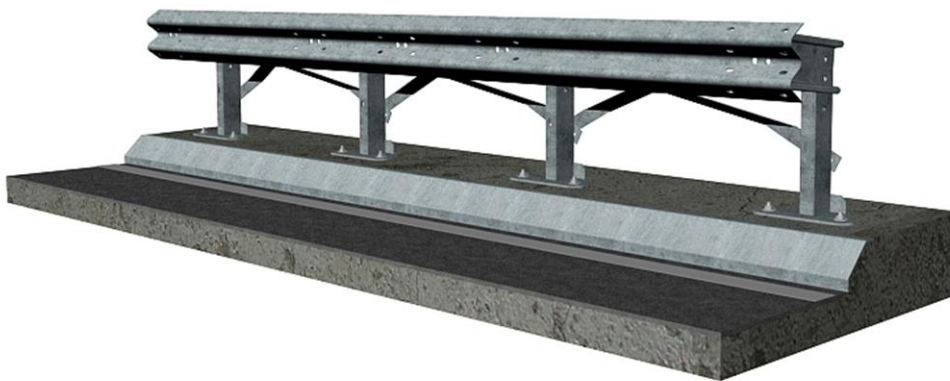


# ASSEMBLY INSTRUCTIONS

for the vehicle barrier system

## KREMSBARRIER 2 RH2C

on artificial structures



Performance class in accordance with EN 1317-2:

|                        |    |
|------------------------|----|
| Containment level:     | H2 |
| Impact severity level: | B  |
| Working width:         | W3 |

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.vasts@voestalpine.com](mailto:info.vasts@voestalpine.com)

ID: VTMC210

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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 / 1,1   |
| Working width / level                                 | W3 / 1,0m |
| Test length   | 57,00 m   |
| System dimensions                                     |           |
| System width  | 599 mm    |
| System height   | 800 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 C210/2, C210/3 and C210/4 (see appendix)**

It is not necessary to pre-assembly 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. Establishing anchorage**

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

It is recommended to position the bore holes for the three anchors 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  $130\pm 3$  mm. The use of a drill stand with depth gauge ensures precise execution of the bore holes.

The standard spacing of the anchoring groups (i.e. upright spacing) amounts to 1,267 mm.

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



**Figure 1**

The C125 base plate upright is to be placed on the anchorage in such a way that the anchorage is located on the upright section facing the direction of travel (see Fig. 1).

The open side of the C125 upright cross section is to be aligned in such a way that it faces the direction of travel of the corresponding carriageway (see Fig. 1).

Depending on the installation of the guard rails on the right or left edge of the carriageway, right and left C125 base plate uprights are to be used respectively.

It is to be ensured that the C125 base plate uprights are aligned to the anchoring groups in such a way that they sit centrally in the elongated hole of the base plate.

Using the specified tightening torque, the upright is then fixed in place with a 40x18x4 washer and a M18 FK 8 hexagon nut for each concrete bolt (see Fig.1).

With the usual cambers between  $-2.5\%$  and  $+6\%$ , the upright is to be aligned normal to the corresponding mounting surface (cap surface, retaining wall, etc.). The longitudinal gradient to the mounting surface is generally not considered.

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

*Note: The bore hole on the side of the triangular base plate facing away from traffic remains empty. This bore hole is only used for a third anchoring bolt in dilatation areas.*

### 3. Mounting C spacers



Figure 2

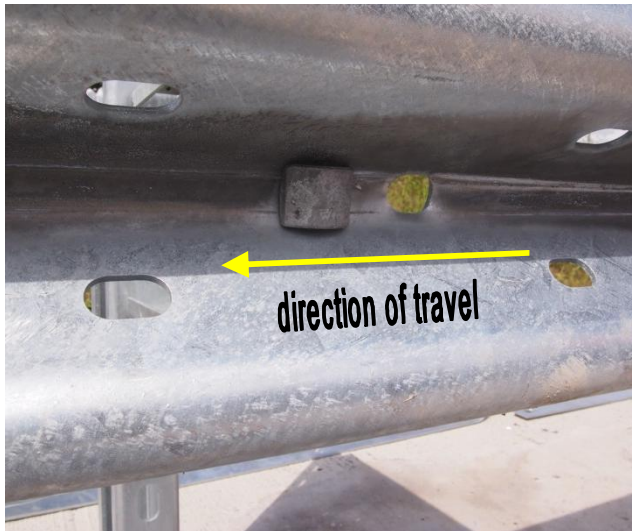
Both arms of the 'C spacers' have recesses for receiving the C125 upright.

