

# ASSEMBLY INSTRUCTIONS

for the vehicle barrier system

## KREMSBARRIER 2 RH2KL

on artificial structures



Performance class in accordance with EN 1317-2:

Containment level:	H2
Impact severity level:	B
Working width:	W4

Production and sales:

**voestalpine KREMS Finaltechnik GmbH**

Schmidhüttenstraße 5, 3500 Krems, Austria

T.: +43/50304/14-670

F.: +43/50304/54-628

E-Mail: [info.finaltechnik@voestalpine.com](mailto:info.finaltechnik@voestalpine.com)

ID: TSTEC226  
Version: 11/2022

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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	H2
Impact severity level / ASI	B
Working width / level	W4 / 1,1m
Test length	53,20 m
System dimensions	
System width	367 mm
System height	1100 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 type sheets C226/2, C226/3 and C226/4 (see appendix)**

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

The ambient temperature is irrelevant for purposes of installation as the vehicle barrier system does not come pre-tensioned.

### **1. Establishing the anchoring**

Each C125 base plate upright is to be anchored in position using two TSM B16x190 concrete bolts in accordance with type sheet TSM 190 (see appendix).

It is recommended to position the bore holes for the anchor pairs with the help of a drill template in order to ensure precise spacing of the anchors.

The bore holes are to be executed normally to the mounting surface. The drill depth amounts to  $130\pm 3\text{mm}$ . The use of a drill stand with depth gauge will ensure a precise execution of the bore holes.

The standard spacing of the anchoring groups (i.e. spacing of uprights axes) amounts to 1,900mm.

### **2. Staggering the C125 base plate uprights**



**Figure 1**

The C125 base plate uprights must be mounted on the anchorings in such a way that the anchorings are positioned on the side of the uprights facing traffic (see Fig. 1).

The open sides of the C125 uprights must be mounted and aligned in such a way as to face the direction of travel of the traffic lane concerned (see Fig. 1).

Left and right C125 base plate uprights are to be used and aligned on the left and right edge of the traffic lanes accordingly.

It must be ensured that the C125 base plate uprights are placed on the anchoring pairs in such a way that the anchorings are positioned centrally in the elongated holes of the base plates.

The uprights are then secured in place by means of 40x18x4 washers and M18 FK 8 hexagonal nuts for each TSM B16x190 concrete bolt using the specified tightening torque (see Fig. 1)

For ordinary cross slopes between  $-2.5\%$  and  $+6\%$ , the uprights must be aligned normally to their mounting surfaces (coping surface, breast wall, etc.). In general, the longitudinal gradient relative to the mounting surface is not taken into consideration.

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

*Note: The bore holes on the side of the triangular base plates facing away from traffic will remain empty.*

### 3. Mounting the S2L vehicle barrier

Two guard rails are to be mounted on top of each other.

The axis of the lower guard rail must be mounted  $\sim 525\text{mm}$  and the axis of the of the guard rail  $\sim 83\text{mm}$  below the top edge of each upright.

The joint areas of S2L vehicle barriers must overlap in relation to the direction of travel in such a way that vehicles can not get caught by the guard rails.

joint sections (upper part) of the guard rail ends facing the traffic lanes have drop-shaped holes. The joint sections (lower part) of guard rail ends facing away from the traffic lanes have elongated holes. The joint sections (upper part) of the guard rail ends facing the traffic lanes have drop-shaped holes. The joint sections (lower part) of guard rail ends facing away from the traffic lanes have elongated holes.



