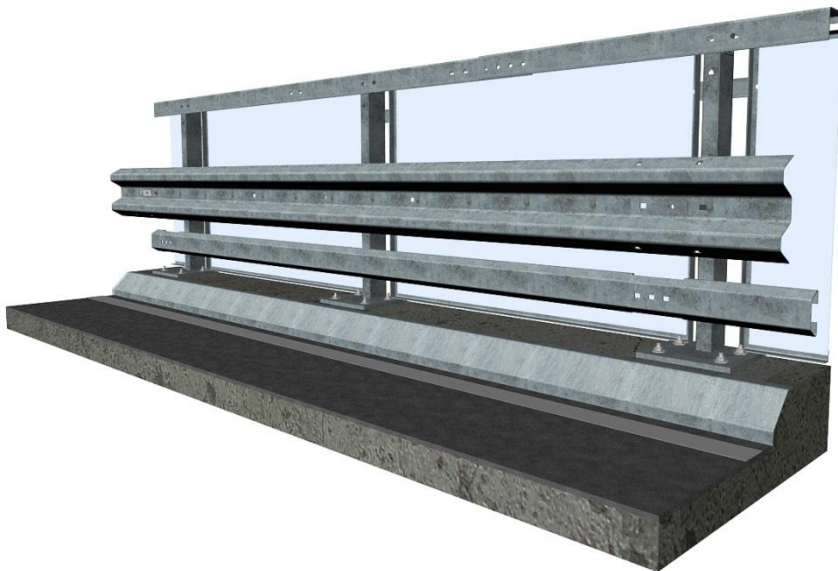


ASSEMBLY INSTRUCTIONS

for the vehicle barrier system

KREMSBARRIER 1 RH1K

on artificial structures



Performance class in accordance with EN 1317-2:

Containment level:	H1
Impact severity level:	B
Working width:	W4

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Safety instructions

As working on vehicle barrier systems should generally be categorised as especially dangerous, such tasks should always be carried out under the supervision and instruction of applicably trained specialist personnel.

These assembly instructions assume that supervision and instruction is provided by such specialist personnel on-site.

All construction personnel must wear personal protective equipment in accordance with EC directive 89/686/EEC.

Proper use

The task of a vehicle barrier system is to restrain and redirect vehicles straying off of the carriageway and thereby minimise the consequences for passengers as well as for other road users and objects worthy of protection.

Note: Vehicle barrier systems are generally to be used only in situations where straying off of the carriageway is likely to result in more severe consequences for vehicles and their passengers as well as for third parties or objects worthy of protection than a collision with the barrier system.

Technical description of the vehicle barrier system

Performance class in accordance with ÖNORM, EN 1317-2:	
Containment level	H1
Impact severity level / ASI	B / 1.3
Working width / level	W4 / 1.1m
Test length	53.20 m
System dimensions	
System width	500 mm
System height	1,200 mm
Bore depth	130 mm

Transport

The following points are to be observed when transporting components of the vehicle barrier systems:

- A regulation load securing system is to be made available.
- When transporting on salt-treated roads, the components must be transported on enclosed / tarpaulin-covered truck trailers.
- Avoid contact with other aggressive transported materials (e.g. residual chemicals on the loading space).
- The lifting gear is to be designed for a maximum package weight of 2.5 t.

Note: A proper load securing system must also be used when transporting equipment for installation of vehicle barrier systems.

Requirements for installation

The executing contractor (=installation firm) must have the professional aptitude and general qualifications for the undertaking of such installation work.

The installation firm must be in possession of the technical equipment required for the professional and proper undertaking of the installation work. This includes, in addition to a fleet of vehicles adapted for this type of work, especially the pile-driving equipment for the required post segments with adapted drive heads and guides as well as drilling equipment, impact screwdrivers, mandrels and measuring equipment, etc.

The installation firm must maintain all relevant national and international laws, regulations, directives, etc. and ensure that the required permits are available and have been submitted in good time.

The following must be checked by the installation firm prior to the start of installation

- Possible existing installations in the area of the anchoring must be assessed and correspondingly taken into consideration
- The suitability of the subgrade (soil class, sufficient bore depth, evenness, etc.) is to be checked.
- The definitive reference line must be marked for installation of the vehicle barrier system.
- The delivery of materials must be checked for correctness and completeness and complaints must be immediately forwarded to the supplier.
- It must be ensured that the building site is properly secured.

The customer is to be informed immediately in writing in the event that deviations are determined and the matter is to be clarified.

