

ASSEMBLY INSTRUCTIONS

for the vehicle barrier system

KREMSBARRIER 2 MH2C

for pile-drivable subgrades



Performance class in accordance with EN 1317-2:

Containment level:	H2
Impact severity level:	A
Working width:	W5

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

ID: VTMC209

Version: 01/2015

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 vehicle barrier system in accordance with type sheets C209/2 and C209/3 (see appendix)	6
1. Pile-driving the C100x60 uprights.....	6
2. Mounting the S2A retaining brackets	7
3. Mounting the S2A guard rail	7
4. Mounting the S2A connecting plate.....	9
5. Shims.....	10
6. Torques for threaded connections.....	10
7. Clearing the construction site	11
8. Clearing the construction site	11
Repairing the vehicle barrier system.....	11
Durability of corrosion protection.....	12
Inspection and maintenance	12
Recycling / Disposal	12
Appendix 1	Data sheet C209/2
Appendix 2	Data sheet C209/3
Appendix 3.....	Parts list KREMSBARRIER 2 MH2C

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	A / 0,7
Working width / level	W5 / 1,4 m
Test length	49,40 m
System dimensions	
System width	254 mm
System height	830 mm
Ram depth	870 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 vehicle barrier system in accordance with type sheets C209/2 and C209/3 (see appendix)

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

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

1. Pile-driving the C100x60 uprights



Figure 1

The C100x60 upright with a minimum length of 1,700 mm is to be driven vertically into the subgrade using suitable pile-driving equipment so that the upper edge of the upright will be positioned 830 ± 40 mm above the reference level. The open side of the C100x60 upright section is to alternately face the direction of travel of the corresponding carriageway and away from it (see Fig. 1). The hole pattern must be aligned at the upper end of the upright (upright head).

The pile driver must be equipped with a pile cap suitable for the C100x60 cross-section in order to prevent possible deformation or damage to the hot-dip galvanised coating on the head of the upright. A suitable guide for the C100x60 section is to be mounted to the pile driver and positioned near the upper edge of the ground level to ensure precise positioning of the upright during the pile driving process.



Figure 2

The standard spacing of the uprights amounts to 1,900 mm.

Note: As the uprights are to be alternately turned by 180° and then pile-driven, the pile cap must be equipped with a groove as shown in Fig. 2.

2. Mounting the S2A retaining brackets

Two S2 retaining brackets are to be mounted on each C100x60 upright (see Fig. 3). Each S2 retaining bracket is to be bolted to the narrow sides of the uprights using a M10x25 FK 4.6 hexagon bolt (see Fig. 5). The keyhole in the retaining bracket must cover the upper of the two 18x36 mm elongated holes in the narrow sides of the upright. The M10 FK 4.6 hexagon bolt is then inserted together with the previously attached washer 11 from the retaining bracket side into the narrow side of the keyhole (narrow side up) and through the elongated hole (see Fig. 3). On the inner side of the upright section, a 120x40x2 lug is pushed onto the M10 FK 4.6 bolt aligned to the upper of the two axially arranged 12 mm diameter bore holes and fixed in place with a hexagon nut M10 FK 5 (see Fig. 5).



Figure 3



Figure 4

3. Mounting the S2A guard rail

There are two guard rail bands to be aligned back to back (see Fig. 1).

The jointed areas of the guard rails are to be overlapped in relation to the direction of travel so that oncoming vehicles can not 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.

The guard rails are bolted in place to each retaining bracket every ~1,900 mm with two M16 FK 6.8 mushroom head bolts using the elongated 30x18 mm holes (see Fig. 5 to 7).



Figure 5: Bolting of jointed area



Figure 6: Bolting of intermediate upright



Figure 7: Bolting of intermediate upright

M16 FK 6.8 mushroom head bolts are used in lengths of 30 and 40 mm. M16x40 mushroom head bolts are only used for bolting the retaining brackets in the jointed area of the guard rails.

The guard rail joints are additionally to be bolted in place with six M16 FK 6.8 mushroom head bolts (see Fig. 5). When tightening the M16 FK 6 hexagon nuts, ensure correct alignment of the drop-shaped anti-twist protection of the bolt head in the drop-shaped hole of the guard rail.

A 40x18x4 washer is to be aligned under each of the M16 FK 6 hexagon nuts.

4. Mounting the S2A connecting plate

Each of guard rail bands aligned back to back must be connected by means of an S2A connecting plate at every third of the length of their guard rails.