Figure 2

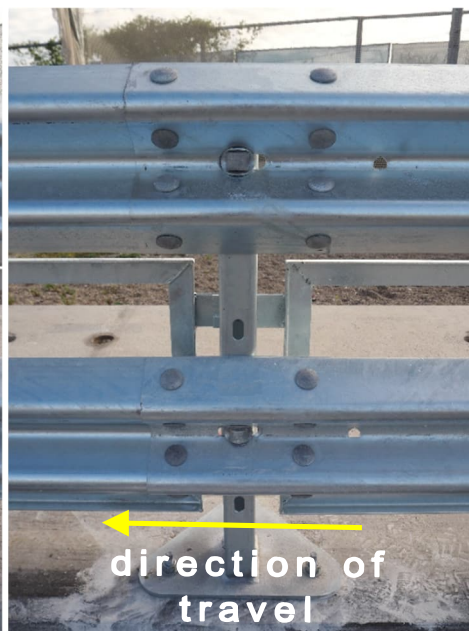


Figure 3



Figure 4

Both guard rails are bolted in place on each upright every ~1,900mm on the elongated 78x20mm hole as seen from the direction of travel by means of round-head bolts (see Fig. 2, 3 and 4)).

The lower guard rail is bolted onto the uprights with M16x55 FK4.6 round-head bolts.

The upper guard rail is bolted onto the uprights in the overlapping areas of the rails by means of M16x55 FK4.6 round-head bolts. In the spaces between, M16x55 FK4.6 round-head bolts are used.

To this end, the round-head bolts including their R19 washers already fitted on the bolts must be inserted into the elongated 78x20mm holes along the vehicle barrier axis as well as into the elongated 16x38mm holes in the uprights in such a way that their heads and the R19 washers are fitting snugly onto curvature of the guard rail. This connection is then secured in place with a 40x18x4 washer and an M16 FK5 hexagonal nut (see Fig. 5).

Use eight M16x30 FK 6.8 round-head bolts to bolt the joint areas of the guard rail together (see Fig. 3), securing each connection in place by means of a 40x18x4 washer and an M16 FK 6 hexagonal nut. Make sure that the drop-shaped anti-twist locks on the heads of the round-head bolts are fitting properly in the drop-shaped holes in the guard rail.



#### 4. Installing (railing) fillings

As railings are often a part of bridge designs, they are frequently subject to special visual requirements.

As an example for a vast number of possible fillings, the viability of the system has been demonstrated in combination with a frame consisting of 50x30x4 L-brackets welded together (see Fig. 2, 3 and 6).

In practice, all fillings to be used have to meet the following requirements:

- Road restraint systems intended for use as railings must comply with the national standards applicable to railings in general.
- It must be possible to mount them at four pre-defined points (lugs).
- In case of impacts by vehicles, it must be guaranteed that any such fillings will become detached at the open elongated holes of the lugs only.
- Individual filling components must not become detached completely in case of vehicle impacts.
- It must be ensured that any temperature-related movement in the dilatation structure will be compensated by means of an appropriate system.

The lugs with their open elongated holes are to be positioned on the end of each field



Figure 5



Figure 6

as seen from the direction of travel. Bolt two lugs onto one upright by means of an M16x40 FK6.8 round-head bolt and secure them in place using a 40x18x4 washer and an M16 FK6 hexagonal nut (see Fig. 6).

The lugs welded onto the frames must be overlapped on the back of the uprights in such a way that the lugs with the open elongated holes are positioned in between the lugs with the closed elongated holes and the uprights (see Fig. 7).

## 5. 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!

## 6. Torques for threaded connections

Thread / strength class	Torque	
	min.	max.
M16 / 4.6	35 Nm	70 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.

## 7. 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.  $\pm 100$  mm). This is to be discussed with the manufacturer.

