

INSTALLATION INSTRUCTIONS

KREMSBARRIER APD P110 RL

KREMSBARRIER APD P110 NR



Performance class in accordance with EN 1317-3:

Restraint level:	110
Impact severity class:	B
Redirection zone class:	Z1
Permanent lateral displacement class:	D1

Production and sale:

Voestalpine KREMS Finaltechnik GmbH

Schmidhüttenstraße 5, 3500 KREMS, Austria

T.: +43/50304/14-670

F.: +43/50304/54-628

Email: info.finaltechnik@voestalpine.com

ID: TTMP110R01

Status as of: 01/2022

CONTENT

Safety instructions	4
Intended use	4
Technical description of the vehicle restraint system.....	4
Transport.....	5
Installation requirements.....	5
Suitable substrate.....	6
Installing the crash cushion (APD) in accordance with the P110R01 data sheet (see annex)	7
1. Markings showing the location of the crash cushion.....	7
2. Creating the backup.....	7
2.1. Creating the pile driven backup	8
2.2. Creating the anchored backup.....	8
3. Installing and anchoring the “crash cushion C100x60” sliding rails.....	9
4. Installing guides on the framework	11
5. Installing the “crash cushion frame”	11
6. Installing the “crash cushion rail elements” of the sled.....	12
7. Installing the “crash cushion sled”	12
8. Installing the absorber elements.....	13
8.1. Installing the absorber elements in segments 3 to 7.....	14
8.2. Installing the absorber elements in segment 2.....	15
9. Installing the “crash cushion anchorage insulator”	16
10. Tightening the screw connections of the absorber elements	17
11. Connecting the last frame to the I120 post.....	17
12. Installing the “crash cushion LS.S2A end pieces”	17
13. Installing the “crash cushion LS.S2A” guard rails in segment 9.....	18
14. Installing the “crash cushion LS.S2A” guard rails in segment 8 to 1	19
15. Installing the “crash cushion LS.S2A heads”	20
16. Torques for threaded connections.....	21
17. Conformity check.....	21
18. Cleaning on the construction site.....	21
Repairs to the Vehicle Restraint System.....	22

Durability of Corrosion Protection 22

Inspection and Maintenance 22

Recycling / disposal 22

Annex 1 Datasheet P110R01

Annex 2 Datasheet P110R02

Annex 3 Crash cushion pile driven backup data sheet<>FRS

Annex 4 Crash cushion anchored backup data sheet<>FRS

Annex 5 TSM A22x155 data sheet

Annex 6 TSM 190 data sheet

Annex 7 KREMSBARRIER APD P110 RL / NR parts list

SAFETY INSTRUCTIONS

Because work on vehicle restraint systems must be classified as highly dangerous, it may only be carried out under supervision and in accordance with the instructions of properly trained specialists.

The use of these installation instructions presupposes supervision and instruction by these specialists.

Installation personnel must wear personal protective equipment (PPE) in accordance with EU Directive 89/686/EEC and national regulations.

INTENDED USE

The purpose of the crash cushion is to stop or redirect vehicles that have veered off the roadway, thus minimizing the consequences for passengers.

Please note: As a rule, vehicle restraint systems should only be required where a vehicle veering off the roadway would have more adverse consequences for the vehicle and the passengers in it, as well as other persons or objects worthy of protection, than driving into the restraint system.

TECHNICAL DESCRIPTION OF THE VEHICLE RESTRAINT SYSTEM

Performance class according to ÖNORM EN 1317-3

Restraint level	110
-----------------	-----

Impact severity level	B
-----------------------	---

Redirection zone class	Z1
------------------------	----

Permanent lateral displacement class	D1
--------------------------------------	----

System dimensions

System width	800 mm
--------------	--------

System length	7604 mm
---------------	---------

System height	660 mm
---------------	--------

TRANSPORT

When transporting the components of the vehicle restraint system, the following factors must be observed:

- The load must be properly secured.
- On roads covered with de-icing salt, the components must only be transported in tarpaulin-enclosed trucks.
- Avoid contact with other aggressive transport loads (e.g. chemical residues on the loading area).
- Hoists must be dimensioned for a maximum bale weight of 2.5 tons.

Please note: You must also ensure that the load is properly secured when transporting tools for the installation of vehicle restraint systems.

INSTALLATION REQUIREMENTS

The contractor (= installation company) must have the professional competence and general qualifications to carry out installation work of this type.

The installation company must have the technical equipment to perform installation work professionally and properly. In addition to the fleet of vehicles required for this work, this includes pile driving devices designed for the necessary length of posts with driving heads and guides adapted accordingly, as well as drilling rigs, impact hammers, pilot shafts, measuring instruments, etc.

The installation company must ensure compliance with all national and international laws, guidelines, regulations, etc., that are applicable to the installation work and must check that the necessary permits have been issued in good time.

Before installation begins, the installation company must

- find out whether there are no existing installations in the anchoring area, and if so take these into consideration accordingly.
- check the suitability of the substrate (soil class, sufficient depth for drilling, evenness, etc.).
- draw the reference line guiding the installation of the vehicle restraint system.
- check that deliveries of material are complete and accurate, and notify the supplier immediately of any complaints.
- ensure that the construction site is properly secured.

When deviations are detected, the client must be notified immediately in writing and their cause must be clarified.

If the components of the vehicle restraint system need to be stored for a short period, the following storage conditions must be observed:

- The storage area must be supportive, reinforced and accessible by truck.
- Galvanized components must not be stored in tall, damp grass, in puddles or mud.
- The bales in the delivered packaging unit must be stored on wooden underlays at a height of at least 150 mm off the ground.
- Components must be stored with a slight gradient so that water can drain away.
- Accumulation of moisture must be avoided.
- Remove the sheets used to prevent shifting during transport.
- The storage area must not be treated with de-icing agents.

The extended storage of bundled components outdoors must be avoided.

SUITABLE SUBSTRATE

The crash cushion can be anchored in both asphalt and concrete.

The substrate is suitable for the installation of the vehicle restraint system if the following conditions are met:

- The asphalt layers meet the requirements for road pavement.
- The total layer thickness of all installed asphalt layer thicknesses or concrete thicknesses must not be less than 20 cm. This applies to an area corresponding to the contour of the crash cushion according to Figure 1 plus an enlargement on all sides of at least 20 cm. For smaller thicknesses, the procedure must be coordinated with the manufacturer in each case.
- The strength of the concrete is at least C30/37.
- If HEA120 posts are driven into the substrate, it must be suitable for pile driving. The substrate can be considered suitable if the soil can be classified in soil classes 1, 3, 4 and 5 of ÖNORM B B2205, it does not contain any boulders, and has a low stone proportion of < 10 mass-% according to ÖNORM EN ISO 14688-2.
- If HEA120 posts are anchored in concrete, they must be reinforced in accordance with static requirements and it must be possible to derive the characteristic forces.
- The required space for installation must be provided on one level, taking into account the installation conditions.
- The maximum deviation of the surface evenness in the anchoring area of the crash cushion is 5 mm per 0.50 m of rail length.

INSTALLING THE CRASH CUSHION (APD) IN ACCORDANCE WITH THE P110R01 DATA SHEET (SEE ANNEX)

The pre-assembly of the crash cushion components in the factory is not necessary.

The vehicle restraint system is not pre-stressed, so the ambient temperature is not relevant for installation.

1. Markings showing the location of the crash cushion

The middle axis of the crash cushion and the perpendicular axis of the two I120 posts (see Figure 1) must be

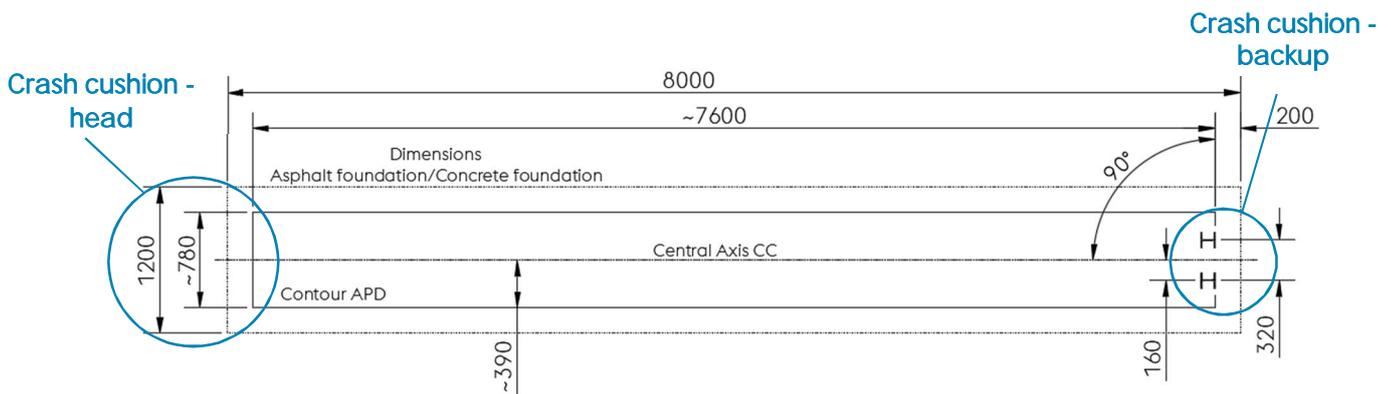


Figure 1

marked on the installation surface.

The positioning of the crash cushion in the traffic zone and the continuation of any connected vehicle restraint systems must be checked again.

2. Creating the backup

The crash cushion is supported on the back end by two I120 posts, the so-called "backup".

The backup is usually driven into the substrate. If required by the installation conditions, the backup can be alternatively anchored in concrete with a dowel.

2.1. Creating the pile driven backup

Asphalt layers or concrete pavement must be drilled with two 163 mm diameter core holes spaced 320 mm apart in accordance with Figure 2. The holes must be drilled vertical to the installation surface (see Figure 2).