If components for the vehicle barrier system are to be intermediately stored, then the following warehouse conditions are to be fulfilled:

- The storage area must be capable of bearing the load and must be accessible with an HGV truck.
- Galvanised components may not be stored on tall, damp grass, in standing water or mud.
- The packages are to be stored in the original packaging on wooden slats with approximately 150 mm gap to the ground.
- The components should be stored at a slight angle, so that water can drain off.
- The formation of puddles (collection of moisture) is to be avoided.
- Foil used for purposes of securing the layers during transportation is to be removed.
- The storage area may not be treated with defrosting agents.

Long-term storage of bundled components outdoors is to be avoided.

Suitable subgrade (structure)

In the event of a vehicle impact, the vehicle barrier system and the vehicle itself transfers forces (nominal characteristic values) into the subgrade (structure). These forces are also dependent on the alignment of the barrier system to the structure.

The subgrade is considered suitable for the installation of the vehicle barrier system if the following conditions are fulfilled:

- Conduction of the characteristic values is ensured.
- Concrete strength minimum C25/30
- Reinforcement corresponds to the structural requirements
- Levelness of the surface in the area of anchorage:
maximum deviation 5 mm over 0.50 m batten length

Note: The vehicle barrier system can also be anchored on steel structures, if the conduction of aligned characteristic forces is correspondingly ensured. The alignment of anchoring for the vehicle barrier system on steel constructions must always be agreed with the manufacturer.

Installation of the vehicle barrier system in accordance with data sheets D118/2, D118/3 and D118/4 (see appendix)

It is not necessary to pre-assemble the vehicle barrier system components in the factory.

Due to the fact that the vehicle barrier system is not pre-stressed, the ambient temperature at the time of installation is irrelevant.

1. Establish anchoring

Each C125 base plate post is to be anchored in place with four concrete bolts TSM B16x190 in accordance with Data Sheet TSM 190 (see appendix).

It is recommended to position the bore holes for the anchoring pairs with the help of a drilling template, in order to ensure precise spacing for the anchorage.

The bore holes are to be executed normally, to the installation surface. The bore depth amounts to 130 ± 3 mm. Using a drill stand attachment with depth gauge ensures that the bore holes are executed precisely.

The regulation centre distance of the anchoring groups (= post spacing) amounts to 1900 mm.

2. Offset C125 baseplate post

A "rubber plate for C125 posts" is to be aligned between the installation surface and the baseplate. It is to be ensured that the rubber plates and the C125 baseplate posts are positioned within the anchoring groups so that the anchor sit centrally in the baseplate bore holes diameter 22 mm.

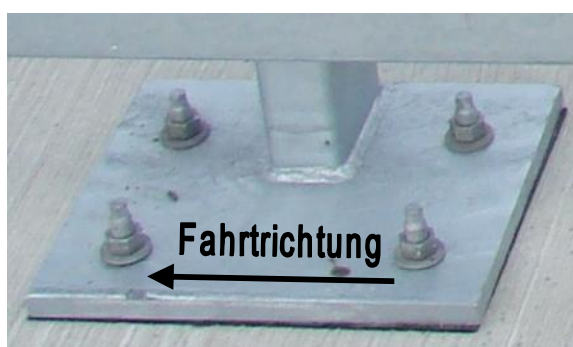


Figure 1

The C125 baseplate post is to be positioned on the anchoring so that the C125 post section is placed on the baseplate side facing away from traffic.

The open side of the C100 post section is to be aligned so that it points in the direction of traffic flow for the corresponding carriageway (see Fig. 1).

The C125 baseplate posts are fixed in place to the specified torque with a washer 40x18x4 and a hexagon nut M18 FK 8 for each concrete bolt.

The lateral inclination of the installation surface is to be taken into consideration in terms of the angle between the baseplate and the post, so that the C125 post deviation from perpendicular amounts to no more than 2.5%.

Varying curb heights are to be taken into consideration in accordance with national regulations.

3. Mounting "Connection bracket post"



Figure 2

The "connection bracket post" is bolted to the upper end of the C125 post so that one side lies flush against the post and the other side projects away from the post (see Fig. 2).

In order to do so, a coach bolt M16x35 FK 6.8 is fed through the elongated hole 18x36 from the inside of the C125 post, through the elongated hole 18x30 mm in the connection bracket and is fixed in place with a washer 40x18x4 and a hexagon nut M16 FK 6.

4. Mounting the beam

The beam is to be aligned so that it surrounds the upper end of the post and the long arm of the beam lays flush with the side of the C125 post facing the traffic (see Fig. 2 and 3).

The beams are to be overlapped in the jointed area in accordance with the direction of traffic, so that vehicles cannot get caught up on them. The drop-shaped holes indicate that the upper end of the beam (upper part) is facing upwards in the joint area.

The beam joint centre line, as viewed in the direction of traffic, is aligned 950 mm after the centre line of the guardrail joint (see Fig. 10).