## 8. 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.

## 9. 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.

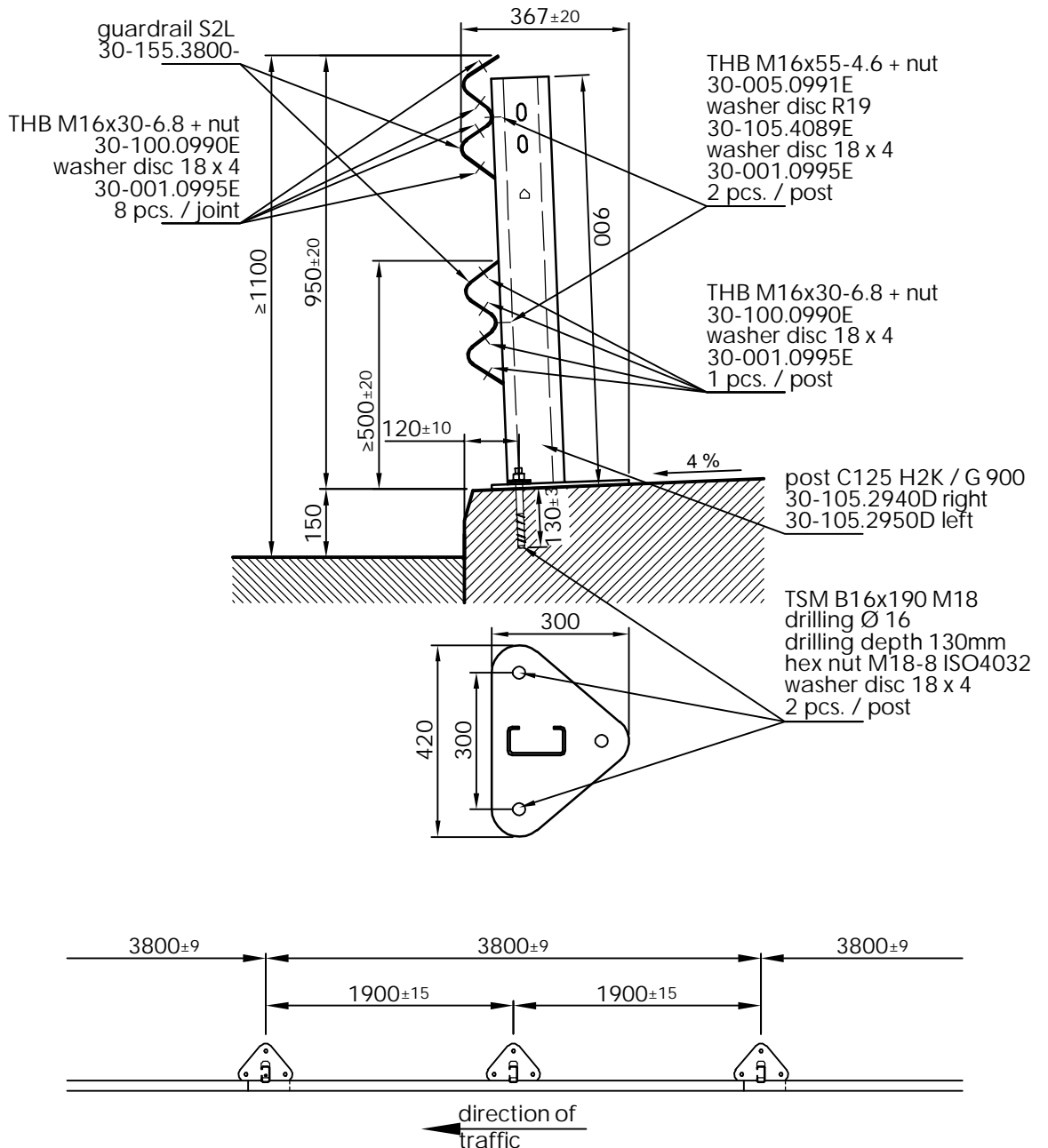
Packaging and other waste is to be recycled or disposed of in accordance with statutory requirements.