Using a suitable pile driver, both 2000 mm long I120 posts must be driven into the substrate vertical to the installation surface spaced 320 mm apart (each 160 mm to the middle axis) so that the top edge of the post is 660 ± 20 mm above the reference plan. The I120 posts must be positioned so that their flanges are in a line and vertical to the middle axis of the crash cushion. The holes in the I120 posts must be aligned at the top and facing the crash cushion (see Figures 2 to 4).

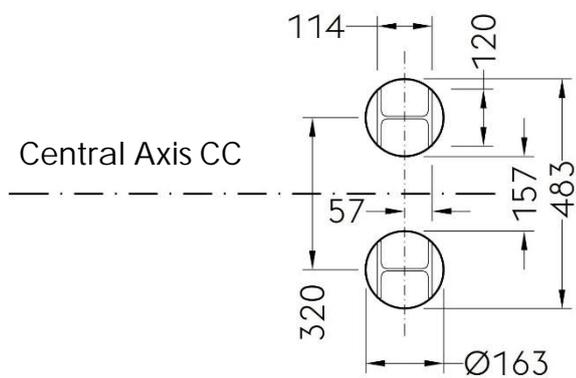


Figure 2



Figure 3



Figure 4

2.2. Creating the anchored backup

In this version, each of the two I120 posts is welded to a base plate via two support plates. The two I120 support plate posts must be arranged as shown in Figure 5. They rest right up against each other without any gap. The support plates face away from the crash cushion.

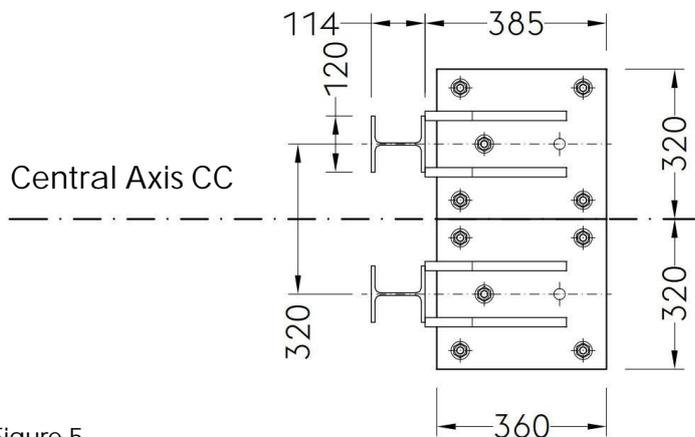


Figure 5

Each base plate is anchored in the concrete substrate with 5 TSM B16x190 concrete screws in accordance with the TSM 190 data sheet (see annex) and affixed using an anchor screw with one washer 40x18x4 and one M18 FK 8 nut for each one. The drilling depth is 130 ± 3 mm.

The holes must be centered in the 24 mm diameter holes of the base plates and drilled normally with them. Using a drill stand with depth-control stop will ensure that each hole is precise.

3. Installing and anchoring the “crash cushion C100x60” sliding rails

To determine the position of the holes used to anchor the sliding rails, the two 7490 mm long “crash cushion C100x60” sliding rails are temporarily connected using at least three installation aids. These set the necessary distancing of 270 mm between the sliding rails.

The sliding rails should be arranged parallel to each other with the open side facing up and with flush ends, and it should be affixed in three positions (front, middle, back) using installation aids. For this purpose, a M16x30 round flathead screw is inserted from the inside through the 36x18 mm side-elongated hole in the rails and the 18 mm hole in the legs of the installation aid and affixed with a 40x18x4 washer and M16 FK6 nut (see Figures 6 and 7).

The middle of the installation aids ($270/2=135$ mm) is then marked. The rails attached to the installation aids can now be centered over the marked middle axis of the crash cushion. The markings on the installation aids must be exactly over the marked middle axis of the crash cushion and the ends of the rails should be mounted on the I120 posts if possible (see Figures 6 to 8).



Figure 6

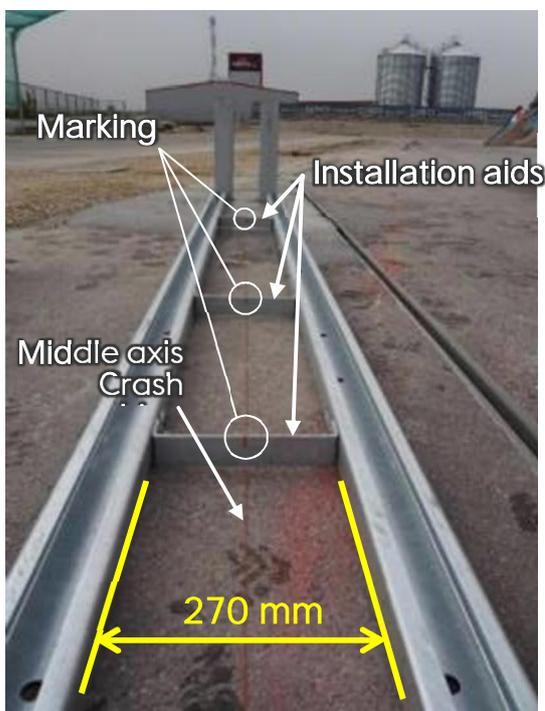


Figure 7



Figure 8

This position must be affixed so that the anchoring holes for the rails can be drilled precisely in the substrate.

Please note: The best method has been to first prepare the two anchoring holes for each end of the rails in accordance with Figure 9 and temporarily affix the rails with four TSM A22 anchoring screws inserted through the rails and screwed halfway into the substrate.

The rails can be anchored in both asphalt and concrete.

The total thickness of asphalt layers or concrete thickness on the installation surface must be at least 20 cm in order to offset the TSM A22x155 anchoring screws with a hole depth of 163 ± 3 mm.

The positions of the 11 holes with a diameter of 22 mm for each rail with a hole depth of 163 ± 3 mm are shown in Figure 9.

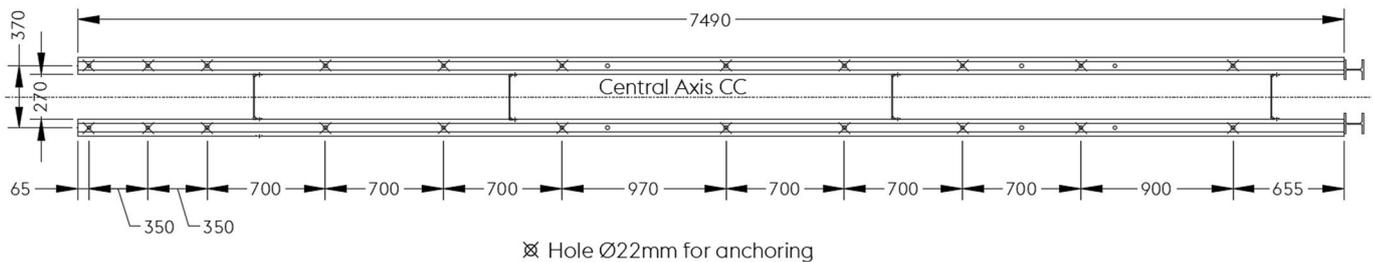


Figure 9

Once the holes have been made, the rails and installation aids must be put to the side and the drilling dust removed.

The holes must be thoroughly blown out and the installation surface cleaned.

The installation of 11 "TSM A 22x155 IM 16" asphalt screws per rail must be done in accordance with the "TSM A 22x155" data sheet (see annex).

- **ATA 2004C composite material** must be used for **anchoring in asphalt**.
- **CF-T410V composite material** must be used for **anchoring in concrete**.

Make sure that the asphalt screws are flush with the installation surface.

The rails, which are still connected to the installation aids, must now be reassembled as shown in Figure 10. The 22 mm diameter holes on the bottom of the rails must be located in the middle over the holes of the asphalt screws already offset.

Before screwing in the rails, the holes for the asphalt screws (M16 internal thread) must be cleaned!

Both rails are affixed to the asphalt anchors using 11 M16x35 FK 4.6 hexagon bolts and 40x18x4 washers (see Figure 9).

The installation aids, including the screw connection, must then be removed.



Figure 10

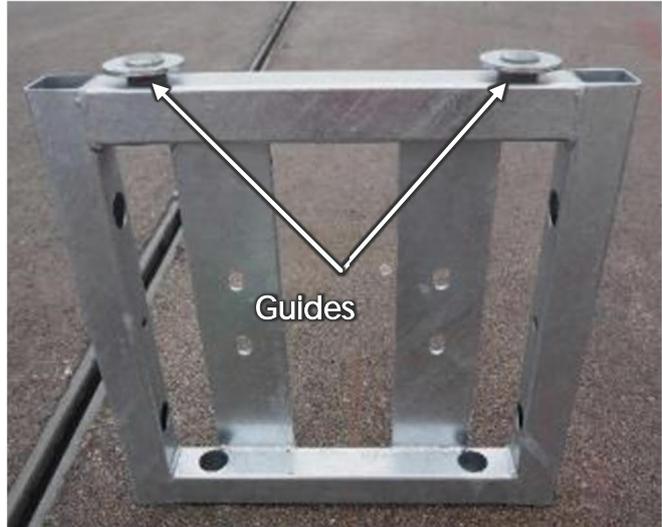


Figure 11

4. Installing guides on the framework

One 22 washer (80x24x6) and **three 40x18x4 washers** are slid onto each of the two M16x40 FK 6.8 round flathead screws. The screws with the washer package are then inserted through the 18 mm diameter holes on the bottom of the frame and affixed with one 40x18x4 washer and M16 FK6 nut. Make sure the screw is centrally aligned with the 80-gauge washer.

The three 40x18x4 washers ensure the necessary distance between the frame and the 80x22x6 washer. Figure 11 shows the frame for easier installation of the screws on the head.

