand (it is imperative that you avoid the seals being 'squashed' by the slats being stored resting on the seal surfaces!). The slats can be nested together to save space and can be bundled into easily manageable packs.

3. Product overview

Illustration	Name	Item number	Length/Pack
	Toothed track, outside	**901200** (WP W03-01)	4500 mm
	Toothed track, inside	**901201** (WP W03-02)	4500 mm
	Slat	**901202** (WP W03-03)	4500 mm
	Bottom seal	**901208** (WP W08-06)	4500 mm
	Strengthening section	**901203** (WP W03-04)	4500 mm

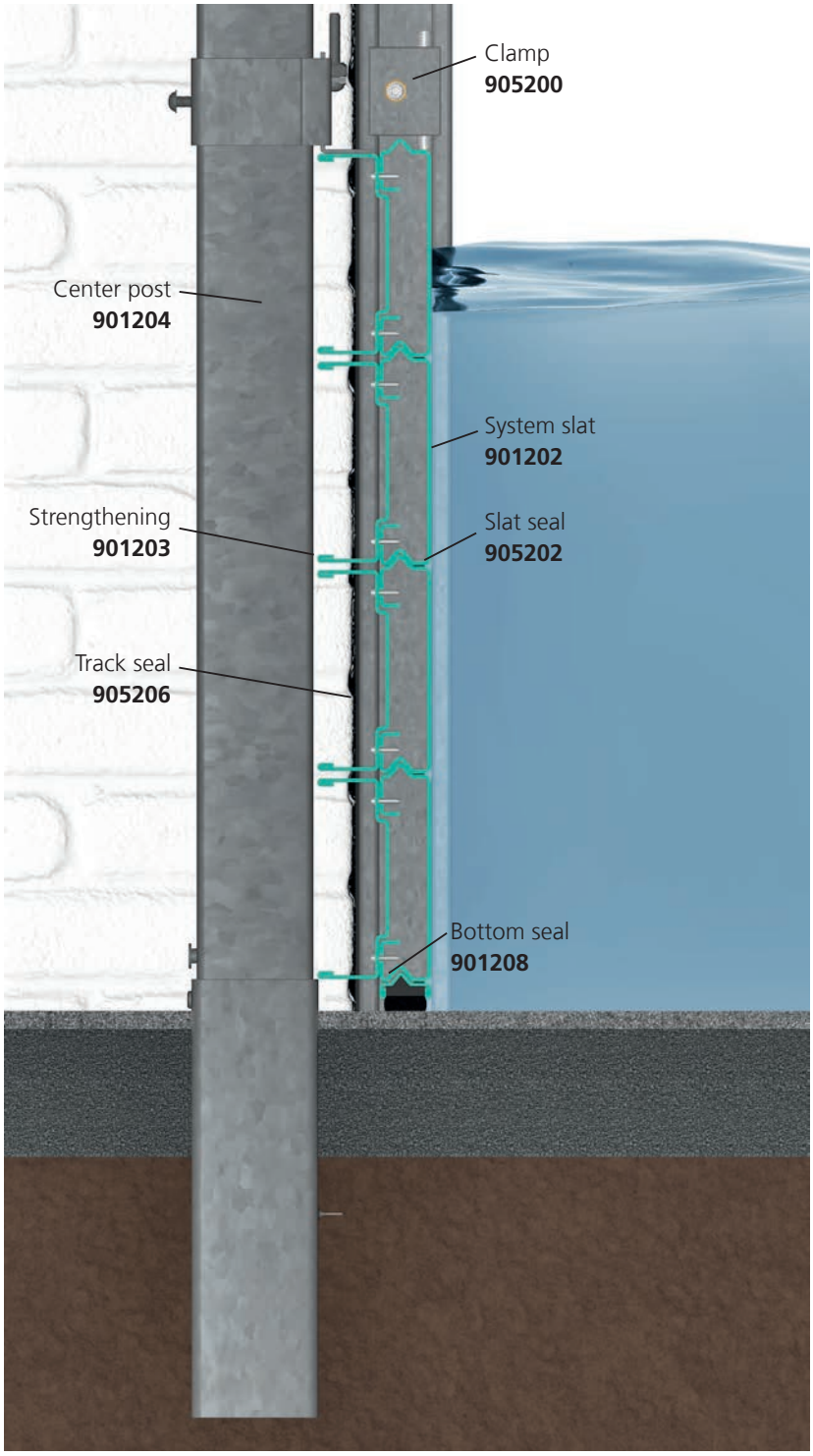
	Clamp	**905200** (WP W03-11Z)	2 per pack
	Medium post with bottom hull	**901204** (WP W09-06)	1750 mm
	Track seal	**905206** (WP W13-01Z)	25 m/roll
	Slat seal	**905202** (WP W03-10Z)	200/roll
	Closing seal	**905205** (WP W11-01Z)	10 m/roll