Figure 8



Figure 9



Figure 10

Each S2A connecting plate is fixed in place on the previously mounted first guard rail band using two M16x30 FK 6.8 mushroom head bolts. The M16x30 FK 6.8 mushroom head bolts are inserted into the elongated 30x18 mm holes of the S2A guard rail and the elongated 36x18 mm holes of the connecting plate (see Fig. 10) and then each fixed in place with a 40x18x4 washer and a M16 FK 6 hexagon bolt (see Fig. 9).

After mounting the second guard rail band, the connecting plate must be bolted onto the second guard rail accordingly, using the procedure described above for the first guard rail (see Fig. 10).

Note: As the S2A connecting plates can not be inserted following installation of the second guard rail band anymore, they must be fixed in advance on the previously mounted first guard rail band!

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 can not 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.
M10 / 4.6	10 Nm	17 Nm
M16 / 6.8	35 Nm	150 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. Clearing the construction site

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.

8. 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.

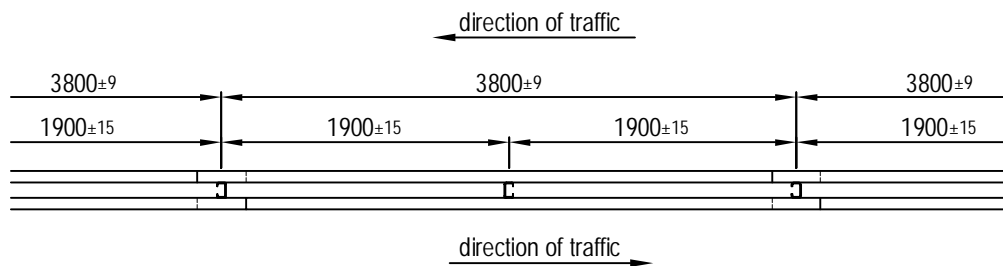
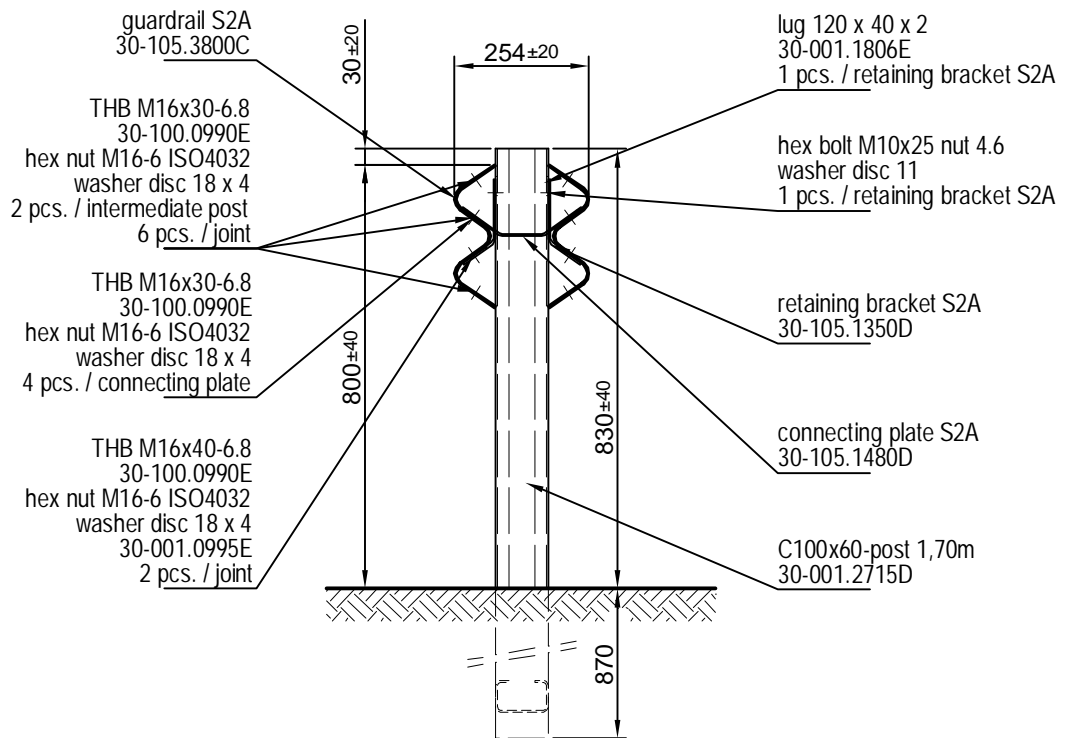
Vehicle barrier systems manufactured by voestalpine Krems Finaltechnik GmbH do not contain toxic or potentially hazardous materials.