5. Installing the “crash cushion frame”



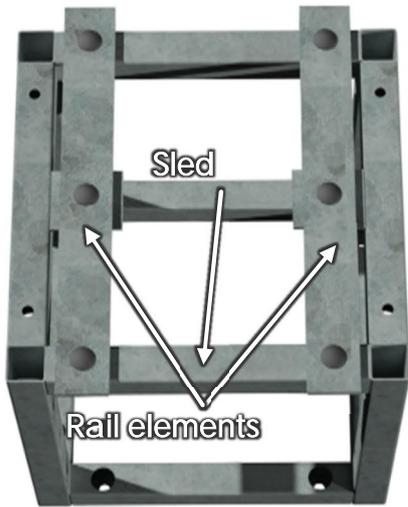
Figure 12



Figure 13

The nine frames must be slid onto the rails one after the other so that the guides engage with the rails and the vertical sheets for connecting the absorbing elements face the head of the crash cushion (see Figures 12 and 13).

6. Installing the “crash cushion rail elements” of the sled



Two rail elements must be affixed to the sled at three points (see Figure 14)

For this purpose, six M16x40 FK 6.8 round flathead screws are inserted through the 18x30mm elongated holes in the rail elements, **three 40x18x4 washers** are slid on, and then they are inserted through the 18 mm diameter holes in the sled. Each screw must be affixed with a 40x18x4 washer and M16 FK 6 nut.

The tapers on the ends of the rail elements must also point away from the sled (see Figure 15).

Figure 14

7. Installing the “crash cushion sled”

The sled is slid onto the rails so that both rail elements engage with the rails (see Figures 15 and 16).



Figure 15



Figure 16

8. Installing the absorber elements

The crash cushion consists of nine segments (see Figure 17).

Only segments 2 to 9 are equipped with absorber components.

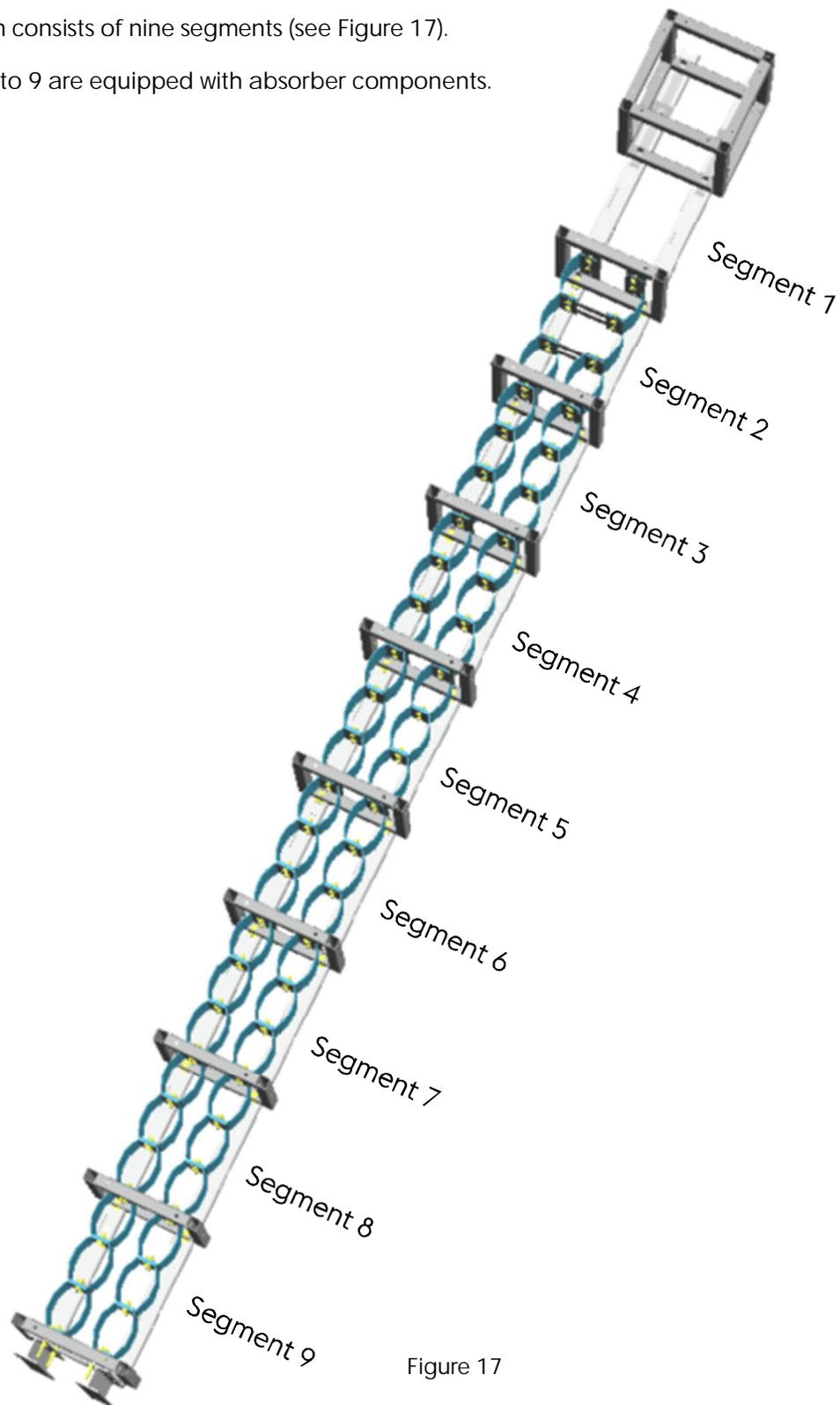


Figure 17

8.1. Installing the absorber elements in segments 3 to 7

First, six absorber half-shells are screwed together loosely to form an "absorber package" as shown in Figure 18.

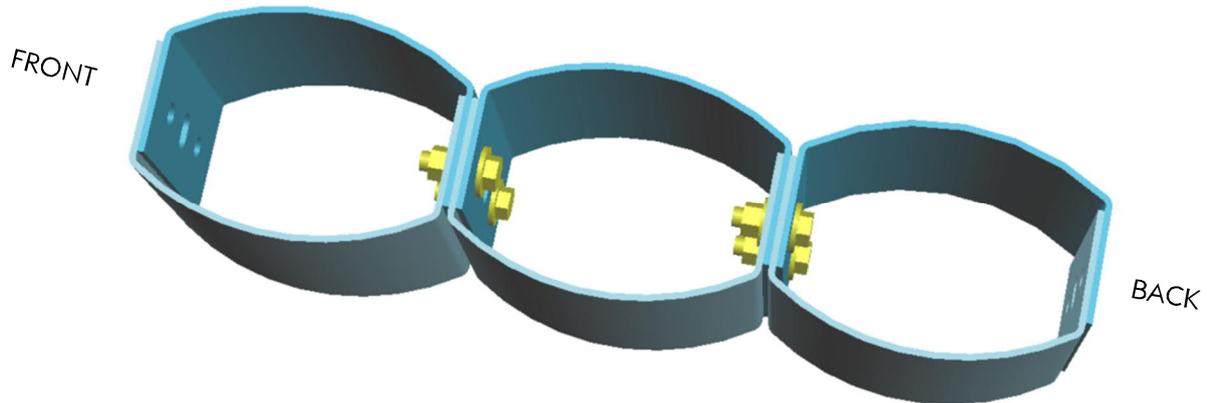


Figure 18

To accomplish this, two absorber half-shells are positioned as mirror images and attached on both sides with another pair of absorber half-shells, each connected with two M16x50 FK 8.8 hexagon bolts with a 40x18x4 washer already fitted as shown in Figure 19 and affixed with one 40x18x4 washer and M16 FK 8 hexagon nut.

In total, ten of these loosely attached "absorber packages" are required for segments 3 to 9.

Two "absorber packages" are arranged symmetrically next to each other for each segment, installed between the respective frame (see Figure 19).

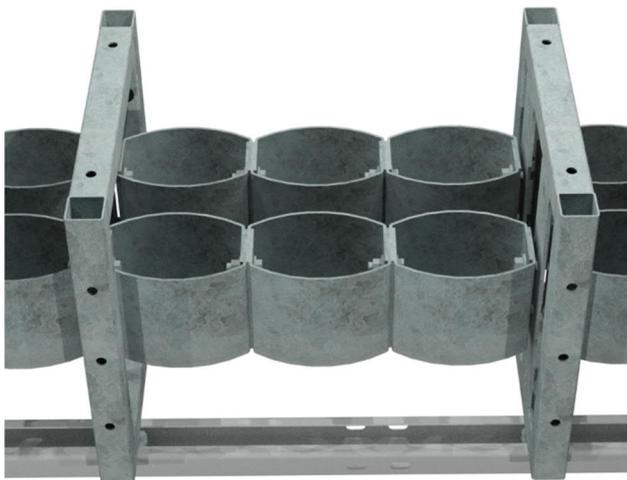


Figure 19

absorber half-shell sets are screwed directly into the frame in front of the backup. To accomplish this, a M16x50 FK 8.8 hexagon bolt with a 40x18x4 washer already fitted on is inserted through the 30x18 mm elongated hole

The absorber packages of two segments are also connected to each other by two hexagon bolts.

To accomplish this, a M16x50 FK 8.8 hexagon bolt with a 40x18x4 washer already fitted on is inserted through the empty 18 mm diameter holes for the last pair of absorber half-shells, through the 30x18 mm elongated hole in the web plate of the frame, and through the 18 mm diameter holes of the first pair of absorber half-shells in the next segment and affixed with one 40x18x4 washer and one M16 FK 8 hexagon nut.

In segment 9, the last pairs of absorber half-shell sets are screwed directly into the frame in front of the backup. To accomplish this, a M16x50 FK 8.8 hexagon bolt with a 40x18x4 washer already fitted on is inserted through the 30x18 mm elongated hole

in the web plate of the frame and the 18 mm diameter holes of the absorber half-shell set and affixed with one 40x18x4 washer and one M16 FK 8 hexagon nut.

