

ASSEMBLY INSTRUCTIONS

KREMSBARRIER 2 RH3C ON CIVIL STRUCTURES



Performance class in accordance with EN 1317-2:

Containment level:	H3
Impact severity level:	B
working width:	W5

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CONTENTS

Safety instructions	3
Proper use.....	3
Technical description of the guardrail system	3
Transport.....	4
Requirements for installation.....	4
Suitable subgrade (structure).....	5
The Installation of Vehicle Restraint System in Accordance with Type Sheets B204/2, B204/3 and B204/4 (see appendix) .	5
1. Establishing the Anchoring	6
2. Installation of the C125 base plate upright	6
3. Mounting the S2A damping element	7
4. Mounting the connecting Angle S2A	7
5. Mounting the S2A guardrail.....	8
6. Installing (Railings) Fillings (Optional).....	9
7. Shims.....	9
8. Torques for threaded connections.....	10
9. Dilating construction in the area of carriageway transitions.....	10
10. Conformity checks.....	10
11. Clearing the construction site	10
Repairing the guardrail system.....	11
Durability of corrosion protection	11
Inspection and maintenance.....	11
Recycling / Disposal	11
Appendix 1	type sheet B204/2
Appendix 2	type sheet B204/3
Appendix 3	type sheet B204/4
Appendix 4	type sheet B204/5
Appendix 5	type sheet TSM 190
Appendix 6	Part list KREMSBARRIER 2 RH3C on civil structures

SAFETY INSTRUCTIONS

As working on guardrail 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 guardrail 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: Guardrail 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 GUARDRAIL SYSTEM

Performance class in accordance with ÖNORMEN 1317-2	
Containment level	H3
Impact severity level / ASI	B / 1,1
Working width / class	W5 / 1,4 m
Test length	57,00 m
System dimensions	
System width	564 mm
System height	1.200 mm
Bohr depth	130 mm

TRANSPORT

The following points are to be observed when transporting components of the guardrail 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 guardrail 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 n.
- » The definitive reference line must be marked for installation of the guardrail 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 guardrail 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 guardrail 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 guardrail 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 guardrail system can also be anchored on steel structures, if the conduction of aligned characteristic forces is correspondingly ensured. The alignment of anchoring for the guardrail system on steel constructions must always be agreed with the manufacturer.

THE INSTALLATION OF VEHICLE RESTRAINT SYSTEM IN ACCORDANCE WITH TYPE SHEETS B204/2, B204/3 AND B204/4 (see appendix)

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

Since the vehicle restraint system does not become pre-tensioned, the installation ambient temperature is not relevant for the purposes of assembly.

1. Establishing the Anchoring

Each C125 base plate upright is to be anchored using three TSM B16×190 concrete bolts in accordance with type sheet TSM 190 (see appendix).

When drilling bore holes for the anchor groups, it is recommended that you use a drill template to ensure the precise spacing of the anchors.

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

The standard axial spacing of the anchoring groups (= i.e. spacing between the uprights) is 1,267 mm.

2. Installation of the C125 base plate upright



Figure 2

The C125 base plate upright must be installed into the anchoring in such a way that the anchoring is positioned on the side of the upright facing the road and the open side of the C125 upright section is facing in the direction of travel of the traffic lane concerned (see Fig. 1).

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

The upright is then secured in place by means of one 40×18×4 washer and an M18 FK 8 hexagonal nut for each TSM B16×190 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.). 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.

3. Mounting the S2A damping element



Figure 3



Figure 4

The intermediate uprights are to be fitted with the S2A damping element (see Fig. 2). The U-shape damping element is arranged in the way that the open side (as in the column C) faces towards the direction of travel of the traffic lane concerned and the two bore holes $\text{Ø}20\text{mm}$ overlapping on the arm overlap the elongated openings $30\times 18\text{mm}$ on the side of the upright towards the traffic.

The uprights at the contact of guardrails must be fitted with two Damping elements. The other damping element is to be mirror mounted to the first damping element, positioned in the same way as in the intermediate uprights, so that the overlapping holes $\text{Ø}20\text{mm}$ overlap both the damping elements on the arm.

(see fig. 3).

The damping elements are always bolted to the uprights with two round-head bolts M16x40 FK 6.8. For this purpose, the bolts are to be pushed from the upright inside through the elongated hole in the upright and the holes in the damping element, and they are to be secured with one washer $40\times 18\times 4$ and one hexagonal nut M16 FK6 (see Fig. 2 and 3).