Right and left beams are to be inserted in accordance with the alignment on the right and left edge of the carriageway.

The beam is to be bolted to each post and each connection bracket. In order to do so, a coach bolt M16x40 FK 6.8 is inserted through the elongated hole 18x30 mm on the side of the beam facing the carriageway and through the corresponding elongated hole 18x36 mm in the C125 post. A coach bolt M16x30 FK 6.8 is inserted from above, through the elongated holes 18x30 mm in the beam and the connection

bracket. Both bolts are fixed in place with a washer 40x18x4 and hexagon nut M16 FK 6 to the inside of the post and the underside of the connection bracket (see Fig. 2 and 3).

**Figure 3****Figure 4**

In order to do so, eight coach bolts M16x30 FK 6.8 are fed through the drop-shaped holes in the upper part and inserted into the corresponding bore holes 18x30 in the lower section. They are then secured with washers 40x18x4 and hexagon nuts M16 FK 6 on the inside (see Fig. 4).

It is to be ensured when tightening the hexagon nuts M16 FK 6 that the drop-shaped anti-twist protection for the bolt heads is correctly positioned in the drop-shaped recesses or elongated holes.

5. Mounting the fishplates for fastening the guard rail panels

Two fishplates spaced at 190 and 990 mm from the upper edge of the post are attached to the side of the C125 post facing away from the traffic in order to be able to fasten the panels to the posts.

**Figure 5****Figure 6**

In order to do so, a coach bolt M16x30 FK 6.8 is fed through the elongated hole 18x36 mm from the inside of the C125 post and is inserted centrally through the "fishplate guard rail panel". It is then fastened in place with a washer 40x18x4 and a hexagon nut M16 FK 6 (see Fig. 5 and 6).

The fishplates should be aligned normally to the posts, so that the open elongated hole is positioned in front of the post and the closed elongated hole projects behind the post, as viewed from the direction of traffic flow (see Fig. 5 and 6).

6. Install sliding profile S1

The sliding profiles are to be aligned on the side of the C125 posts pointing towards the traffic, so that sides lay flush with the C125 posts (see Fig. 7).

The sliding profiles are attached to each C125 post. In order to do so, a coach bolt M10x25 FK 4.6 is fed through the inner side of the sliding profile, through the elongated hole 60x12 mm in the upper flank of the sliding profile and through the elongated hole 30x12 mm of the C125 post. It is then fixed in place with a washer 11 (washer ISO 7091-10-100HV) and hexagon nut M10 FK 5.

The guardrails are to be overlapped in the jointed area in accordance with the direction of traffic, so that vehicles cannot get caught up on them.



Figure 7

The carriageway facing the respective slide profiles in the joint region (upper part) is indicated by the stamped plate marked with \triangle on voestalpine crash barriers. The sliding profile joint is to be aligned, as seen from the direction of travel ~180 mm after the post centre line and secured in place with three coach bolts M16x35 FK 6.8, washers 40x18x4 and nuts M16 FK 6 (see Fig. 7).

7. Mounting spacer C

"Spacer C" has recesses in both arms which enable the C125 post to be accommodated.

Right and left "spacer Cs" are to be inserted in accordance with the alignment on the right and left edge of the carriageway.

Each "spacer C" is bolted in place with two coach bolts to the C125 post. In order to do so, the coach bolts M16x30 FK 6.8 are fed through the drop-shaped holes of the spacers and into the elongated holes 12x30 in the side of the post. They are subsequently secured with washers 40x18x4 and hexagon nuts M16 FK 6 (see Fig. 8).

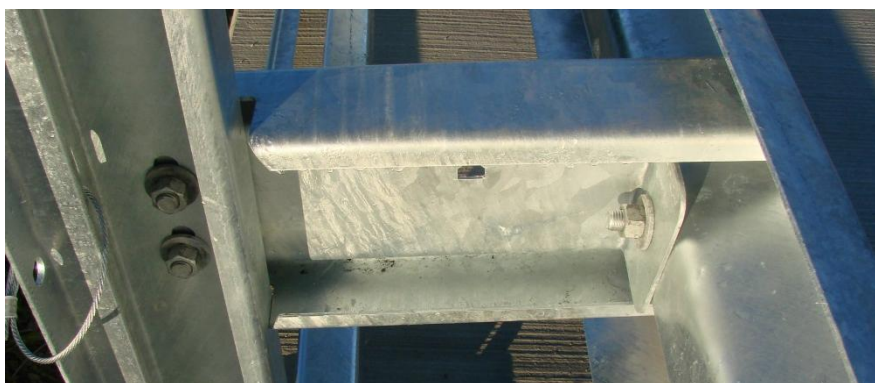


Figure 8

8. Mounting the (railing) fishplates

As bridge railings represent a design element of bridges, they are often subject to specific visual requirements.