Depending on the installation of the guard rails on the right or left edge of the carriageway, right and left 'C spacers' are to be used respectively.

All 'C spacers' are bolted to the C125 upright using two mushroom head bolts. To this end, the M16x30 FK 6.8 mushroom head bolts are inserted through the drop-shaped holes in the spacer and the lateral elongated 12x36 mm holes of the upright and then fixed in place with a 40x18x4 washer and an M16 FK 6 nut each on the inner side of the upright (see Fig. 2).

### 4. Mounting the guard rail (crash barrier) S2A

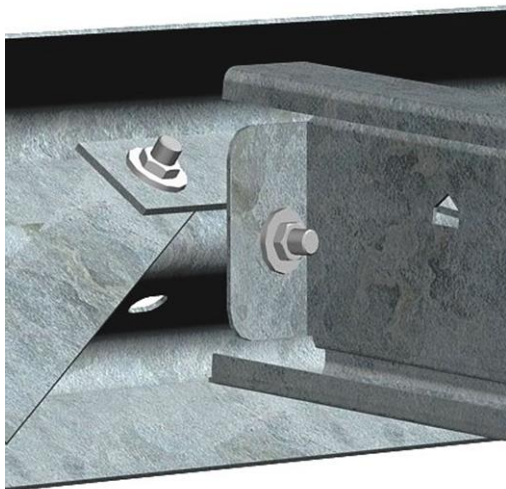
The jointed areas of the guard rails are to be overlapped in relation to the direction of travel in a way that vehicles cannot engage with the guard rail. The jointed sections (upper part) of guard rail ends facing the carriageway have drop-shaped holes. The jointed sections (lower part) of guard rail ends facing away from the carriageway have elongated holes.



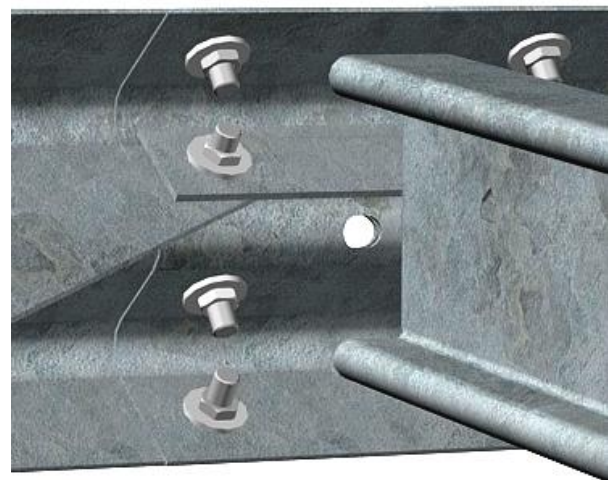
**Figure 3**

The guard rails are bolted in place to each 'C spacer' every ~1,267 mm on the second elongated 26x20 mm as seen from the direction of travel with a mushroom head bolt (see Fig. 3).

To this end, an M16x35 FK 4.6 mushroom head bolt is inserted through the elongated 26x20 mm hole in the guard rail axis and the 18 mm diameter bore hole in the spacer that its head is touching the curvature of the guard rail. This connection is to be fixed in place with a 40x18x4 washer and an M16 FK5 hexagon nut (see Fig. 4).



**Figure 4**



**Figure 5**

The guard rail joints are to be bolted in place with eight M16 FK 6.8 mushroom head bolts (see Fig. 5).

On the bolting connections of the struts, edge reinforcement elements are to be mounted instead of 40x18x4 washers.

These connections are to be fixed in place with M16 FK 6 hexagon nuts. When tightening the hexagon nuts M16 FK 6, ensure correct alignment of the drop-shaped anti-twist protection of the bolt head in the drop-shaped hole of the guard rail.



The longer mushroom head bolts M16x40 are required for bolting the struts in the jointed areas. In all other places, M16x30 mushroom head bolts are to be used.