4. Construction Images

4.1 Audited widths to 2,000 mm and 2,000 mm application range water level

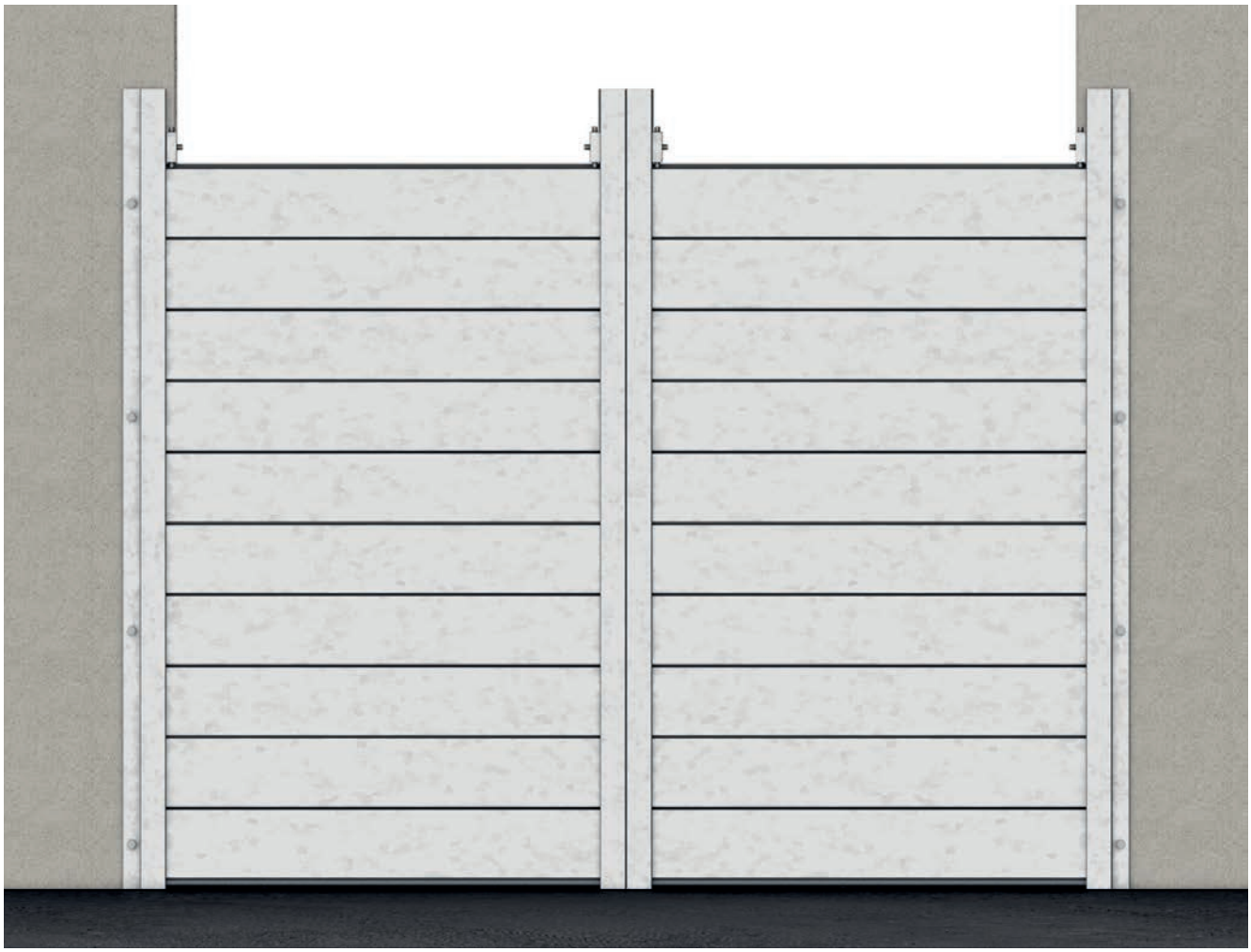
System section

4.2 Audited widths to 4,000 mm and 1,200 mm application range water level

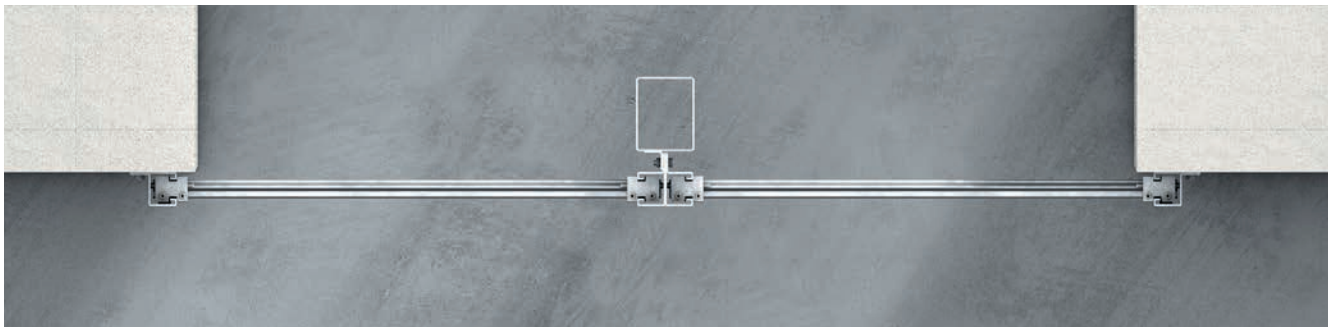


System section with medium post

5. Possible structural construction version



Front view in alignment



Top view

Illustration of an untested system configuration. This object-related design was built in self-construction using a central support post due to local conditions.

UNIVERSITÄT SIEGEN

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und Praxis
für Karrieren
von morgen

fwu

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Projekt Prüfbescheinigung Hochwasserschutzsystem WP WASTO

Ansprechpartner Prof. Dr.-Ing. Jensen
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Datum 28.04.2005

PRÜFBESCHEINIGUNG WP WASTO

Die Firma Husemann & Hücking hat einen im Wesentlichen aus Stahlprofilen bestehenden Bausatz (WP WASTO) zum Verschließen von Gebäudeöffnungen als Schutz vor Hochwasser entwickelt. Dieses Schutzsystem WP WASTO wurde durch das Forschungsinstitut Wasser und Umwelt (fwu) numerisch, statisch und im Praxistest bei einer Einsatzbreite von b = 2,0 m und einer Stauhöhe bis zu h = 2,0 m überprüft, optimiert und begutachtet. Unter anderem wurde die Belastungsfähigkeit des Systems sowie die Leckwassermenge mit unterschiedlichen Dichtungsmaterialien auf verschiedenen Oberflächenstrukturen ermittelt.

Die Handhabung des Bausatzes wurde anhand dieser Versuche mehrfach und ausdauernd getestet und ebenfalls optimiert.

Wir bestätigen hiermit die Prüfergebnisse, die in der Einbauanleitung des Systemanbieters Husemann & Hücking veröffentlicht sind. Bei Einhaltung der vom Hersteller in der Dokumentation angegebenen Randbedingungen kann das System WP WASTO uneingeschränkt empfohlen werden.