The functionality of the system has been demonstrated with a frame made up of 40x40x4 mm welded L-shaped brackets as a substitute for a large number of various fishplates.

The fishplates used in practical applications must fulfil the following requirements:

- The pertinent national regulations for railings must be fulfilled, insofar as the vehicle barrier system is also to serve as a railing.
- Installation on the four defined points (fishplates) must be possible.
- In the event of vehicle impact, it must be ensured that the railing fishplate fastening releases at one side as a result of the open ended fishplate.
- However, the fishplate may not come completely free in the event of vehicle impact and must therefore be additionally secured with a correspondingly sized loop of cable between the post and the non-releasing side.
- The receptacle for temperature-related movement in the area of the dilating structure must be enabled by means of a corresponding structure.

9. Install S1 guardrail (crash barrier)

The guardrails S1 are to be overlapped in the jointed area in accordance with the direction of traffic, so that vehicles cannot get caught up on them (see Fig. 10). The drilled 9 mm diameter hole indicates that the guard rail in the joint region (upper part) is facing the respective carriageway.



Figure 9

In order to be able to overlap the guardrail in the jointed area, the carriageway side of the guardrail ends (lower part) are goosenecked.

The guardrails are bolted in place to the guard rail axis on each spacer (every ~1.900 mm) with a coach bolt M16x40 FK 6.8. An M16 cover plate is to be aligned between the bolthead and guard rail.

The guardrail joint is additionally secured with six coach bolts M16x30 FK 6.8 (see Fig. 9).

It is to be ensured when tightening the hexagon nuts M16 FK 6 that the drop-shaped anti-twist protection for the bolt head is correctly positioned to the guardrail.

A washer 40x18x4 is to be aligned under each hexagon nut M16 FK 6. The exception to this is the four off-centre bolts in the crash barrier joint, where two reinforcement flanks are to be installed instead of the washers 40x18x4 (see fig. 9).



Figure 10

10. Shims

Generally, the vehicle barrier system should be installed so that shims are not required. However, if shims are required due to conditions on site, then the following points must be observed:

- The regulation centre distance of the posts is to be retained as far as possible.
- If the longitudinal elements have to be sawn, it is to be ensured that the cut is made clearly.
- The cut is to be executed so that the swarf cannot damage the hot-dip galvanised sections (risk of extraneous rust or damage to the coating).
- The burrs are to be removed and the cut area is to be protected against corrosion with cold-galvanizing paint in accordance with EN ISO 1461.
- The hole pattern for joining a shim must correspond to the regulation design and the gaps to the corners may not be smaller than those of the regulation design.
- Flame cutting is generally impermissible for installation work!

11. Torques for threaded connections

Thread / strength class	Torque	
	min.	max.
M10 / 4.6	10 Nm	17 Nm
M16 / 6.8	35 Nm	150 Nm
M18 / 8.8	80 Nm	330 Nm

It is to be ensured that a sufficiently large bearing surface is given in the clamped area for tightening unscheduled prestressed threaded connections when applying the above specified torques.

12. Dilating construction in the area of carriageway transitions

The dilating construction enables the absorption of temperature-related movement within the bridge structure.

The design of the dilating construction for the vehicle barrier system is dependent on the functionality of the barrier system and the amount of expansion to be accommodated (e.g. ± 100 mm). This is to be discussed with the manufacturer.

13. Conformity checks

The following checks are to be undertaken during the installation process and by way of final inspection:

- Correct alignment and bolting of the structural components
- Vertical gap between the barriers and upper edge of the tension bar and reference level
- Horizontal gap between the front edge of the protective barrier post and the respective reference line for the installation
- Continuous line of the longitudinal elements (protective barrier post, tension bar)

Suitable corrective measures are to be undertaken in the event of deviations outside the range of permissible tolerances.

It is to be checked that the system has been installed correctly in accordance with the installation instructions upon completion of the installation work and this should be documented in the acceptance certificate.

14. Clearing the construction site

All residual materials (including connecting devices), packaging and supporting timber, screw boxes, foil, packaging straps, etc. and any other rubbish must be removed from the site.

The construction site is subsequently to be swept clean.

Repairing the vehicle barrier system

All components which exhibit mechanical damage or deformation subsequent to an accident are to be replaced by new components. The installation of these components is to be undertaken in accordance with the installation instructions.

New connecting devices are generally to be used when repairing a vehicle barrier system.

Durability of corrosion protection

The vehicle barrier system's components are hot-dip galvanised in accordance with EN ISO 1461 to ensure its operational lifetime / durability of protection.