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

# KREMSBARRIER 2 RH2KL

roadside restraint system  
on civil structures

product specifications Sheet C226/2

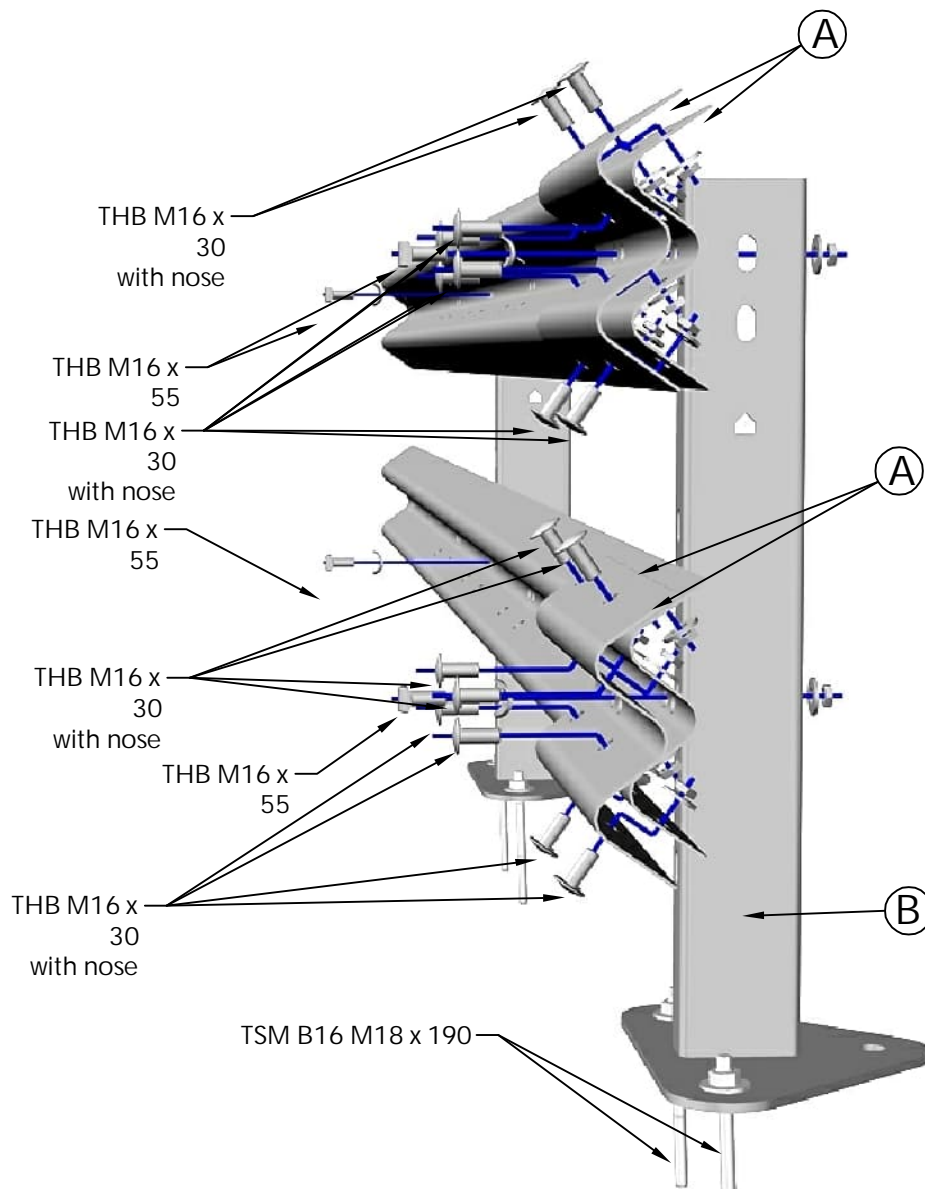


# KREMSBARRIER 2 RH2KL

roadside restraint system  
on civil structures

product specifications Sheet C226/3

installation drawing



- |     |                   |
|-----|-------------------|
| (A) | guardrail S2L     |
| (B) | post C125 H2K / G |