(Prof. Dr.-Ing. J. Jensen)

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PfB Prüfzentrum für Bauelemente
Dipl.-Ing. (FH) Rüdiger Müller

Fenster · windows
Rollläden · shutters
Türen + Tore · doors
Fassaden · curtain walling
Baubeschläge · building hardware

KURZBERICHT Nr. 09/03-A068-K1

Prüfung der Hochwasserbeständigkeit nach „RICHTLINIE Hochwasserbeständige Abschlüsse und Bauteile", Ausgabe Januar 2008 - herausgegeben vom **PfB** – an einem Stahlprofil-Steckwandsystem.

Antragsteller	Firma Husemann & Hücking Profile GmbH Am Hofe 9 D-48640 Iserlohn
Bauart	Stahllamellen mit Verstärkungen und Klemmsystem. Wandprofile mit Dichtung wahlweise mit einsteckbaren Stützen in Bodenhülse
Produktbezeichnung	**WP WASTO**
Herstellungsgrößen	Lichter Durchgang: 3000 mm Höhe variabel bis 0,6 m Stützweite 1500 mm Höhe variabel bis 1,2 m
Wasserbeaufschlagung	glatte Profilseite
Klassifizierung	Obige Bauart sowie deren Anbindung sind gemäß Prüfbericht Nr. 09/03-A068-B1 vom 24.06.2009 hochwasserbeständig gegen drückendes oder stehendes (klares) Wasser bei Wasserstand über Bodenniveau bis zu 0,6 m bei lichtem Durchgang von 3,0 m und 1,2 m bei Stützweite von 1,5 m. Die Leckrate kann bis zu ca. 40 l/h je Feld zwischen zwei Führungsschienen betragen. Dieser Kurzbericht enthält nur eine Aussage über die Leistungseigenschaft der Hochwasserbeständigkeit gemäß obiger Richtlinie.
Gültigkeit	Laufzeit der „RICHTLINIE Hochwasserbeständige Abschlüsse und Bauteile" Ausgabe Januar 2008.

Hochwasser

Dipl.-Ing. Matthias Demmel
Stellvertretender Institutsleiter

24.06.2009

Andreas Nerz
Sachbearbeiter

Die Montageanleitung ist Bestandteil von Prüfbericht Nr. 09/03-A068-B1 vom 24.06.2009 und ist jedem gelieferten Bauelement beizulegen.

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