*Note: It goes without saying that the struts must be positioned in the jointed areas under each edge reinforcement element already before the corresponding mushroom head bolts are inserted (see Fig.4 and 5).*

## 5. Mounting the S2A struts

Seen from the direction of travel, strut 1 is to be bolted to the SA2 guard rail ahead of the 'C spacer'.

Seen from the direction of travel, strut 2 is to be bolted to the SA2 guard rail after the 'C spacer'.

Additionally, both struts are connected with an edge reinforcement element in the spacer area.

To this end, one M16x30 mushroom head bolt (M16x30 within the guard rail joints) FK 6.8 each is inserted through the elongated 30x18 mm holes in the guard rail and the strut as well as through the  $\varnothing 18$  mm bore hole of the edge reinforcement element and then fixed in place with one hexagon nut FK 6 each (see Fig. 4 and 5).

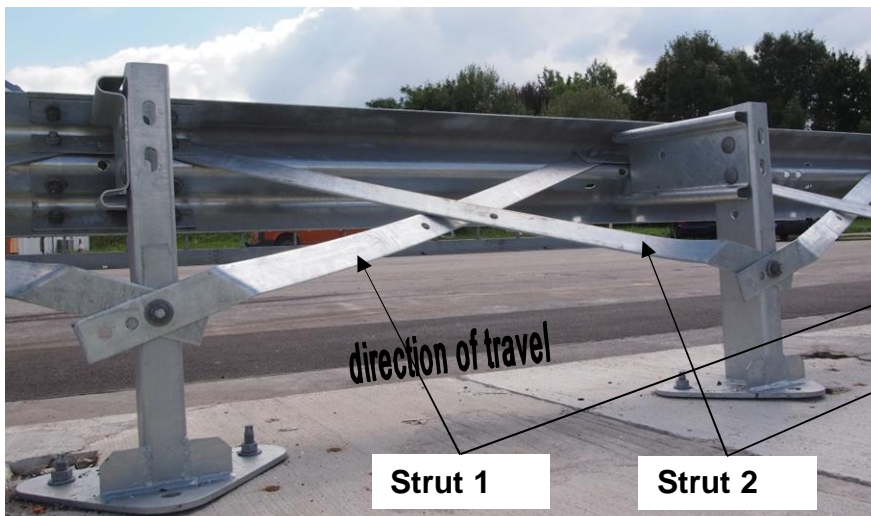


Figure 6



Figure 7

Where the two struts are crossing, strut 2 is positioned over strut 1 (see Fig. 6)

The struts are fixed in place on the upright using an M16x40 FK 6.8 mushroom head bolt inserted from the inner side of the upright through the elongated 18x36 mm hole in the upright and the corresponding 18 mm diameter bore holes in the struts, a 40x18x4 washer and an M16 FK 6 hexagon nut. Strut 2 is to be mounted on the side

facing away from traffic between the C125 base plate upright and strut 1 (see Fig. 6 and 7).

## 6. 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!

## 7. 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.

## 8. 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.

### 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  $\mu\text{m}$  per year is to be expected. Therefore, calculating with the average zinc layer thickness of minimum 70  $\mu\text{m}$  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.