The duration of protection for galvanised coatings is defined under EN ISO 14713 and is essentially dependent on the thickness of the coating. Generally, it can be assumed that the zinc coating will erode continuously over the entire area. Due to the known effective macroclimatic corrosion load for roads, corrosion category C4, zinc corrosion amounting to 2.1 to 4.2 µm per year is to be expected. Therefore, calculating with the average zinc layer thickness of minimum 70 µm in accordance with EN ISO 1461, a protection duration of minimum 15 years is given.

Note: The above specified calculated duration of protection applies to macroclimatic effective corrosion loads only. Special macroclimatic conditions could lead to a reduced duration of protection.

Inspection and maintenance

Vehicle barrier systems manufactured by voestalpine Krems Finaltechnik GmbH are fundamentally maintenance free.

The vehicle barrier system is to be visually inspected as part of the continuous inspection trips carried out by the carriageway maintenance authority, however, this must be realised at least once per year, preferably after the winter season. In doing so, it is to be checked, among other things, that there are no deformed segments and that the bolting is correct.

Recycling / Disposal

Dismantled vehicle barrier systems or exchanged components replaced during the repair process are to be disposed of and recycled in accordance with statutory requirements. All vehicle barrier system components manufactured by voestalpine Krems Finaltechnik GmbH are 100% recyclable.

Packaging and other waste is to be recycled or disposed of in accordance with statutory requirements.

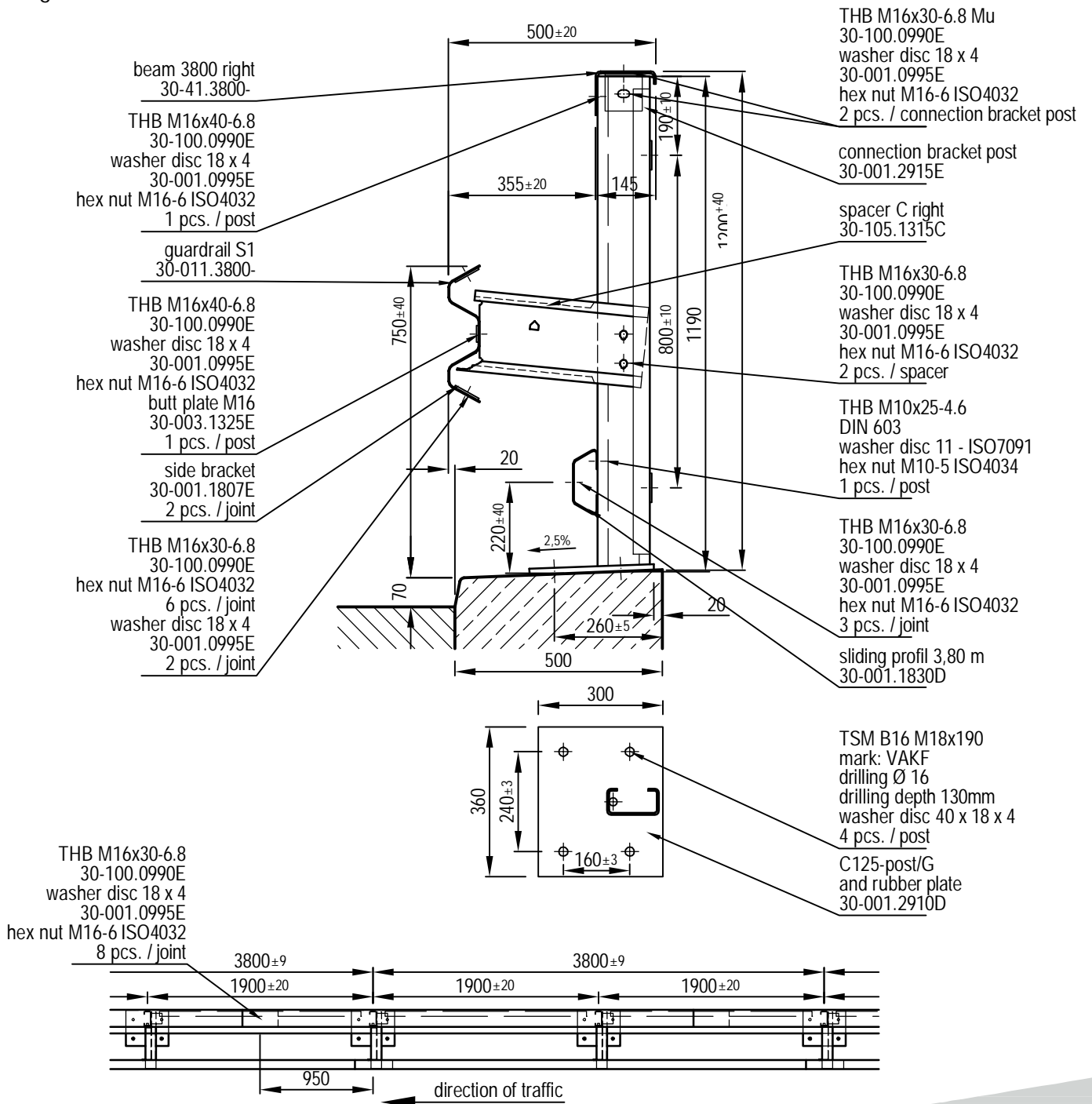
Vehicle barrier systems manufactured by voestalpine Krems Finaltechnik GmbH do not contain toxic or potentially hazardous materials.