SAFETY BARRIERS

KREMSBARRIER 2 MH2C

Restraint System for central medians and ground conditions suitable for pile driving

product specification sheet C209/2



01/2015

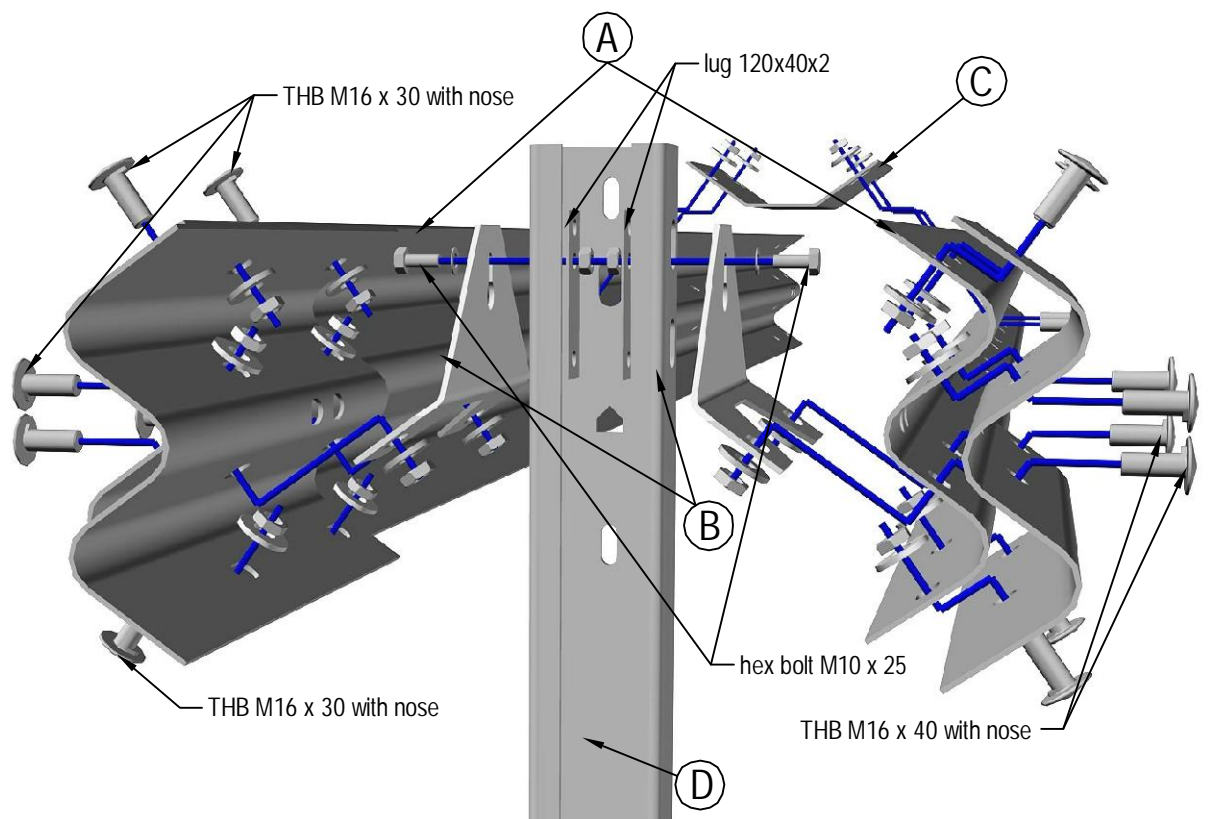
SAFETY BARRIERS

KREMSBARRIER 2 MH2C

Restraint System for central medians and ground conditions suitable for pile driving

product specification sheet C209/3

installation drawing



- (A) guardrail S2A
- (B) retaining bracket S2A
- (C) connecting plate S2A
- (D) C100x60-post

01/2015

SAFETY BARRIERS

Parts list

KREMSBARRIER 2 MH2C

Road Restraint System 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 S2A 3,80	47,09	30-105.3800-	S355JO	acc. to EN ISO 1461
4	retaining bracket S2A	1,06	30-105.1350D	S235JR	acc. to EN ISO 1461
2	connecting plate S2A	2,39	30-105.1460D	S355JO	acc. to EN ISO 1461
2	C100x60-post 1,70	13,16	30-001.2715D	S355JO	acc. to EN ISO 1461
24	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
28	washer 40x18x4	0,03	30-001.0995E	100HV	acc. to EN ISO 10684
4	lug 120x40x2	0,10	30-001.1806E	S235JR	acc. to EN ISO 1461
4	hex bolt M10x25-4.6 +nut	0,04	ISO 4018	4.6	acc. to EN ISO 10684
4	washer 11	0,00	ISO 7091	100HV	acc. to EN ISO 10684

01/2015