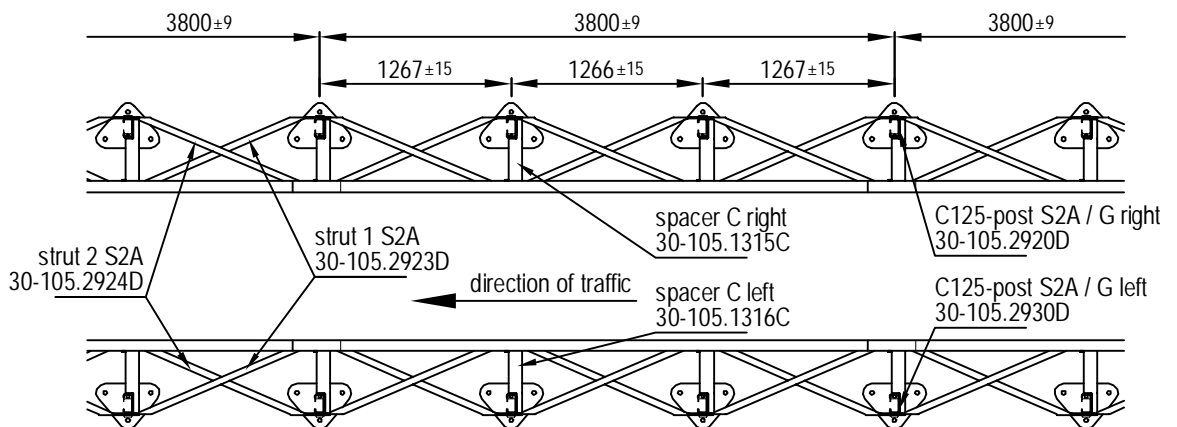
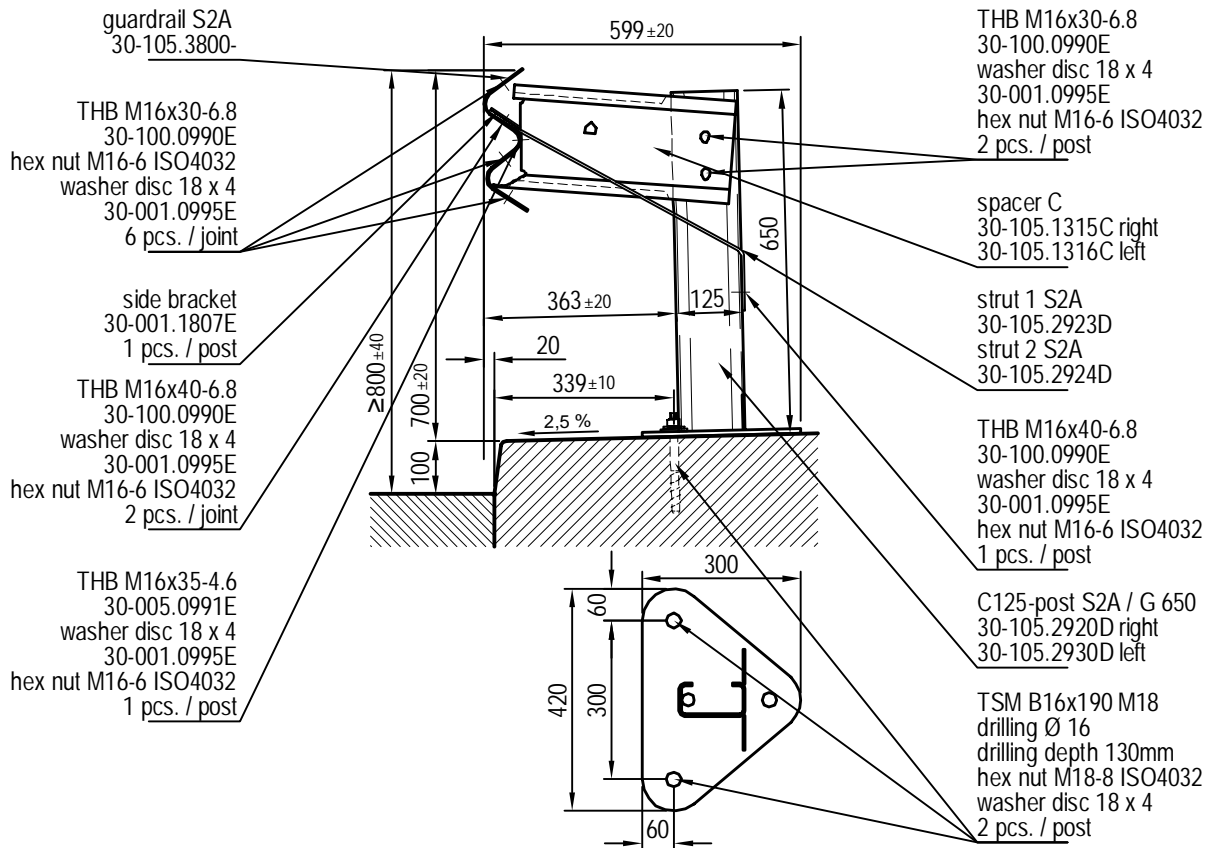
Vehicle barrier systems manufactured by voestalpine Krems Finaltechnik GmbH do not contain toxic or potentially hazardous materials.