SAFETY BARRIERS

KREMSBARRIER 1 RH1 K

Roadside Restraint System with railing and lower guardrail on civil structures

product specifications Sheet D118/2

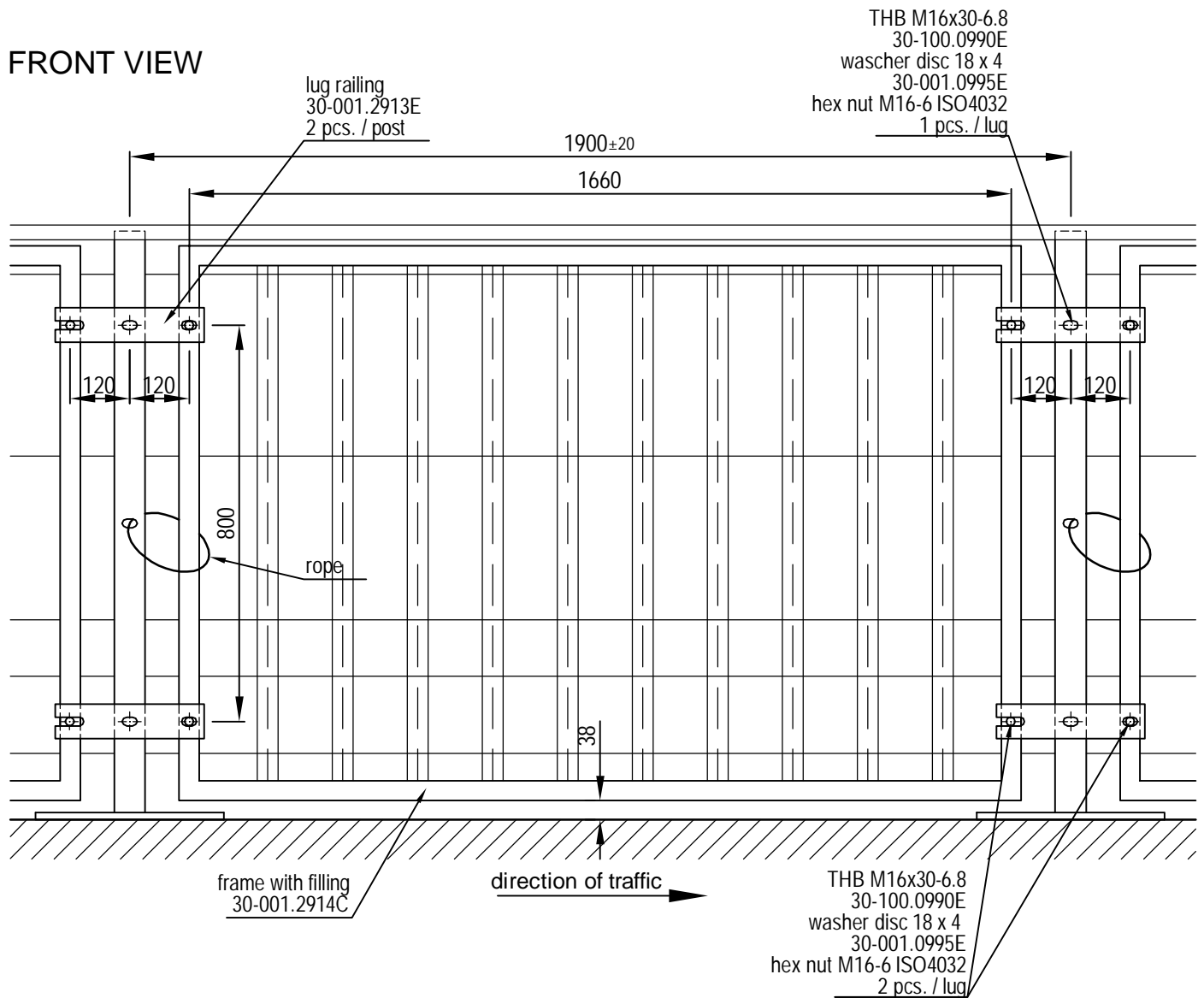


SAFETY BARRIERS

KREMSBARRIER 1 RH1 K