8.2. Installing the absorber elements in segment 2

The installation of the absorber set for the second segment of the crash cushion, consisting of eight symmetrically arranged absorber half-shells and four connections, is done in accordance with Figure 20.

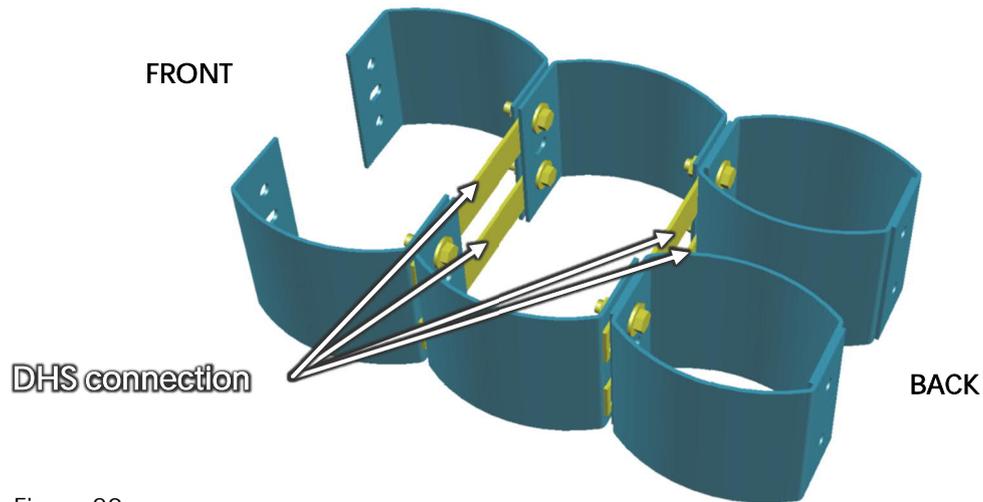


Figure 20

Two pairs of absorber half-shells arranged next to each other are affixed one after the other to two individual absorber half-shells with the convex side facing outward. The spacing of the absorber half-shells is determined by the "DHS connections" that also have to be affixed between the absorber half-shells.

To accomplish this, each of the four M16x50 FK 8.8 hexagon bolts already fitted with a 40x18x4 washer is inserted through the 18 mm diameter hole of the absorber half-shell, through the 20 mm diameter hole for the connection, and again through the 18 mm diameter absorber half-shell hole, and affixed with a 40x18x4 washer and a M16 FK 8 hexagon nut.



Figure 21

The pre-assembled absorber package for segment 2 is similarly screwed to the absorber package for segment 3 in the same way as segments 3 to 9 were attached to the others (see Figure 21).

Screwing the absorber package onto the web plate of the front frame is done with four M16x50 FK 8.8 hexagon bolts with 40x18x4 washers fitted on them, then inserted through the 18 mm diameter holes of the absorber half-shells and the elongated 30x18 hole in the web plate of the frame and affixed with a 40x18x4 washer and M16 FK 8 hexagon nut (see Figure 21).

9. Installing the “crash cushion anchorage insulator”

The exact position of the seven frames between segments 2 and 8 is set by two anchorage insulators.

The top end of the anchorage insulator is affixed to the inside of the frames and the bottom end to the outside of the rails.

To accomplish this, an M10x80 FK4.6 hexagon bolt fitted with an 11 washer is inserted at the top end through the 12x30 elongated hole of the anchorage insulator and the 18 mm diameter hole on the inside of the frame and affixed with an 11 washer and an M10 FK 4 hexagon nut. At the bottom end, an M16x30 FK 6.8 flathead bolt is inserted from the inside through the 36x18 mm outside elongated hole in the railing and the 18 mm diameter hole in the anchorage insulator and affixed with a 40x18x4 washer and M16 FK6 hexagon nut (see Figures 22 and 23).

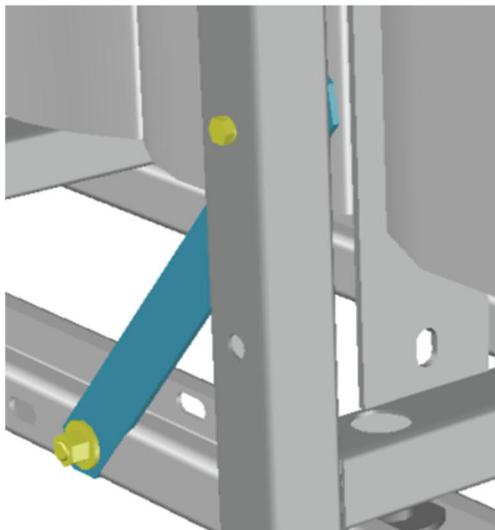


Figure 22

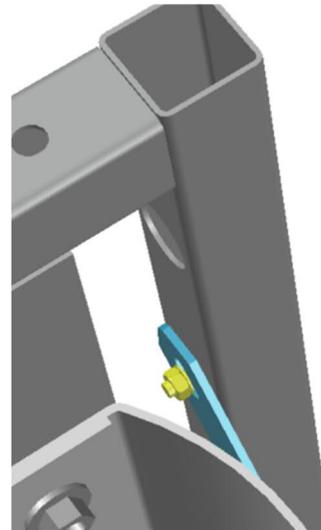


Figure 23

Please note: If the hole patterns used to screw on the anchorage insulator do not exactly align with the rails due to assembly tolerances, the frame in question must be correctly positioned beforehand. Additional loosening of the screw connections of the absorber elements can also be useful.

10. Tightening the screw connections of the absorber elements

After fixing the position of the frames by tightening the screws on the anchorage insulator, all screws on the absorber elements in segments 2 to 9 must be tightened.

11. Connecting the last frame to the I120 post

The back frame is connected to each I120 post with two M16x160 FK8.8 hexagon bolts.

To accomplish this, four 6KT hexagon bolts, each fitted with a 40x18x4 washer, are inserted through the 18x30 mm elongated holes on the top and bottom end of the two web plates of the frame and inserted into the I120 posts through the 24x36 elongated holes behind it and affixed with one 40x18x4 washer and M16 FK8 hexagon nut (see Figure 24).

Please note: The frame must only be tightened onto the I-post enough to keep the vertical sheets of the frame from bending and the bolts cannot be loosened by hand.

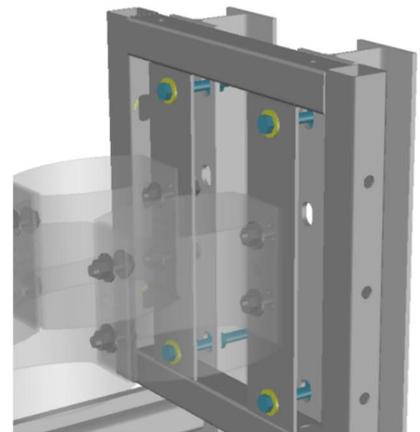


Figure 24

12. Installing the "crash cushion LS.S2A end pieces"

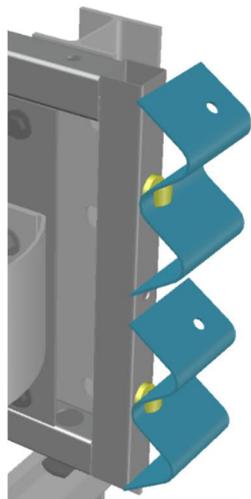


Figure 25

Two LS.S2A end pieces are screwed onto the back frame, which is already connected to the I120 posts, on both sides.

To accomplish this, one M16x35 FK4.6 hexagon bolt is inserted through each 20 mm diameter hole in the middle axis of the end pieces so that the bolt head fits closely to the end piece. **Two 40x18x4 washers** must also be fitted to each bolt. Only then can the bolts be inserted through the 18 mm diameter holes positioned on the side of the frame and affixed on the inside with one 40x18x4 washer and one M16 FK6 hexagon nut.

The middle axis of the end pieces must be horizontal and the 18 mm diameter holes in the sides of the end pieces must be located behind the frame (see Figure 25).

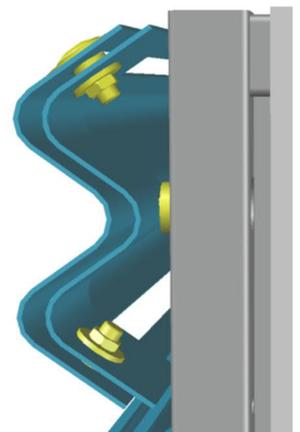


Figure 26

Please note: If an additional FRSs are connected to the crash cushion, the corresponding "crash cushion end piece" is replaced by an "LS.S2A crash cushion" guard rail in accordance with the "crash cushion<->FRS" data sheet.

13. Installing the "crash cushion LS.S2A" guard rails in segment 9

Two LS.S2A are mounted on each side so that the 20 mm diameter hole in the middle axis of the LS.S2A is covered by the 18 mm diameter hole located on the side of the frame and so that the elongated holes lie over the 18 mm diameter holes on the sides of the end pieces (see Figures 26 to 28).

