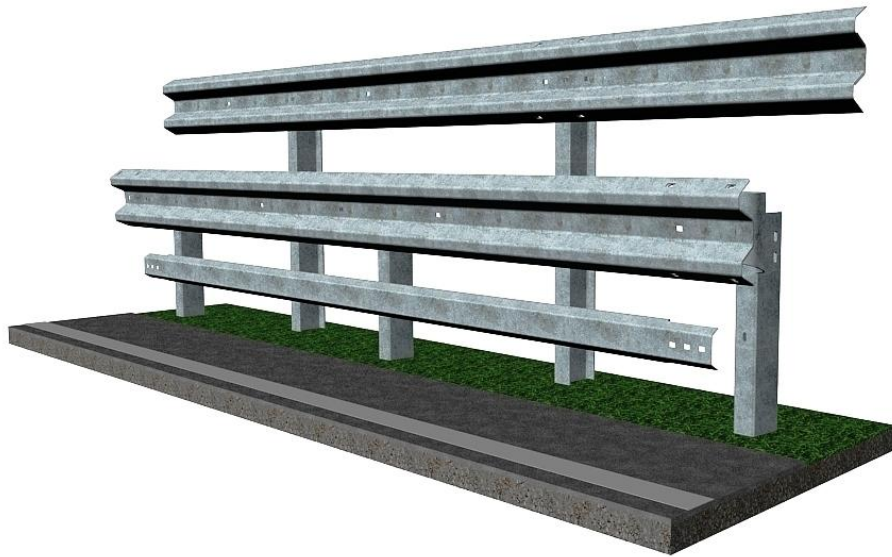


# ASSEMBLY INSTRUCTIONS

for the vehicle barrier system

## KREMSBARRIER 1 RH3 for pile-drivable subgrades



Performance class in accordance with EN 1317-2:

Containment level:	H3
Impact severity level:	A
Working width:	W5

Production and sales:

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## Contents

Safety instructions .....	3
Proper use.....	3
Technical description of the vehicle barrier system.....	3
Transport.....	4
Requirements for installation .....	4
Suitable subgrade .....	5
Installation of the vehicle barrier system in accordance with data sheets B106/2 and B106/3 (see appendix).....	6
1. Ramming IPE160 posts.....	6
2. Ramming C140 posts.....	7
3. Mounting extension profiles for the upper guard rail belt.....	7
4. Mounting guard rails (barriers) S1 for the upper guard rail belt.....	8
5. Install sliding profile S1.....	8
6. Mounting the "round damping element" (round damper).....	9
7. Mounting extension profiles for the lower guard rail belt .....	10
8. Mounting S1 guardrail (crash barrier) for the lower guard rail belt .....	10
9. Shims.....	11
10. Torques for threaded connections .....	11
11. Conformity checks.....	12
12. Clearing the construction site .....	12
Repairing the vehicle barrier system.....	12
Durability of corrosion protection .....	13
Inspection and maintenance.....	13
Recycling / Disposal .....	13
Appendix 1 .....	Data Sheet B106/2
Appendix 2 .....	Data Sheet B106/3
Appendix 3 .....	Parts List KREMSBARRIER 1 RH3

## **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	H3
Impact severity level / ASI	A / 1.0
Working width / level	W5 / 1.7 m
Test length	57.00 m
System dimensions	
System width	640 mm
System height	1,400 mm
Ram depth	1250 mm and 1150 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**

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

- Soil classes 3, 4 and 5 of ÖNORM B 2205 and compacted subgrade which can be graded into these soil classes.
- Degree of compaction  $D_{pr} \geq 97\%$
- The subgrade is suitable for pile driving.

Soil classes 1, 3, 4 and 5 of ÖNORM B 2205 and compacted subgrades which can be graded into these soil classes and which contain no blocks are suitable for pile driving.