# SAFETY BARRIERS

## KREMSBARRIER 2 RH2C

roadside restraint system  
on civil structures

product specifications Sheet C210/2



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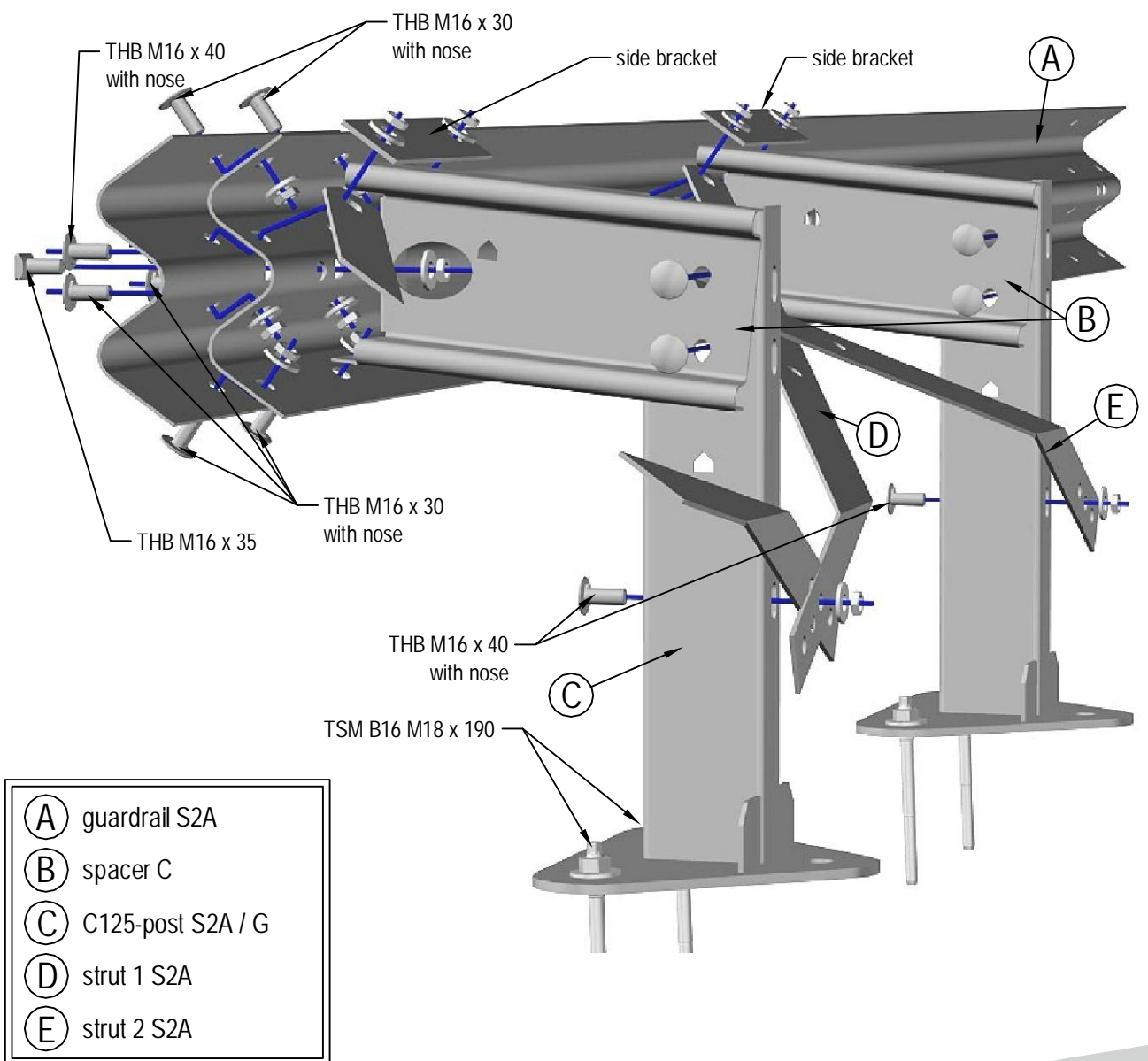
# SAFETY BARRIERS