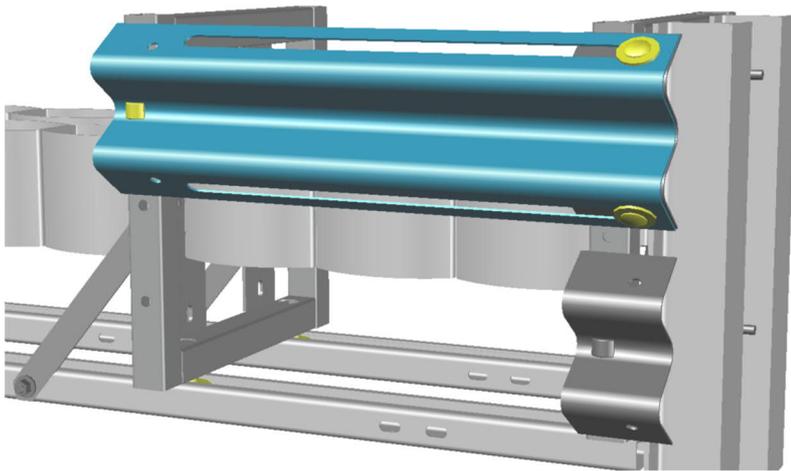


Figure 27

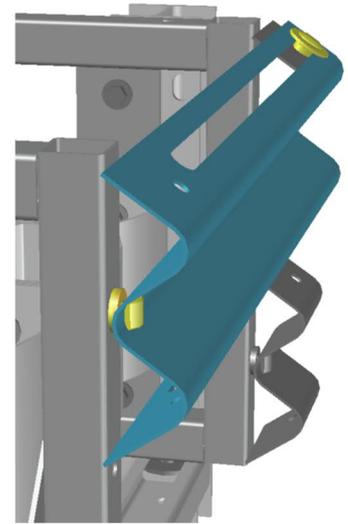


Figure 28

To accomplish this, one M16x35 FK4.6 hexagon bolt is inserted through each 20 mm diameter hole in the middle axis of the LS.S2A so that the bolt head fits closely to the axle radius. **Two 40x18x4 washers** must also be fitted. Only then can the bolts be inserted through the 18 mm diameter hole positioned on the side of the frame and affixed on the inside with one 40x18x4 washer and one M16 FK6 hexagon nut.

The back end of the LS.S2A is affixed to the end pieces with two M16x35 FK4.6 round flathead bolts.

Before this is done, a 20 washer (60x22x4) and 11 mm spacer are fitted onto each of the M16x40 FK6.8 flathead bolts.

The bolt is then inserted into the end pieces through the elongated hole of the LS.S2A and the 18 mm diameter hole and affixed with one 40x18x4 washer and M16 FK6 hexagon nut (see Figures 26 to 31). The spacer fits into the elongated hole.



Figure 29



Figure 30



Figure 31

14. Installing the "crash cushion LS.S2A" guard rails in segment 8 to 1

The LS.S2A is affixed from back to front similar to the procedure used in segment 9 (see Figures 27 to 35).

The only difference is that in segments 8 to 1 the elongated holes in the edges of the guard rail do not abut to the end pieces, rather they must be covered by the 18 mm diameter holes in the edges of the already installed LS.S2A (see Figure 32).

Please note: It is necessary to make sure the 11mm spacer is located in the elongated hole of the guard rail and it is not pinched (see Figure 34).

The four LS.S2A in the first segment must be screwed on the sled together with the head pieces.

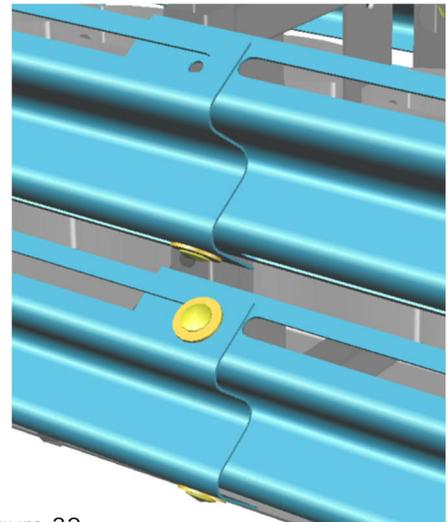


Figure 32

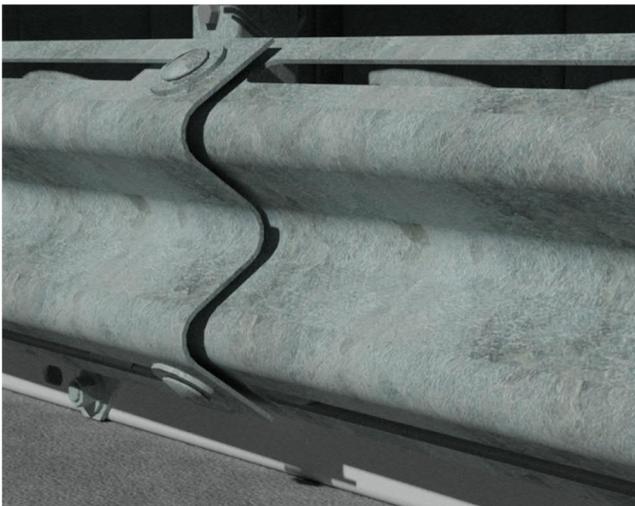


Figure 33



Figure 34

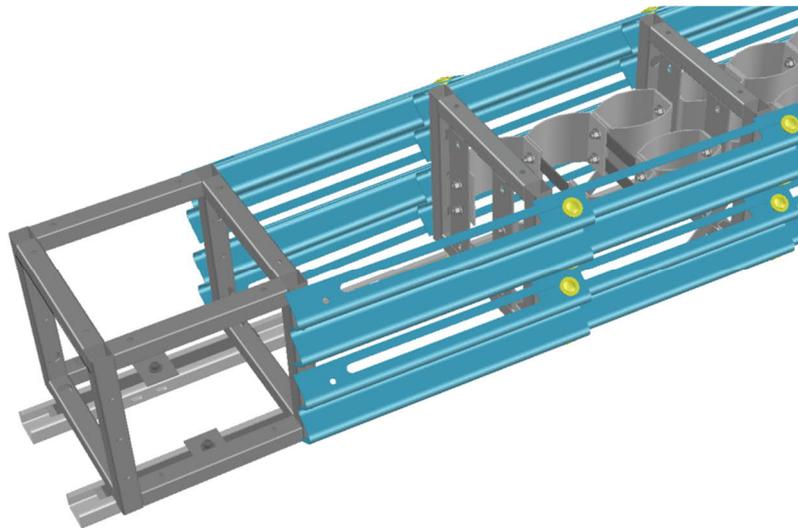


Figure 35

15. Installing the “crash cushion LS.S2A heads”

Both head pieces form the front cap of the overlapping guard rail strips. It is important to ensure the elongated LS.S2A properly overlaps. The guard rail ends of the head pieces must always point outwards.

Each head piece is bolted laterally to the sled in the middle axis with four M16x55 FK4.37 square head screws (see Figures 36 and 37).

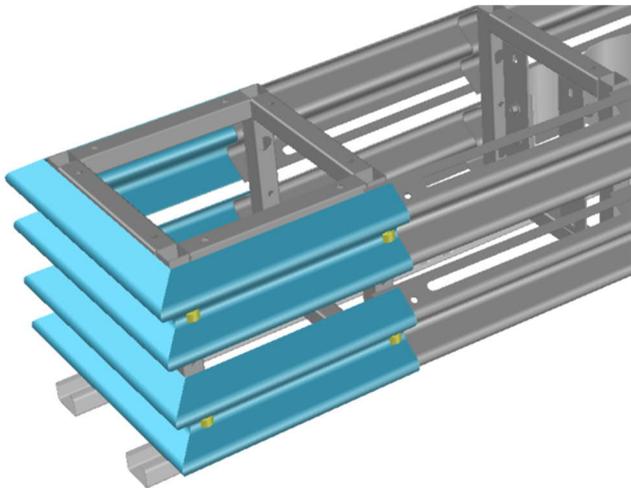


Figure 36

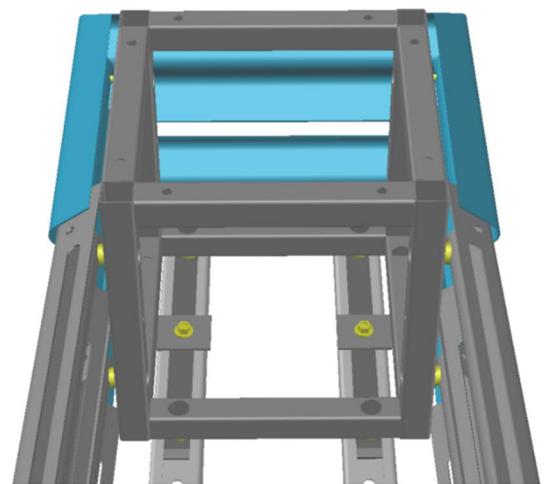


Figure 37

To accomplish this, the back M16x55 FK4.6 square head screws are inserted through the 20x26 mm elongated hole at the ends of the head pieces, through the 20 mm diameter hole in the respective LS.S2A. Subsequently three 40x18x4mm washers are fitted and only then are the screws inserted through the 18 mm diameter holes on the side of the sled and affixed on the inside with a 40x18x4 washer and M16 FK6 hexagon nut.

The front M16x55 FK4.6 square head screws are first inserted through the 20x26 mm elongated hole at the bend in the headpieces and then through the 18 mm diameter holes in the sled and affixed on the inside with one 40x18x4 washer and M16 FK6 hexagon nut.

Please note: It is important to ensure that the head pieces are bolted to the sled in the middle and symmetrically (see Figure 37).

16. Torques for threaded connections

Thread / Strength class	Torques			
	minimum		maximum	
M10 / 4.6	10	Nm	17	Nm
M16 / 4.6	35	Nm	70	Nm
M16 / 6.8	35	Nm	150	Nm
M16 / 8.8	35	Nm	210	Nm
M18 / 8.8	80	Nm	330	Nm

Please note: When tightening threaded connections that are not pre-stressed in accordance with the plan in the range of the torques given above, make sure that everything is even as much as possible at the tightening point.

17. Conformity check

The following checks must be performed continuously during installation and the final inspection:

- Proper alignment and bolting of components
- Proper placement of the spacers to avoid pinching the guard rails.
- Proper overlap of components
- Symmetrical alignment of components

Appropriate corrective measures must be taken in the event of deviations outside the permitted tolerances.

Once the installation activities are complete, an inspection must be performed during handover to ensure that the installation was done correctly in accordance with the installation instructions and documented in the acceptance protocol.

18. Cleaning on the construction site

Dispose of all residual material (including fasteners), packing material such as wooden underlays, screw boxes, sheets, packing straps, etc. and other waste.

Leave the construction site only after sweeping it.