4. Mounting the connecting Angle S2A



Figure 5

The “connecting angle S2A” ensures strengthened connection between the C125 uprights and the upper guard rail.

The connecting angle shall be placed in the way that the arm with two elongated holes lies on the side of the upright towards the traffic, the arm is adjacent to the upright with only one elongated hole and the corresponding elongated holes in the upright head and on the connecting angle overlap (see figure 4).

The connection angle is to be bolted on its side to the upright using a round-head bolt M16x30 FK 6.8. The bolts are to be pushed from the upright inside through the elongated holes in the upright and the connecting angle and they are to be secured with one washer $40\times 18\times 4$ and one hexagonal nut M16 FK 6 (see Fig. 4).

Note: Before tightening this bolt, make sure that the arm with the two elongated holes lies with its face on the column.

5. Mounting the S2A guardrail

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



Figure 5

The upper guide rail of the guardrail is to be bolted to each connecting angle/upright with two round-head bolts M16x55 FK4. 6. For this purpose, the first round-head bolt with the already fitted washer R19 (see Fig 5) is to be pushed through the first of the two elongated holes of the guardrail mounted axially in the direction of traffic, through the elongated hole in the connecting angle and on the upright. In addition, the other round-head bolt with the already fitted washer R19 is to be pushed through the elongated hole in the guardrail and in the connecting angle. Both the round-head bolts are to be secured with a washer 40x18x4 and a hexagonal nut M16 FK5. 4).

The lower guard rail of the guardrail is to be bolted to the damping elements with two round-head bolts M16x55 FK4. 6. For this purpose, the round-head bolts with the already fitted washer R19 (see Fig. 5) are to be pushed through both elongated holes of the guardrail mounted axially in the direction of traffic and the holes in the damping element which overlap them. The round-head bolts are to be secured with one washer 40x18x4 and a hexagonal nut M16 FK5.

(see Fig. 6).



Figure 6

The joint areas of S2A guardrails must overlap in relation to the direction of travel in such a way that vehicles cannot get caught by the guard rails.

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.

Use eight M16x30 FK 6.8 round-head bolts to bolt the joint areas of the guard rail together (see Fig. 7), 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.



Figure 6

6. Installing (Railings) Fillings (Optional)



Figure 7

As bridge 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 L-brackets welded together (see Fig. 2, 3 and 6).

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

- » Vehicle 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.

The lugs with their open elongated holes are to be positioned on the end of each field as seen from the direction of travel. Bolt two lugs onto one upright by means of one M16x40 FK6.8 round-head bolt and secure them in place using a 40x18x4 washer and an M16 FK6 hexagonal nut (see Fig. 8).

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).

7. Shims

Generally, the guardrail 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!

8. 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.

9. 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 guardrail 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.

10. 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.

11. 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 GUARDRAIL SYSTEM

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.

New connecting devices are generally to be used when repairing a guardrail system