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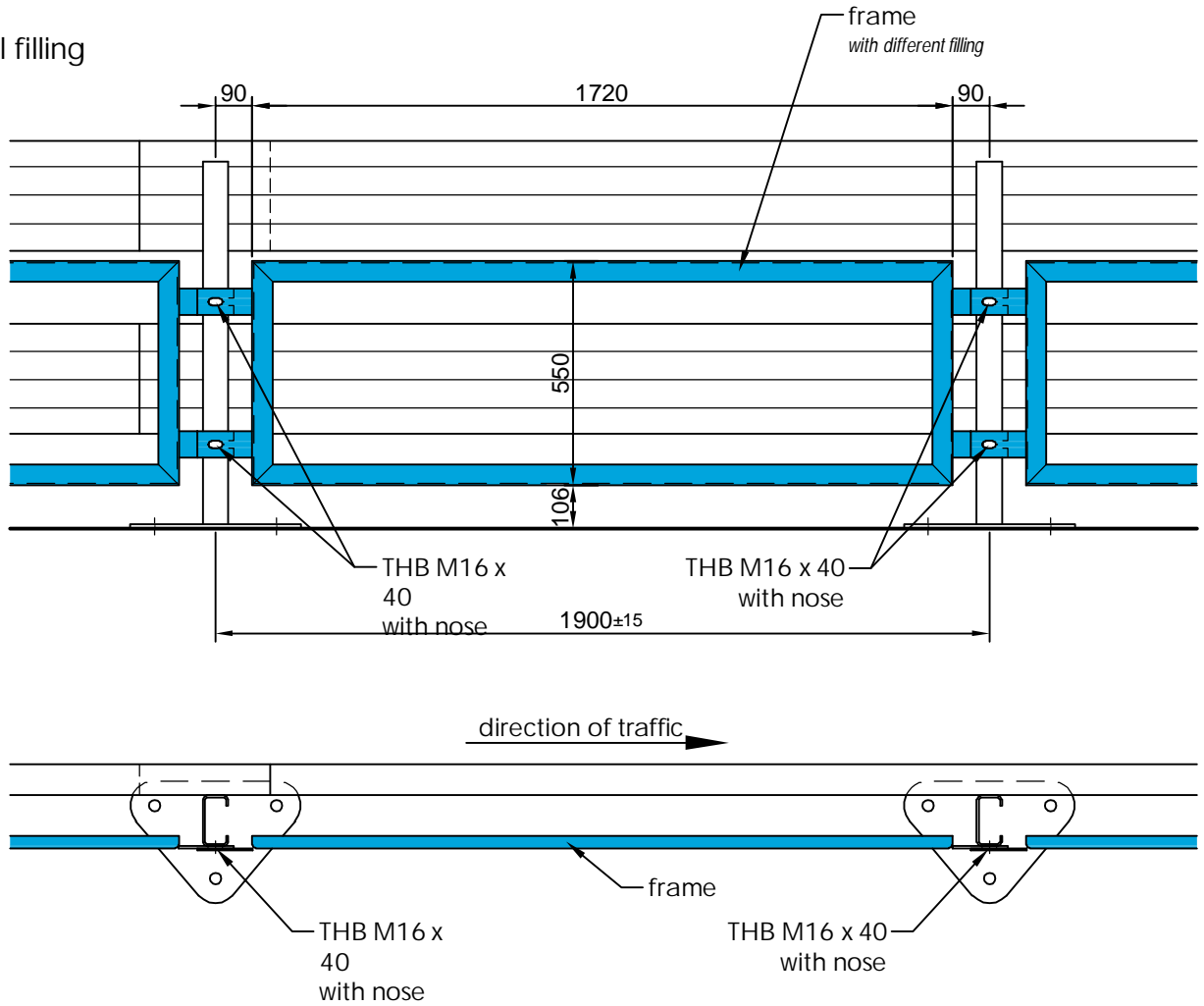
# KREMSBARRIER 2 RH2KL

roadside restraint system  
on civil structures

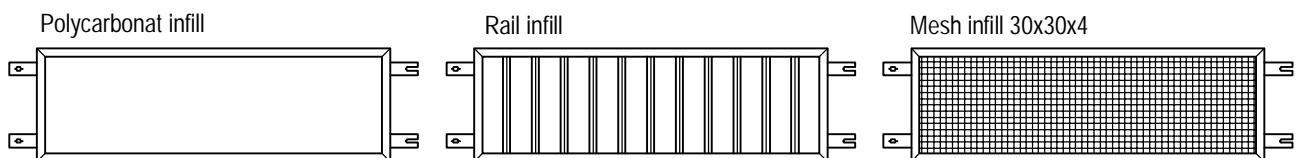
product specifications Sheet C226/4

optional:

rail filling



## Example of infill



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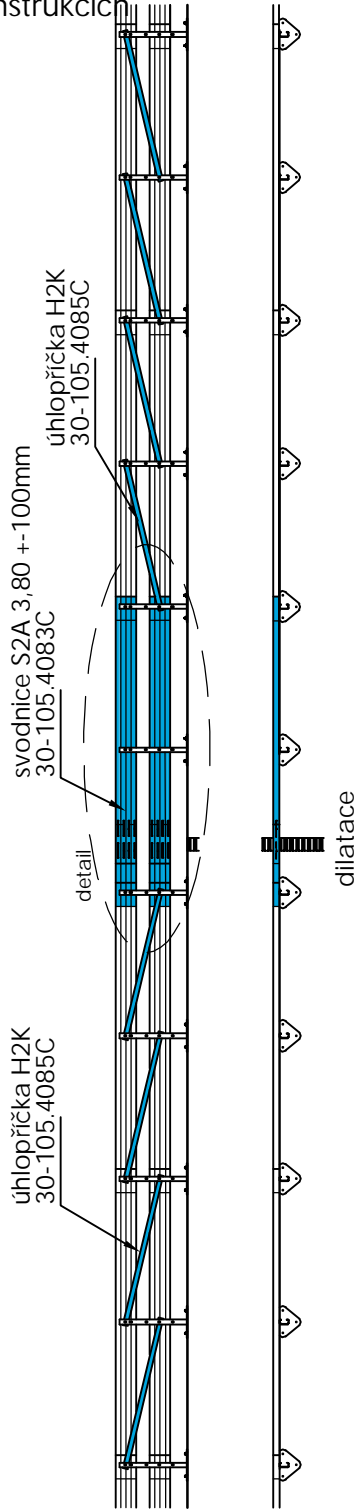
# KREMSBARRIER 2 RH2KL