Roadside Restraint System with railing and lower guardrail on civil structures

product specifications Sheet D118/3



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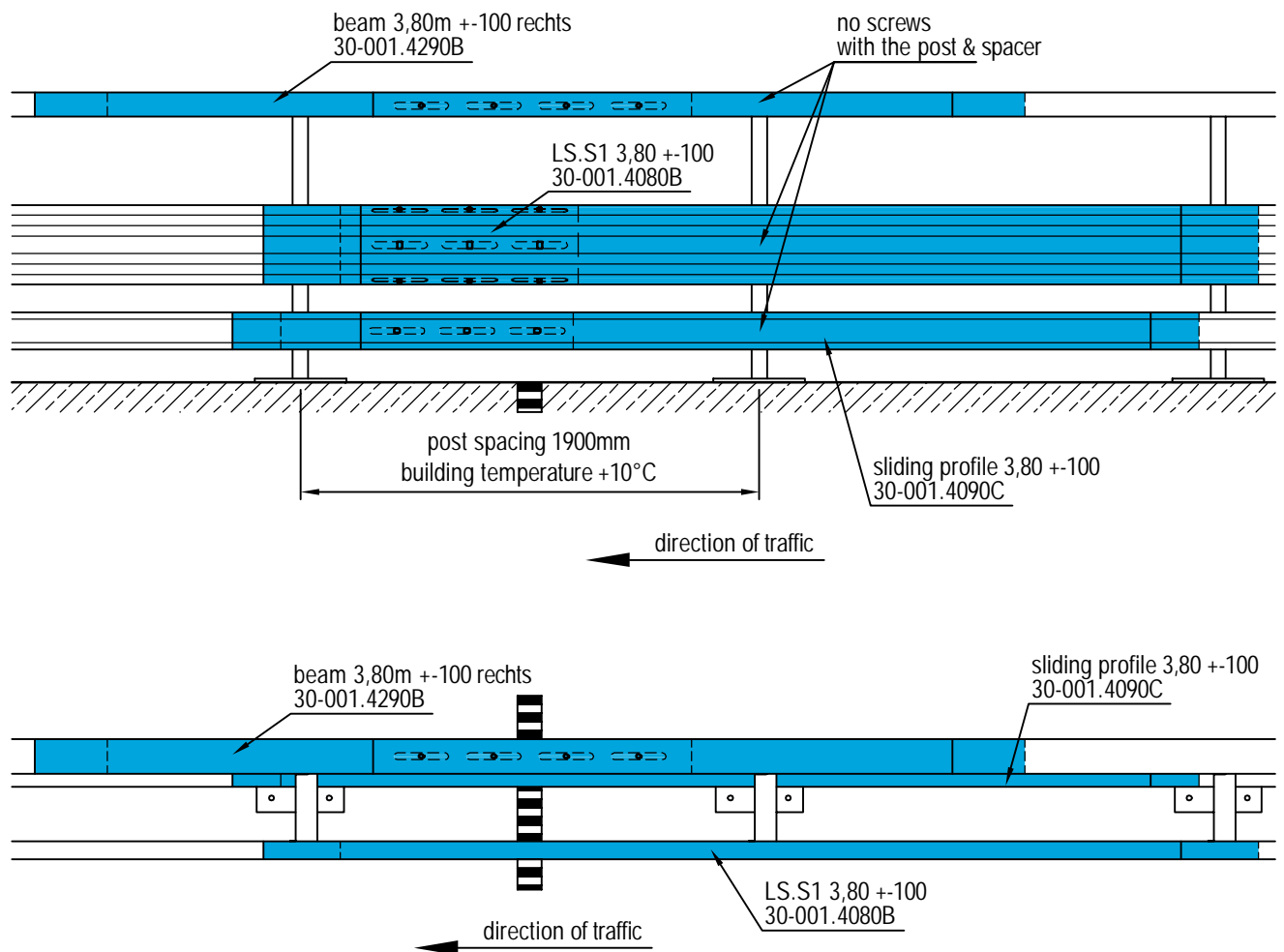
SAFETY BARRIERS