REPAIRS TO THE VEHICLE RESTRAINT SYSTEM

All components that show mechanical damage or deformation after an accident must be replaced with new components. Follow the installation instructions when assembling these parts.

In general, new fasteners must be used when repairing a vehicle restraint system.

DURABILITY OF CORROSION PROTECTION

To ensure the service life / protection period, the components of vehicle restraint systems are hot-dip galvanized in accordance with EN ISO 1461.

The protection period for zinc coatings is defined in EN ISO 14713 and depends mainly on the thickness of the coating. It can generally be assumed that the zinc wears off in layers. Based on the macroclimatic corrosion of category C4 known to exist on roads, zinc can be expected to erode at a rate of 2.1 to 4.2 µm per year. This results in a protection period of at least 15 years for an average zinc thickness of at least 70 µm calculated according to EN ISO 1461.

Please note: The protection period calculated using the above method only applies to macroclimatic corrosion. Microclimatic peculiarities can shorten the protection period.

INSPECTION AND MAINTENANCE

Voestalpine Krems Finaltechnik GmbH vehicle restraint systems are basically maintenance-free.

The vehicle restraint system must be visually checked at least once a year, preferably after the winter season, as part of ongoing road maintenance inspections. These inspections should look for deformed components and check that the fasteners are screwed in properly. The rail system must be kept free of dirt and soiling that could negatively impact the proper function of the system.

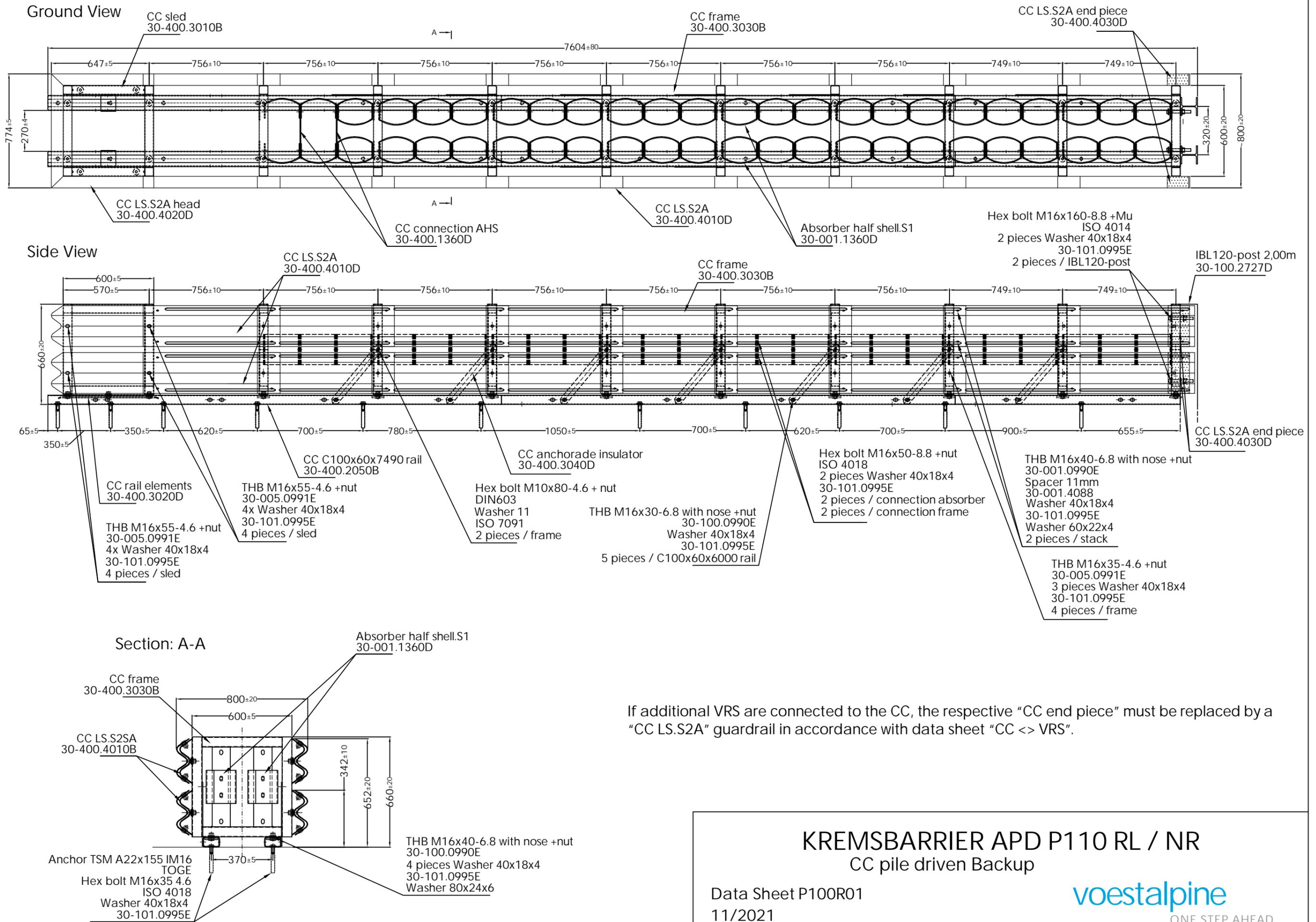
RECYCLING / DISPOSAL

Dismantled vehicle restraint systems or components replaced when repairs are made should be disposed of in accordance with legal regulations and disposed of in recycled waste. The components of Voestalpine Krems Finaltechnik GmbH vehicle restraint systems are 100% recyclable.

Packaging material and other waste must be recycled or disposed of in accordance with legal regulations.

Toxic or hazardous materials are not used in Voestalpine Krems Finaltechnik GmbH vehicle restraint systems.

The content of this drawing is our intellectual property. The drawing is entrusted to the recipient for personal use only. Without our written approval, it may not be reproduced or made accessible to third parties. We will prosecute violations. VOESTALPINE KREMSFINALTECHNIK GmbH



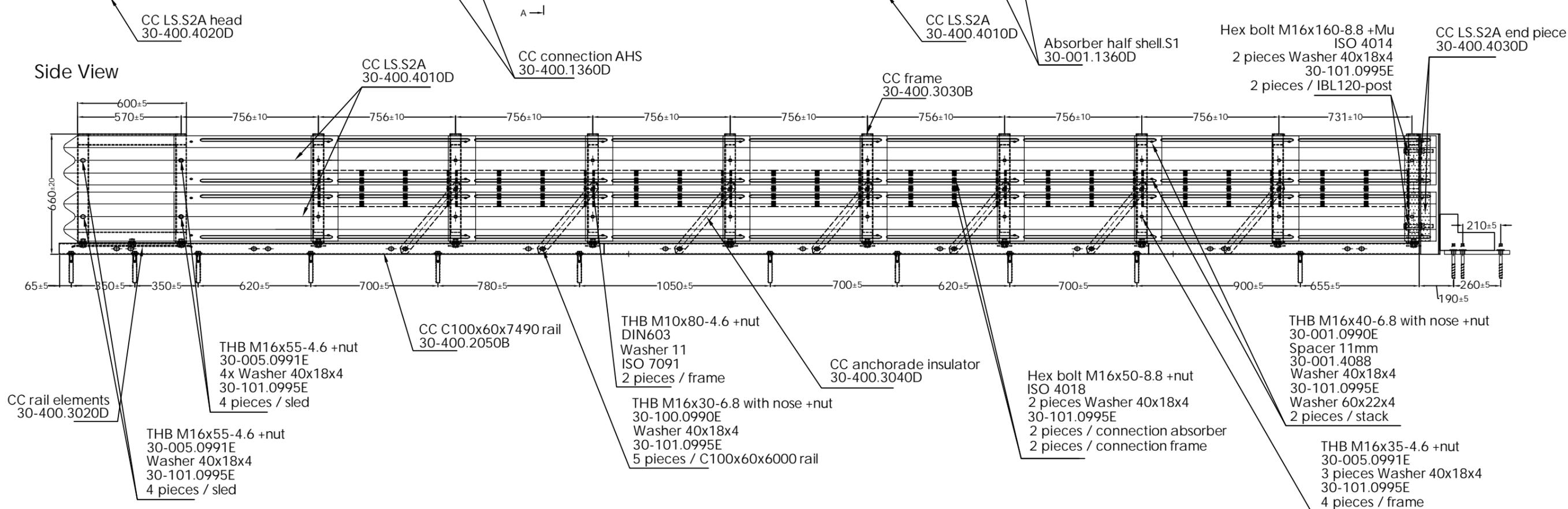
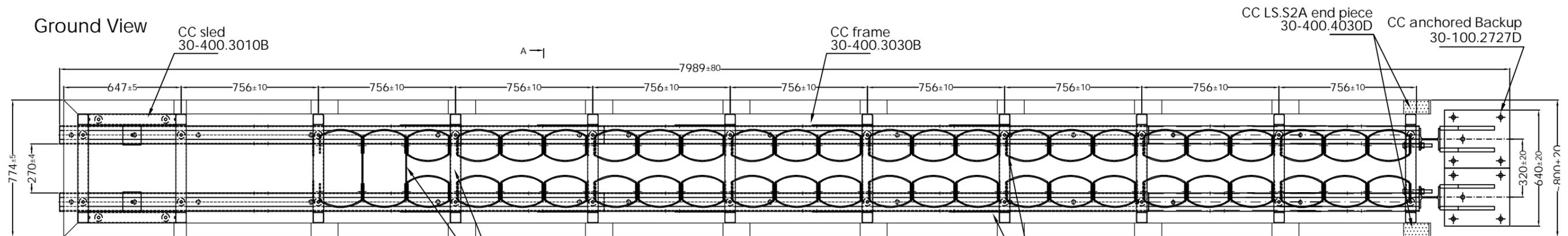
If additional VRS are connected to the CC, the respective "CC end piece" must be replaced by a "CC LS.S2A" guardrail in accordance with data sheet "CC <> VRS".