Zádržný systém pro okraj silnice  
na mostních konstrukcích

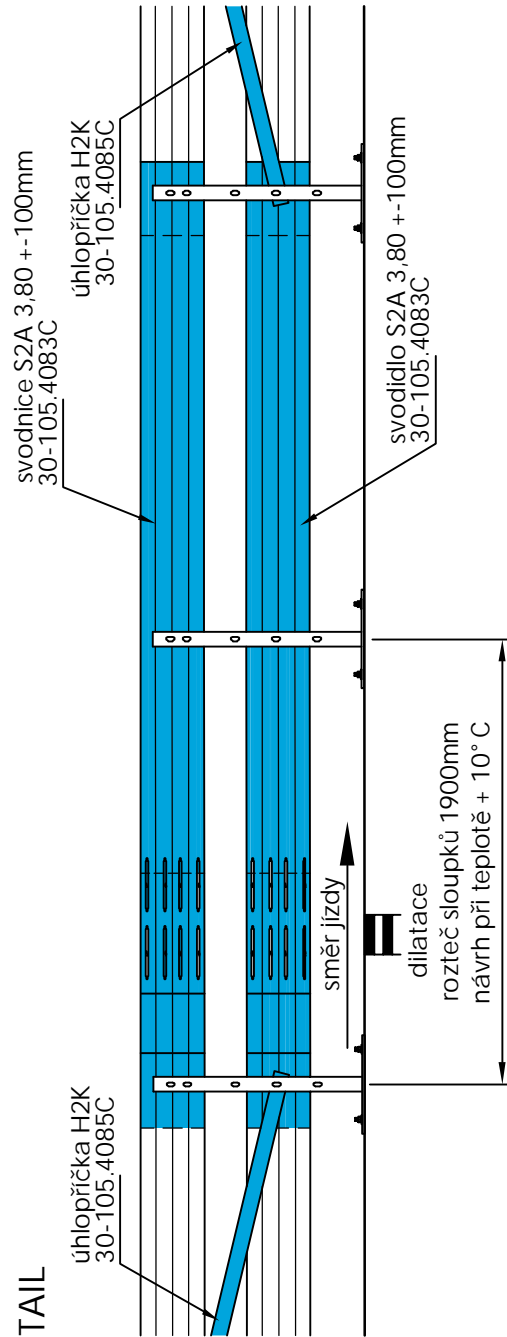
Typový list C226/5

dilatace +/-100

POHLED ZE ZADU



DETAIL



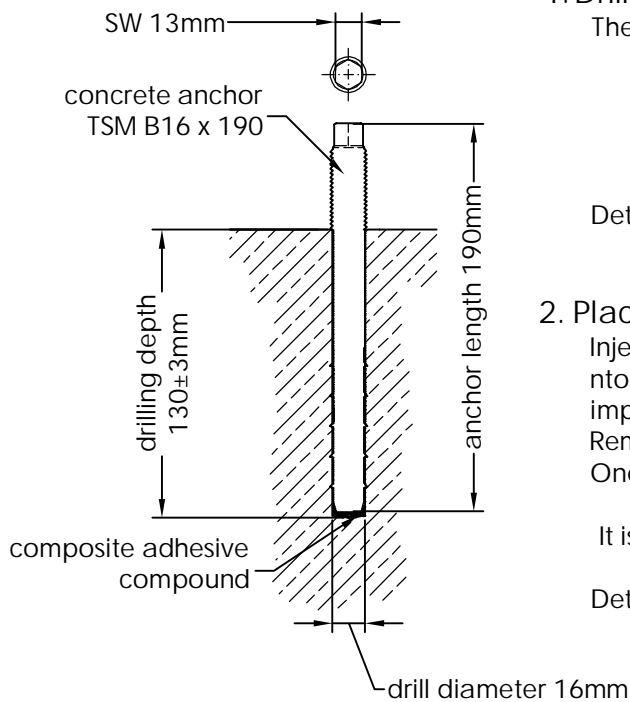
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# CONCRETE ANCHOR TSM B16 x 190

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 ± 3mm
- 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.

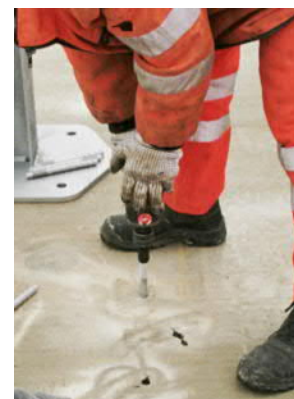
Details: Contribute to the mass of the composite is a special required to press the cartridge matched.



drilling bore hole



inject the  
compound mass



screw the concrete  
anchor

01/2015

## Parts list KREMSBARRIER 2 RH2KL

Road Restraint System  
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
2	guardrail S2L 3,80	33,64	30-155.3800C	S355J0	acc. to EN ISO 1461
2	C125-post right H2K/G 900	15,78	30-105.2940C	S355J0	acc. to EN ISO 1461
16	THB M16x30-6.8 with nose +nut	0,11	30-100.0990E	6.8	acc. to EN ISO 10684
4	THB M16x55-4.6 + nut	0,17	30-005.0991E	4.6	acc. to EN ISO 10684
24	washer 40x18x4	0,03	30-001.0995E	100HV	acc. to EN ISO 10684
4	washer R19 bent	0,04	30-105.4089E	100HV	acc. to EN ISO 10684
4	anchor TSM B16 M18x190	0,27	-	10.9	TOGE-KORR
4	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
2	guardrail S2A 3,80 ± 100	52,98	30-105.4083B	S355J0	acc. to EN ISO 1461
8	diagonal H2K	5,44	30-105.4085E	S235JR	acc. to EN ISO 1461

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