*Note: If the subgrade is unsuitable for pile driving, then there is the option to drill boreholes to the required depth or install suitable empty pipes, which can subsequently be filled and compacted with suitable material.*

## **Installation of the vehicle barrier system in accordance with data sheets B106/2 and B106/3 (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. Ramming IPE160 posts**



**Figure 1**

The minimum 2,500 mm long IPE160 post is to be driven vertically into the subgrade with a suitable pile driver, so that the upper edge of the post section is  $1,350 \pm 40$  mm above the reference level. The three elongated holes 20x40 must be on the upper end of the post section (post head) on the side facing the traffic.

The pile driver must be equipped with a suitable drive head to fit the IPE140 section, in order to prevent deformation or damage to the hot-dip galvanised coating on the post head. A guide adapted to the IPE140 section is to be mounted to the pile driver near the upper edge of the ground in order to ensure precise positioning of the post during the pile driving process.

The regulation centre distance of the posts is 1900 mm.

## 2. Ramming C140 posts

The IPE140 posts must be aligned centrally between the IPE160 posts, as viewed in the longitudinal direction. The front faces of the posts lie adjacently to the I160 posts by 175 mm nearer to the carriageway (see Fig. 1).

The minimum 2,000 mm long V140 post is to be driven vertically into the subgrade with a suitable pile driver, so that the upper edge of the post section is  $750 \pm 40$  mm above the reference level. The open ends of the post sections must be aligned pointing away from the traffic and the hole pattern 18x36 mm must be on the upper end of the post section (post head).

The pile driver must be equipped with a suitable drive head to fit the V140 section, in order to prevent deformation or damage to the hot-dip galvanised coating on the post head. A guide adapted to the V140 section is to be mounted to the pile driver near the upper edge of the ground in order to ensure precise positioning of the post during the pile driving process.

The regulation centre distance of the posts is 1900 mm.

## 3. Mounting extension profiles for the upper guard rail belt

The extension profile is to be aligned as a continuous belt between the guard rail belt and the IPE160 posts.

The trapezoidal cross-section of the extension profile surrounds the centre of the guard rail. The rectangular holes 18x25 mm in the guard rail axis and extension profiles must align (see Fig. 2).

The overlapping of the extension profiles is to be executed in accordance with the overlapping of the guard rails. The two drilled 18 mm diameter holes indicate that the extension profiles in the jointed area (upper part) are facing the respective carriageway (see Fig. 2).

The extension profiles are to be mounted together with the guard rails and are fixed in place with the bolted unions in the guard rail axis.



Figure 2

#### 4. Mounting guard rails (barriers) S1 for the upper guard rail belt

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. The drilled 9 mm diameter hole indicates that the guard rail in the joint region (upper part) is facing the respective carriageway. 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 together with the extension profiles on the guardrail axis at each IPE160 post (every ~1.900 mm). In order to do so, a coach bolt M16x50 FK 4.6 is fed through the axially aligned bore holes in the guardrail S1 and the elongated hole 20x40 in front of the extension profile bar on the IPE160 post, as viewed in the direction of traffic. It is then secured in place with a hexagon nut M16 FK 5 (see Fig. 2).

The guardrail joint is additionally secured with six coach bolts M16x35 FK 4.6. It is to be ensured when tightening the hexagon nuts M16 FK 5 that the square-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 5. 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. 2).

#### 5. Install sliding profile S1

The sliding profiles are to be aligned on the side of the V140 post pointing towards the traffic, so that the two sides lay flush with the V140 posts.

The sliding profiles are attached to each V140 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 160x12 in the upper flank of the sliding profile and through the elongated hole 30x12 mm of the V140 post and fixed in place with a washer 11 and hexagon nut M10 FK 5.



Figure 3

The sliding profiles 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. 3).



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 axis and secured in place with three coach bolts M16x35 FK 4.6, washers 40x18x4 and nuts M16 FK 5 (see Fig. 3).

## 6. Mounting the "round damping element" (round damper)

The round damper is to be bolted in place to the V140 post section with two hexagon bolts M10x25 FK 4.6. The two keyholes in the round damper must align with the two elongated holes 18x36 mm on the front face of the post section (see Fig. 1). The hexagon bolts M10x25 FK 4.6 are inserted through the pre-mounted washer 11 from the round damper, through the narrow side of the axially positioned keyhole (narrow side up) and the elongated holes (see Fig. 4). A gusset plate 120x50x2 with two axially aligned bore holes 12 mm diameter is placed onto the two bolts M10x25 FK 4.6 on the inner side of the post and fixed in place with two hexagon nuts M10 FK 5 (see Fig. 5).