KREMSBARRIER 1 RH1 K

Roadside Restraint System with railing and lower guardrail on civil structures

product specifications Sheet D118/5

dilatation +-100



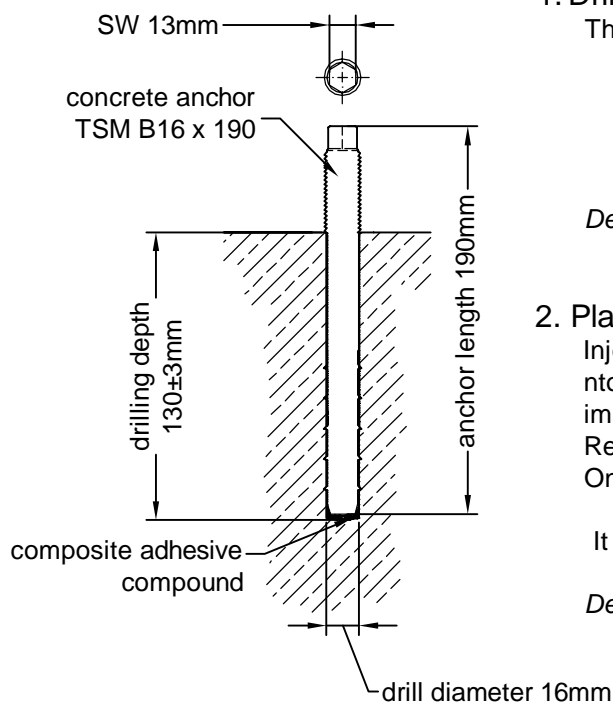
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SAFETY BARRIERS

CONCRETE ANCHOR TSM B16 x 190

Installation instruction

product specification sheet TSM 190



1. Drilling bore hole

The holes are normal to the mounting surface.

- drill diameter 16mm
- drill depth 130 ± 3 mm
- controlling the drilling depth
- to clean the drill hole

Details: The use of a drill rig with a depth stop ensures accurate production drilling.

2. Placing the anchor

Inject composite adhesive compound (Chemofast) into the drill hole. Turn in screw to a depth of 130 mm, using an impact driver until the compound mass oozes out of the drill hole. Remove redundant compound mass. One cartridge lasts for about 33 pc. concrete anchors.

It is mandatory to follow the guidelines stated on the cartridge.

Details: Contribute to the mass of the composite is a special required to press the cartridge matched.



drilling bore hole



inject the compound mass



screw the concrete anchor

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SAFETY BARRIERS

Parts list

KREMSBARRIER 1 RH1K

Roadside Restraint System with railing and lower guardrail on civil structures



Requirements for a field with a 3.80 m length

part	name of the item	weight [kg]	drawing- number	material / quality	corrosion protection
1	guardrail S1 3,80m	46,50	30-011.3800-	S355JO	acc. to EN ISO 1461
2	side bracket	0,78	30-001.1807E	S235JR	acc. to EN ISO 1461
2	butt plate M16	0,20	30-003.1325E	S235JR	acc. to EN ISO 1461
1	beam 3,80m right	39,47	30-041.3800-	S355JO	acc. to EN ISO 1461
2	connection bracket post	0,62	30-001.2915E	S235JR	acc. to EN ISO 1461
2	spacer C right	4,23	30-105.1315C	S235JR	acc. to EN ISO 1461
2	C125-post K right/G 1190 2,5%	29,39	30-001.2910C	S355JO	acc. to EN ISO 1461
2	rubber plate C125-post	0,41	30-001.2346E	70 Shore A	-
1	sliding section 3,80m	28,79	30-001.1830D	S235JR	acc. to EN ISO 1461
4	lug - frame	0,82	30-001.2913E	S235JR	acc. to EN ISO 1461
2	frame with filling	22,24	30-001.2914D	S235JR	acc. to EN ISO 1461
29	THB M16x30-6.8 with nose +nut	0,08	30-100.0990E	6.8	acc. to EN ISO 10684
4	THB M16x40-6.8 with nose +nut	0,10	30-100.0990E	5.6	acc. to EN ISO 10684
38	washer 40x18x4	0,03	30-001.0995E	100HV	acc. to EN ISO 10684
2	THB M10x25-4.6 +nut	0,04	DIN 603	4.6	acc. to EN ISO 10684
2	washer 11	0,00	ISO 7091	100HV	acc. to EN ISO 10684
8	anchor TSM B16 M18x190	0,27	-	10.9	TOGE-KORR
8	hex nut M18-8	0,04	DIN 934	8	acc. to EN ISO 10684

parts for dilatation

part	name of the item	weight [kg]	drawing- number	material / quality	corrosion protection
1	beam 3,80m right +-100	50,72	30-001.4290B	S355JO	acc. to EN ISO 1461
1	guardrail S1 3,80 ± 100	57,92	30-001.4080B	S355JO	acc. to EN ISO 1461
1	sliding section 3,80 ± 100	32,94	30-001.4090C	S235JR	acc. to EN ISO 1461

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