KREMSBARRIER APD P110 RL / NR

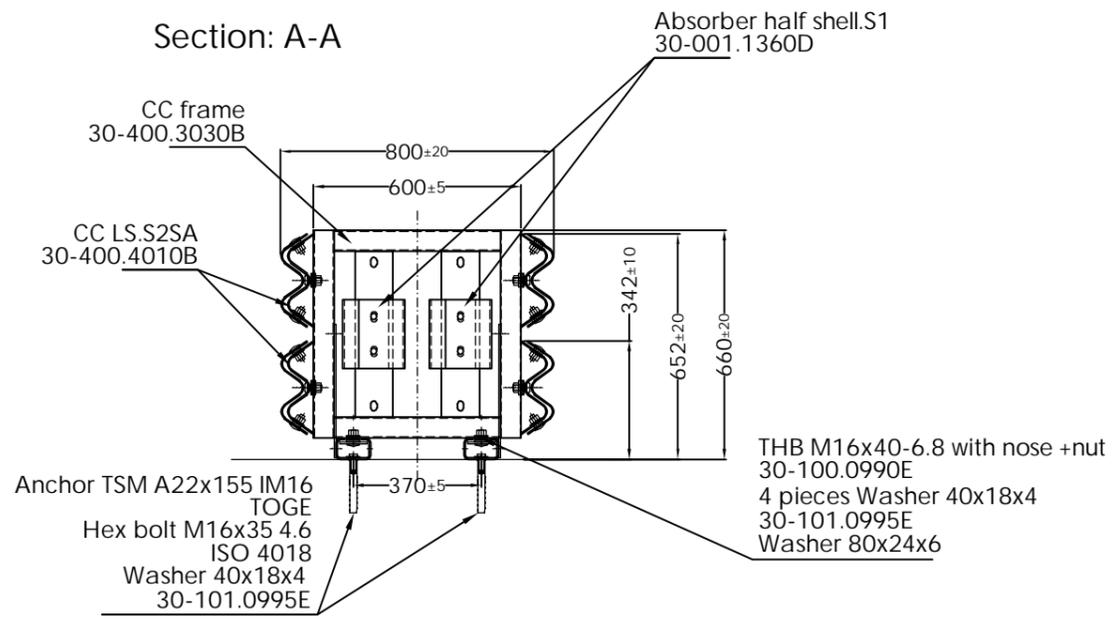
CC pile driven Backup

Data Sheet P100R01
11/2021

The content of this drawing is our intellectual property. The drawing is entrusted to the recipient for personal use only. Without our written approval, it may not be reproduced or made accessible to third parties. We will prosecute violations. VOESTALPINE KREMSFINALTECHNIK GmbH



Section: A-A



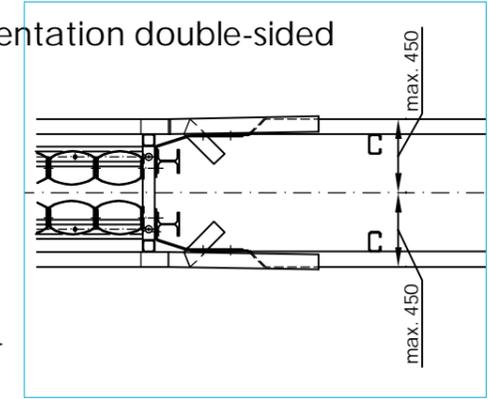
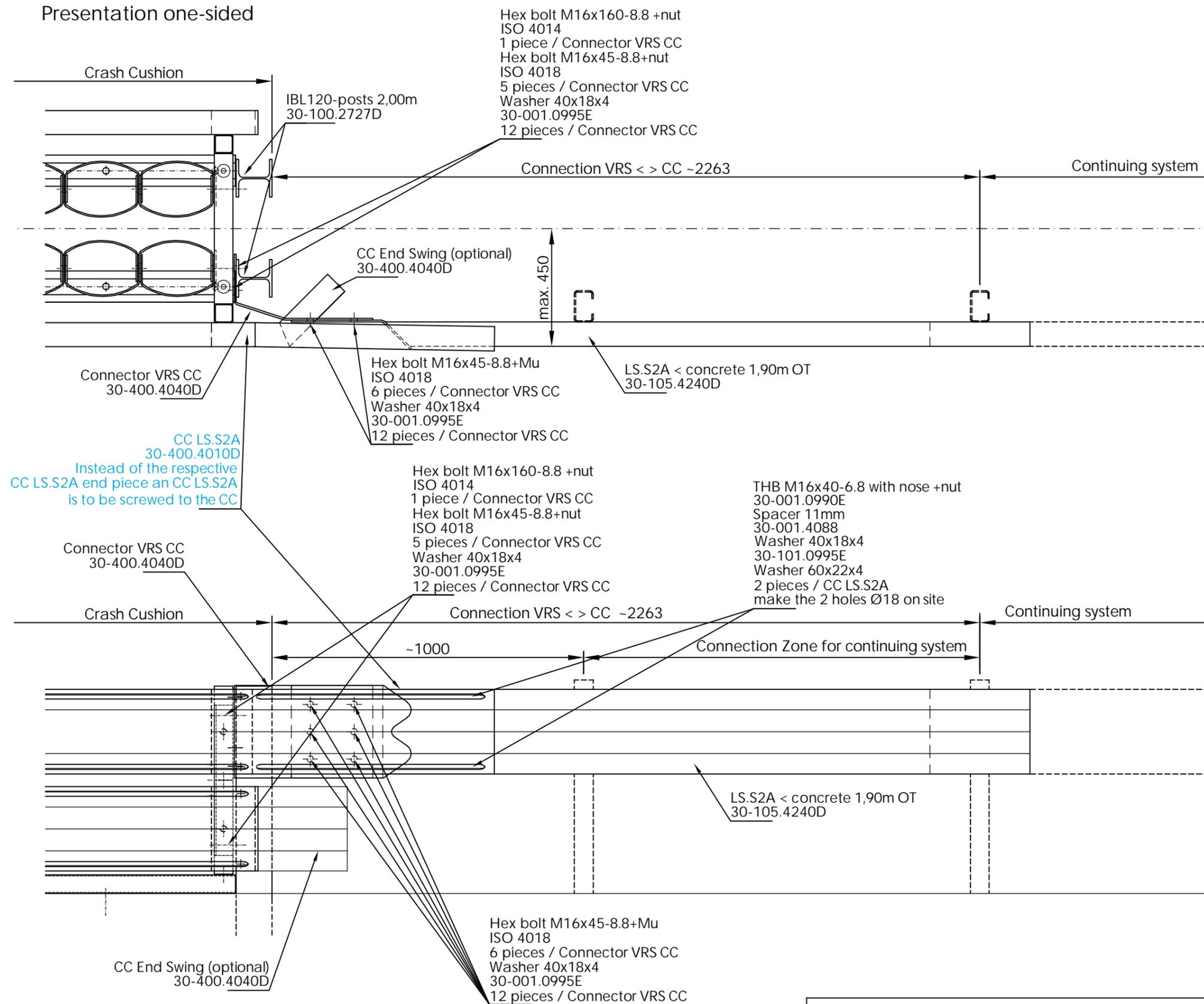
If additional VRS are connected to the CC, the respective "CC end piece" must be replaced by a "CC LS.S2A" guardrail in accordance with data sheet "CC <> VRS".

KREMSBARRIER APD P110 RL / NR
CC pile driven Backup

Data Sheet P100R01
11/2021

Connection to Vehicle Restraint System one-sided and double-sided

Presentation double-sided



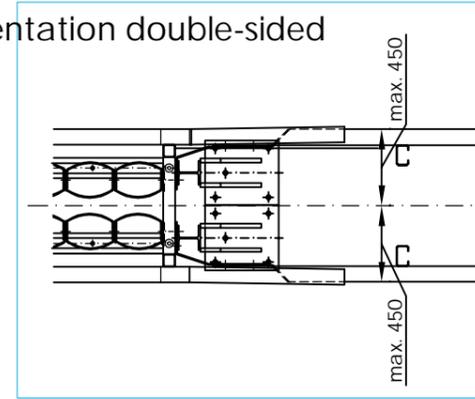
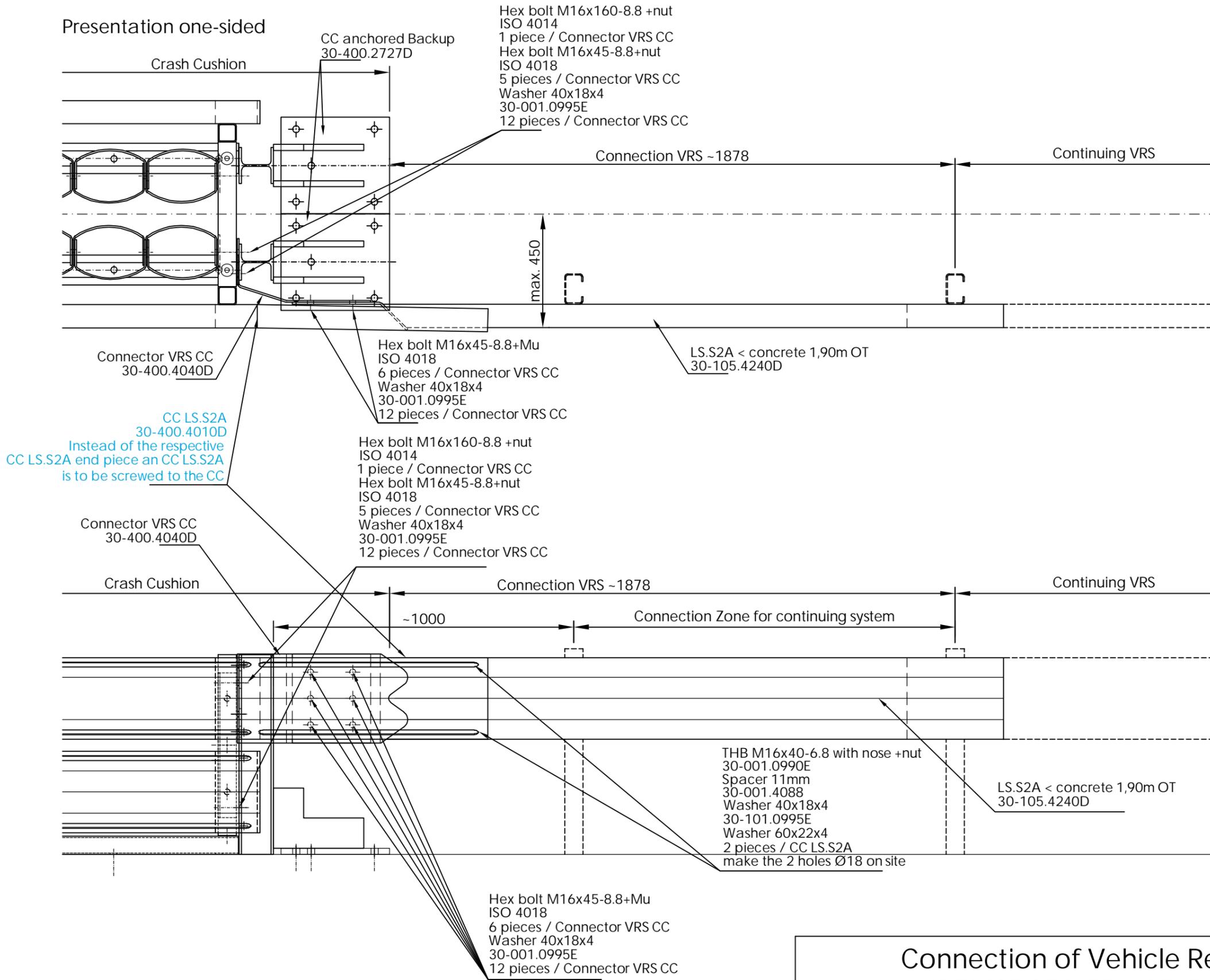
If further VRS are connected to the CC, the respective CC end piece" has to be replaced by a guardrail "CC LS.S2A".
If the arrangement of an "CC End Swing" is required in the two-way traffic area, this replaces the corresponding "CC end piece".