Figure 4



Figure 5

## 7. Mounting extension profiles for the lower guard rail belt

The extension profile is to be aligned as a continuous belt between the guard rail belt and the round dampers (see Fig. 6).

The trapezoidal cross-section of the extension profile surrounds the centre of the guard rail. The rectangular holes 18x25 mm in the guard rail axis and extension profiles must align.

The overlapping of the extension profiles is to be executed in accordance with the overlapping of the guard rails. The two drilled 18 mm diameter holes indicate that the extension profiles in the jointed area (upper part) are facing the respective carriageway (see Fig. 6).

The extension profiles are to be mounted together with the guard rails and are fixed in place with the bolted unions in the guard rail axis (see Fig. 6).

## 8. Mounting S1 guardrail (crash barrier) for the lower guard rail belt

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. The drilled 9 mm diameter hole indicates that the guard rail in the joint region (upper part) is facing the respective carriageway. 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 together with the extension profiles to the guard rail axis on each round damper (every ~1.900 mm) with a coach bolt M16x50 FK 4.6 (see Fig. 6).



Figure 6

The guardrail joint is additionally secured with six coach bolts M16x35 FK 4.6. It is to be ensured when tightening the hexagon nuts M16 FK 5 that the square-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 5. 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. 6).

## 9. 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!

## 10. Torques for threaded connections

Thread / strength class	Torque	
	min.	max.
M10 / 4.6	10 Nm	17 Nm
M16 / 4.6	35 Nm	70 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.

## 11. 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.

## 12. 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.



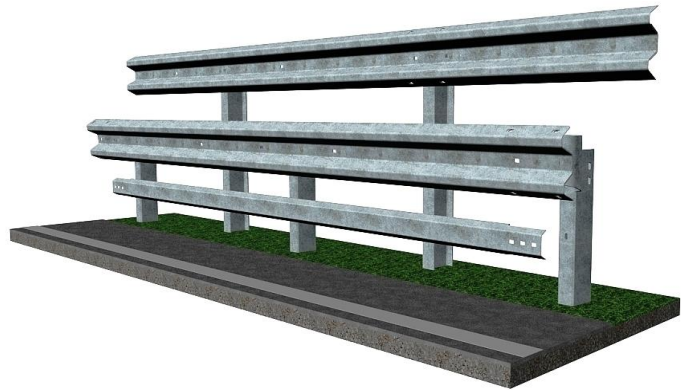


# SAFETY BARRIERS

## Parts list

### KREMSBARRIER 1 RH3

Roadside Restraint System with  
lower guardrail suitable for pile  
driving ground conditions



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 S1 3,80m	46,50	30-011.3800-	S355JO	acc. to EN ISO 1461
2	additional section H2	29,00	30-021.3800-	S235JR	acc. to EN ISO 1461
2	round impact absorber	6,10	30-001.1810C	S235JR	acc. to EN ISO 1461
2	lug 120x40x2	0,10	30-001.1806E	S235JR	acc. to EN ISO 1461
2	V140-post 2,00 m	30,00	30-001.2721D	S235JR	acc. to EN ISO 1461
2	IPE160-post 2,50 m	40,30	30-005.2011E	S235JR	acc. to EN ISO 1461
1	sliding section 3,80m	28,79	30-001.1830D	S235JR	acc. to EN ISO 1461
4	side bracket	0,78	30-001.1807E	S235JR	acc. to EN ISO 1461
15	THB M16x35-4.6 +nut	0,13	30-001.0990E	4.6	acc. to EN ISO 10684
4	THB M16x55-4.6 +nut	0,11	DIN 603	4.6	acc. to EN ISO 10684
11	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
4	hex bolt M10x25-4.6 +nut	0,04	ISO 4018	4.6	acc. to EN ISO 10684
6	washer 11	0,00	ISO 7091	100HV	acc. to EN ISO 10684

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