DURABILITY OF CORROSION PROTECTION

The guardrail 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

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

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

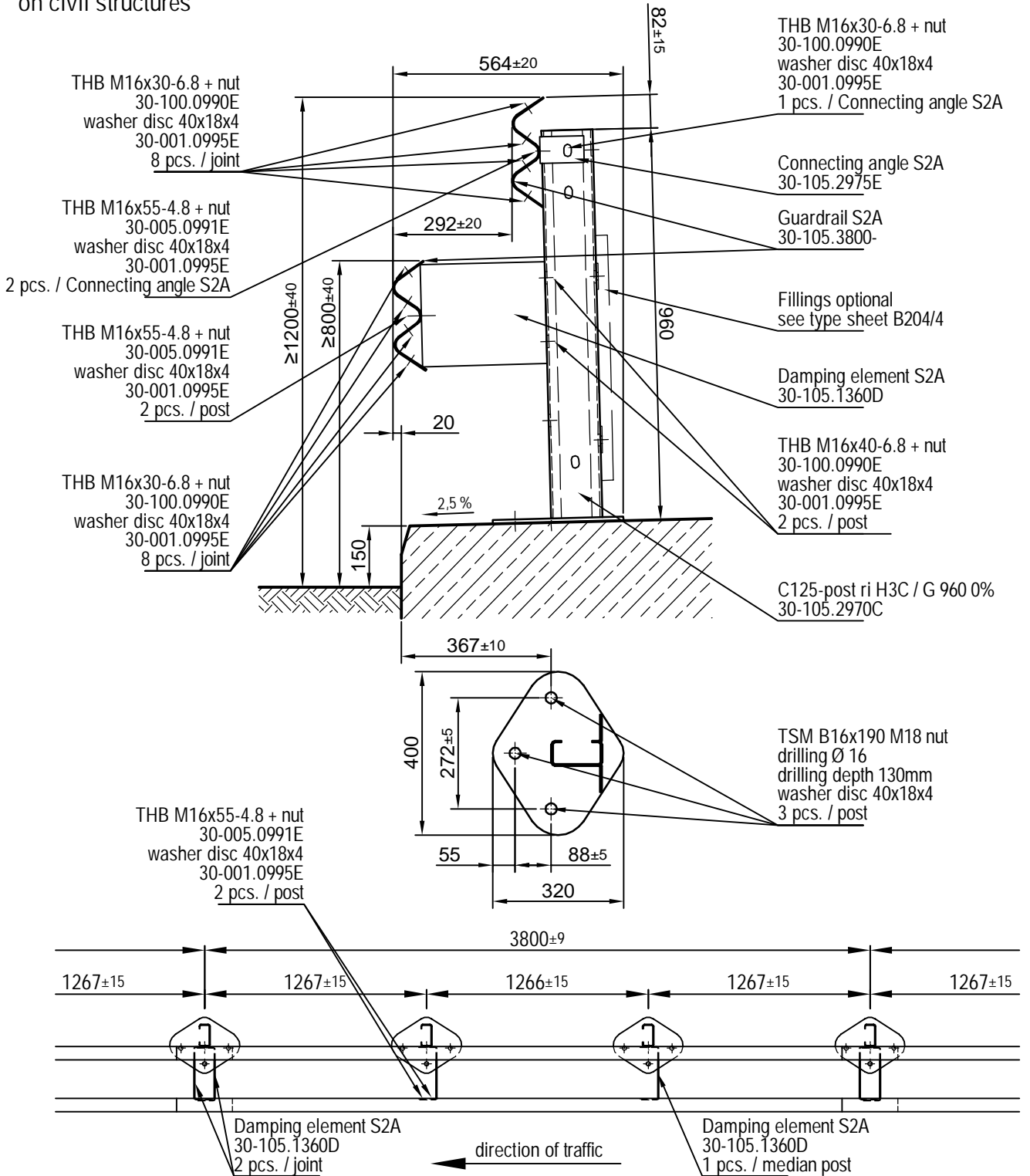
Packaging and other waste is to be recycled or disposed of in accordance with statutory requirements.