## KREMSBARRIER 2 RH2C

roadside restraint system  
on civil structures

product specifications Sheet C210/3

installation drawing



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# SAFETY BARRIERS

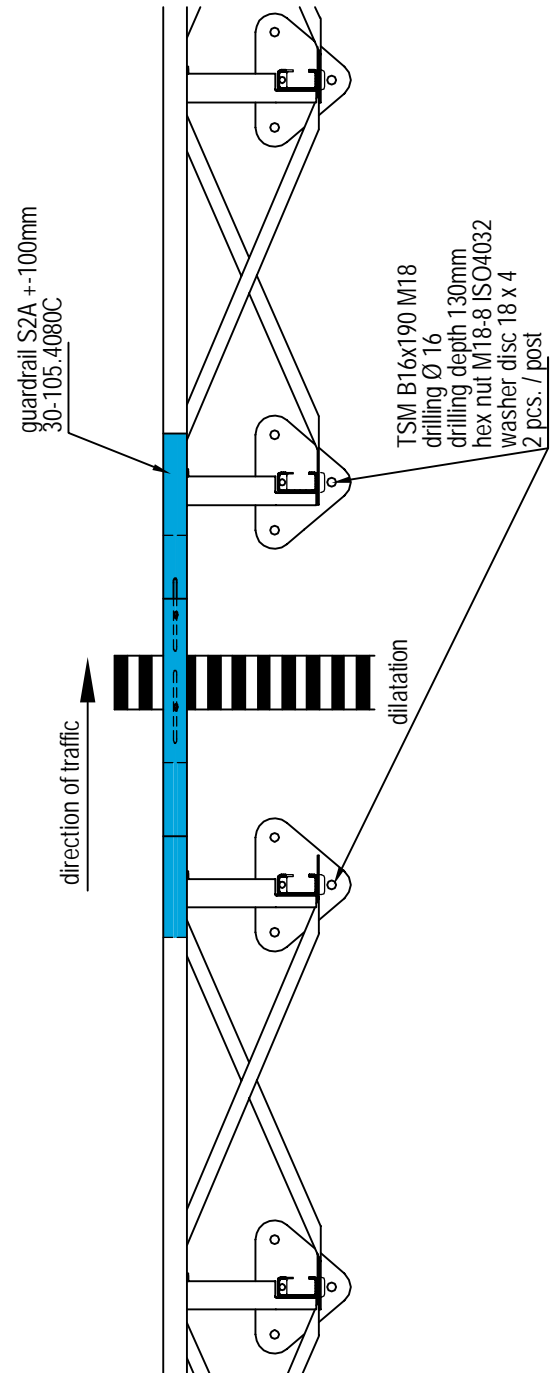
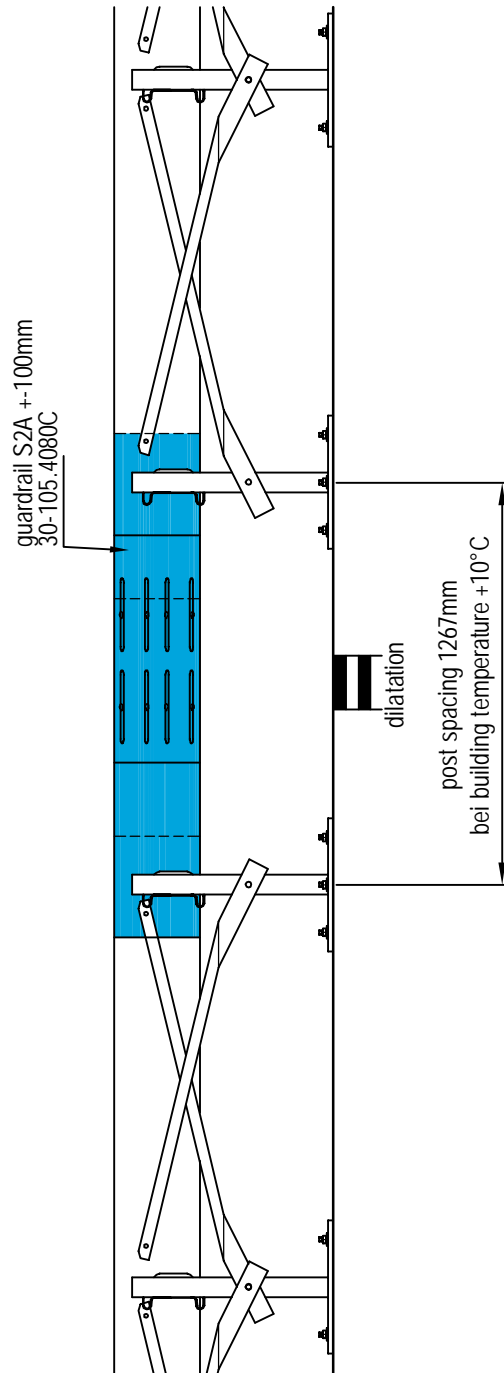
## KREMSBARRIER 2 RH2C