Connection of Vehicle Restraint Systems to KREMSBARRIER APD P50, 80, 100, 110

Data Sheet CC pile driven Backup < > VRS
01/2022

Connection to Vehicle Restraint System one-sided and double-sided

Presentation double-sided



The content of this drawing is our intellectual property. The drawing is entrusted to the recipient for personal use only. Without our written approval, it may not be reproduced or made accessible to third parties. We will prosecute violations. VOESTALPINE KREMS FINALTECHNIK GmbH

If further VRS are connected to the CC, the respective CC end piece" has to be replaced by a guardrail "CC LS.S2A".

Connection of Vehicle Restraint System to KREMSBARRIER APD P50, 80, 100, 110

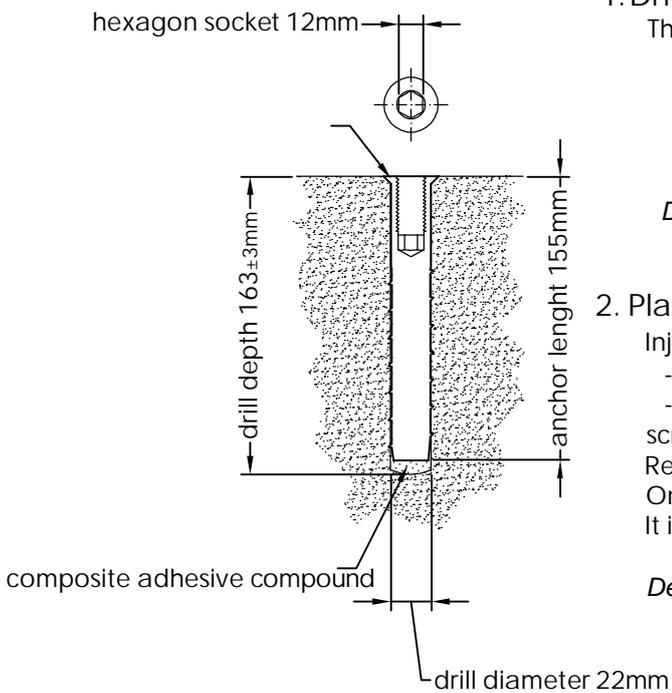
Data Sheet CC anchored Backup <> VRS
01/2022

ONE STEP AHEAD.

ASPHALT ANCHOR TSM A22 x 155

Installation Instruction

Data Sheet TSM A22x155



1. Drilling bore hole

The holes are normal to the mounting surface.

- drill diameter 22mm
- drill depth 163 ± 3mm
- controlling the drilling depth
- to clean the bore hole

Details: The use of a drill rig with a depth stop ensures accurate production drilling

2. Placing the anchor

Inject composite adhesive compound

- ATA 2004C for anchoring in asphalt
 - CFT 410V for anchoring in concrete
- screw in the concrete screw up to the collar.

Remove redundant compound mass.

One cartridge lasts for about 33 pc. asphalt 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

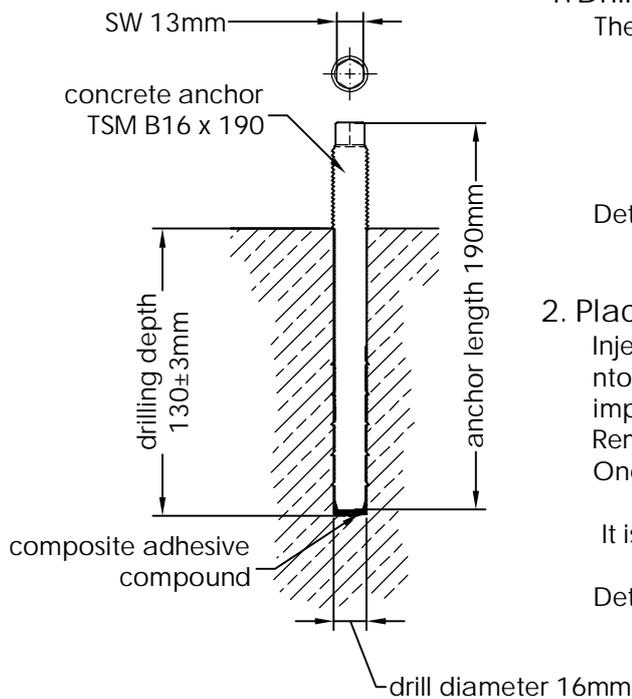


screw the asphalt anchor

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 APD P110 RL / NR

Performance class 110 crash cushion
anchoring in asphalt and concrete



Need for Crash Cushion APD P110 RL / NR

Piece	Component designation	Weight [kg]	Designation-number	Material / Quality	Corrosion protection
2	CC rail element	3,11	30-400.3020D	S355JO	in accordance EN ISO 1461
36	CC LS.S2A	9,82	30-400.4010D	S355JO	
2	CC LS.S2A head	24,32	30-400.4020D	S355JO	
2	CC C100x60x7490 rail	56,80	30-400.2050B	S355JO	
1	CC sled	38,20	30-400.3010B	S355JO	
9	CC frame	15,40	30-400.3030B	S355JO	
14	CC anchorade insulator	1,15	30-400.3040D	S355JO	
92	Absorber half shell.S1	3,51	30-001.1360D	S355JO	
3	CC installation aid	0,72	30-400.2020D	S355JO	
4	CC LS.S2A end piece	1,57	30-400.4030D	S355JO	
4	CC connection AHS	0,75	30-400.1360D	S355JO	
2	IBL120 post 2.00m BE	41,39	30-100.2727D	S235JR	
Connectors					
20	THB M16x30-6.8 with nose +nut	0,11	30-100.0990E	6.8	in accordance EN ISO 10684
96	THB M16x40-6.8 with nose +nut	0,13	30-100.0990E	6.8	
536	Washer 40x18x4	0,03	30-001.0995E	100HV	
72	Spacer 11mm	0,02	30-001.4088E	S235JR	
40	THB M16X35-4.6 +nut	0,14	30-005.0991E	4.6	
8	THB M16X55-4.6 +nut	0,17	30-005.0991E	4.6	
14	Hex bolt M10x80-4.6 +nut	0,08	ISO 4016	4.6	
14	Washer 11	0,00	ISO 7091	100HV	
100	Hex bolt M16x50-8.8 +nut	0,14	ISO 4018	8.8	
4	Hex bolt M16x160-8.8 +nut	0,28	ISO 4014	8.8	
18	Washer 22 (80x24x6)	0,22	ISO 7094	100HV	
72	Washer 20 (60x22x4)	0,08	ISO 7093-2	100HV	

11/2021

Parts list

KREMSBARRIER APD P110 RL / NR

Performance class 110 crash cushion
anchoring in asphalt and concrete

Anchoring system I+II

22	Anchor TSM A22x155 IM16	0,35	TOGE	8.8	TOGE-KORR
22	Washer 40x18x4	0,03	30-001.0995E	100HV	in accordance with EN ISO 10684
22	Hex bolt M16x35-4.6 +nut	0,12	ISO 4018	4.6	

Anchoring system III

22	Anchor TSM A22x155 IM16	0,35	TOGE	8.8	TOGE-KORR
22	Washer 40x18x4	0,03	30-001.0995E	100HV	in accordance with EN ISO 10684
22	Hex bolt M16x35-4.6 +nut	0,12	ISO 4018	4.6	
10	Anchor TSM B16 M18x190	0,27	TOGE	10.9	TOGE-KORR
10	hex nut M18-8	0,04	ISO 4032	8.8	in accordance with EN ISO 10684
10	Washer 40x18x4	0,03	30-001.0995E	100HV	

11/2021