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

KREMSBARRIER 2 RH3C

roadside restraint system
on civil structures

product specifications Sheet B204/2



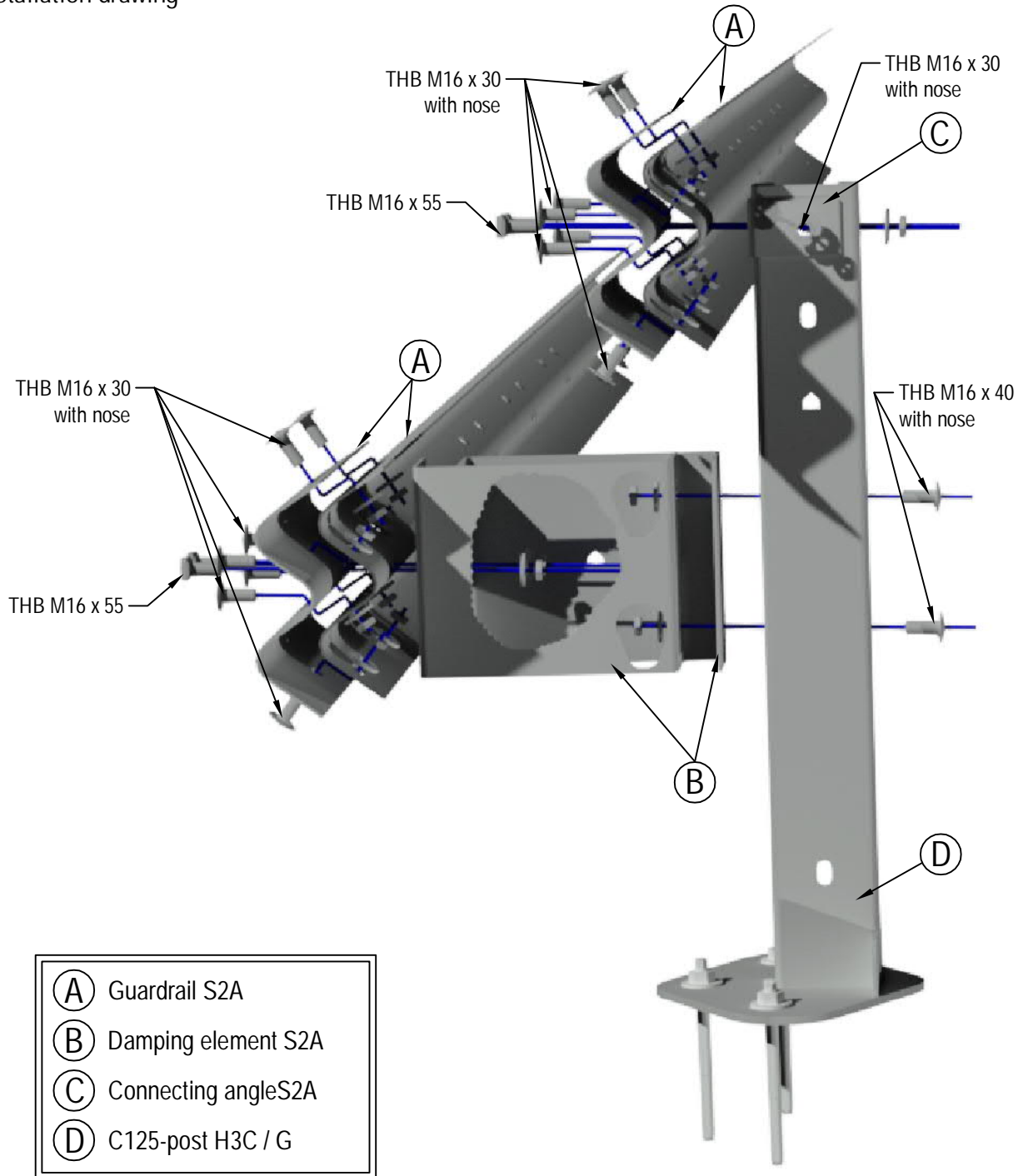
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KREMSBARRIER 2 RH3C

roadside restraint system
on civil structures

product specifications sheet B204/3

installation drawing



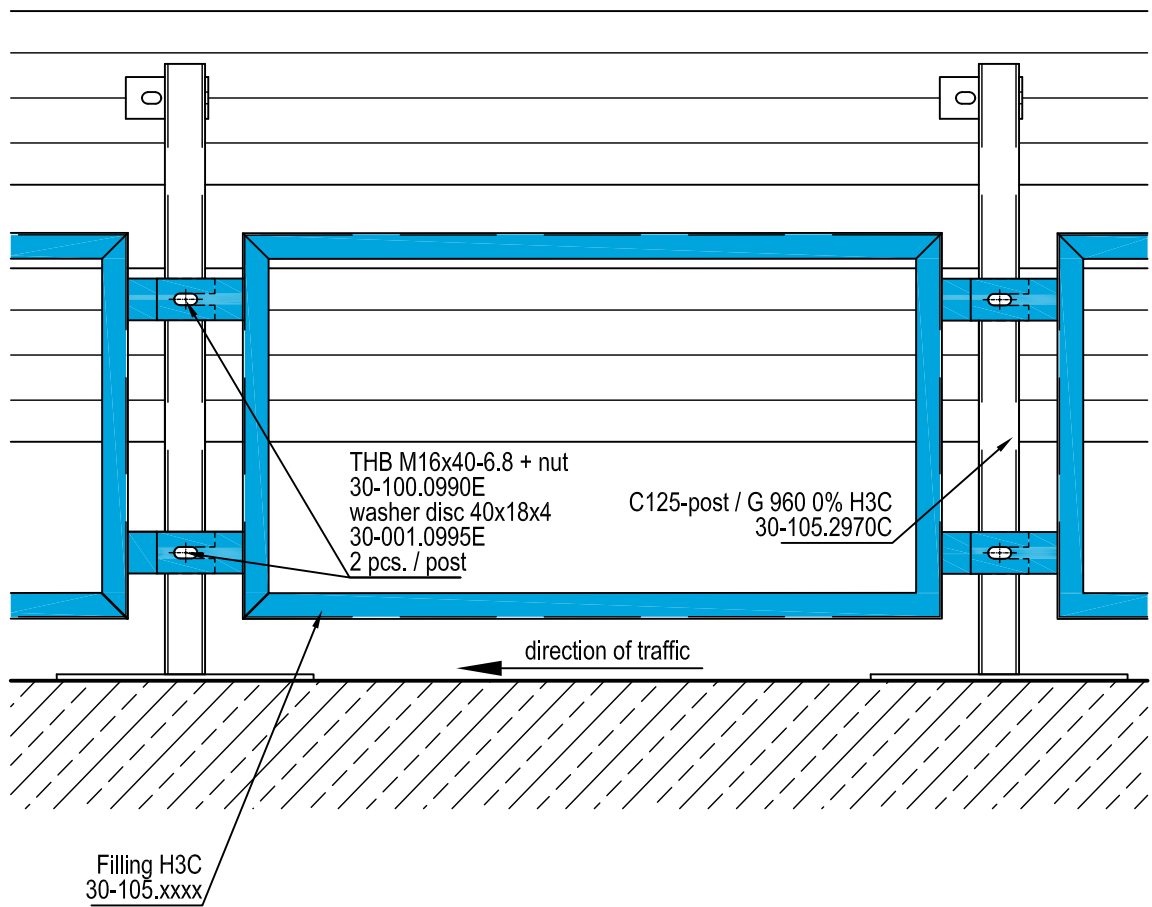
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KREMSBARRIER 2 RH3C