roadside restraint system  
on civil structures

dilatation +-100

product specifications Sheet C210/4

view from behind



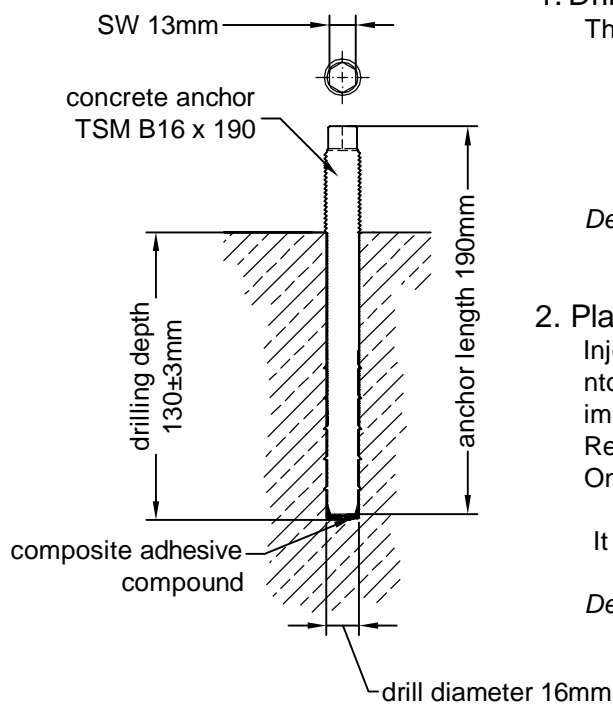
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# SAFETY BARRIERS

## 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  $130 \pm 3$ 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 2 RH2C

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 |
|------|-------------------------------|-------------|-----------------|--------------------|----------------------|
| 1    | guardrail S2A 3,80            | 47,09       | 30-105.3800-    | S355JO             | acc. to EN ISO 1461  |
| 3    | spacer C right                | 4,23        | 30-105.1315C    | S235JR             | acc. to EN ISO 1461  |
| 3    | strut 1 S2A                   | 3,78        | 30-105.2923D    | S235JR             | acc. to EN ISO 1461  |
| 3    | strut 2 S2A                   | 3,78        | 30-105.2924D    | S235JR             | acc. to EN ISO 1461  |
| 3    | C125-post right S2A/G 650     | 13,27       | 30-105.2920D    | S355JO             | acc. to EN ISO 1461  |
| 3    | side bracket                  | 0,78        | 30-001.1807E    | S235JR             | acc. to EN ISO 1461  |
| 16   | THB M16x30-6.8 with nose +nut | 0,08        | 30-100.0990E    | 6.8                | acc. to EN ISO 10684 |
| 5    | THB M16x40-6.8 with nose +nut | 0,10        | 30-100.0990E    | 5.6                | acc. to EN ISO 10684 |
| 18   | washer 40x18x4                | 0,03        | 30-001.0995E    | 100HV              | acc. to EN ISO 10684 |
| 3    | THB M16x35-4.6 +nut           | 0,14        | 30-005.0991E    | 4.6                | acc. to EN ISO 10684 |
| 6    | anchor TSM B16 M18x190        | 0,27        | -               | 10.9               | TOGE-KORR            |
| 6    | 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    | guardrail S2A 1,27m +-100 | 24,03       | 30-105.4080C    | S355JO             | acc. to EN ISO 1461  |

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