roadside restraint system
on civil structures

product specifications sheet B204/4

Fillings optional



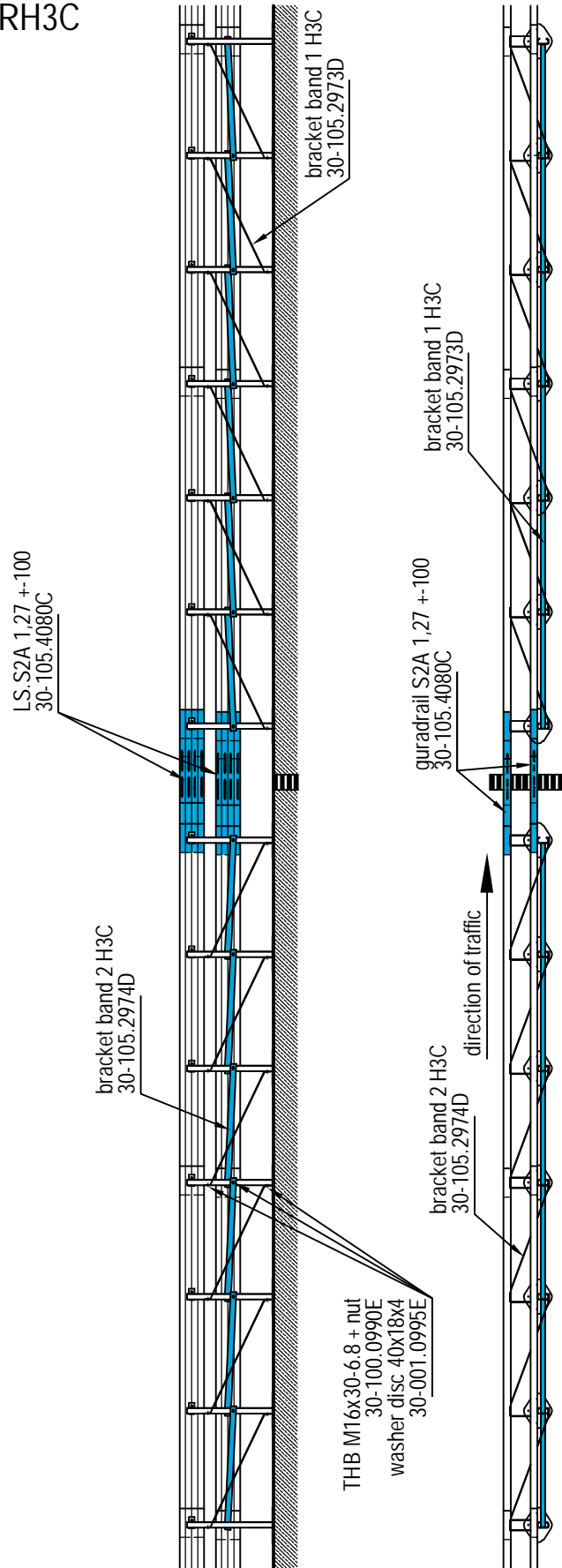
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KREMSBARRIER 2 RH3C

roadside restraint system
on civil structures

dilatation +100

product specifications sheet B204/5

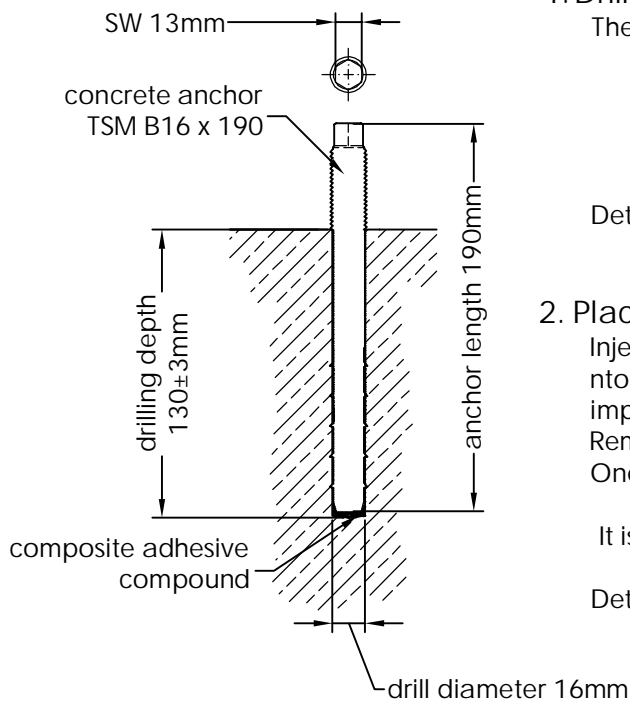


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CONCRETE ANCHOR TSM B16 x 190

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 ± 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.

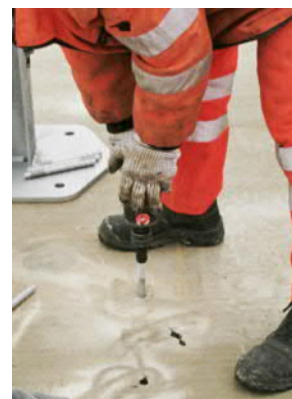
Details: Contribute to the mass of the composite is a special required to press the cartridge matched.



drilling bore hole



inject the compound mass



screw the concrete anchor

01/2015

Parts list

KREMSBARRIER 2 RH3C

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 S2A 3,80	47,09	30-105.3800-	S355J0	acc. to EN ISO 1461
4	Damping element S2A	5,15	30-105.1360C	S355J0	acc. to EN ISO 1461
3	Connecting angle S2A	0,60	30-105.2975E	S235JR	acc. to EN ISO 1461
3	C125-post right H3C / G 960 0%	16,31	30-105.2970C	S355J0	acc. to EN ISO 1461
19	THB M16x30-6.8 with nose +nut	0,11	30-100.0990E	6.8	acc. to EN ISO 10684
12	THB M16x55-4.6 + nut	0,17	30-005.0991E	4.6	acc. to EN ISO 10684
42	washer 40x18x4	0,03	30-001.0995E	100HV	acc. to EN ISO 10684
12	washer R19 bent	0,04	30-105.4089E	100HV	acc. to EN ISO 10684
9	anchor TSM B16 M18x190	0,27	-	10.9	TOGE-KORR
9	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 1,27 ± 100	24,03	30-105.4080C	S355J0	acc. to EN ISO 1461
12	Bracket band 1 H3C	3,12	30-105.2973C	S235JR	acc. to EN ISO 1461
12	Bracket band 2 H3C	2,96	30-105.2974C	S235JR	acc. to EN ISO 1461
36	THB M16x30-6.8 with nose +nut	0,11	30-100.0990E	6.8	acc. to EN ISO 10684
36	washer 40x18x4	0,03	30-001.0995E	100HV	acc. to EN ISO 10684

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