ALPASLAN YOL İNŞ. TAAH. MET. SAN. VE TİC. A.Ş.

AG04 1.33 Bridge

H1 – W1 – B

Passive steel restraint system with high containment level, tested under DIN EN 1317-2

INSTALLATION INSTRUCTION

Index

1. General Information

1.1. Introduction

The safety barrier system is passive safety barrier equipment on bridges, which serves to the protection of the traffic.

In order to reach the performance of the safety barrier according to test reports, following requirements are to be fulfilled exactly during the set-up and installation. In case of acting different of the requirements indicated in the instruction manual without having consulted the manufacturer during the construction, the responsibility of the defects for the construction material will go over from the manufacturer to the installation company.

1.2. Manufacturer

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Vergi Dairesi-No: Yüreğir - 056 235 116

1.3. Storage and Transportation Specifications Related to The Material

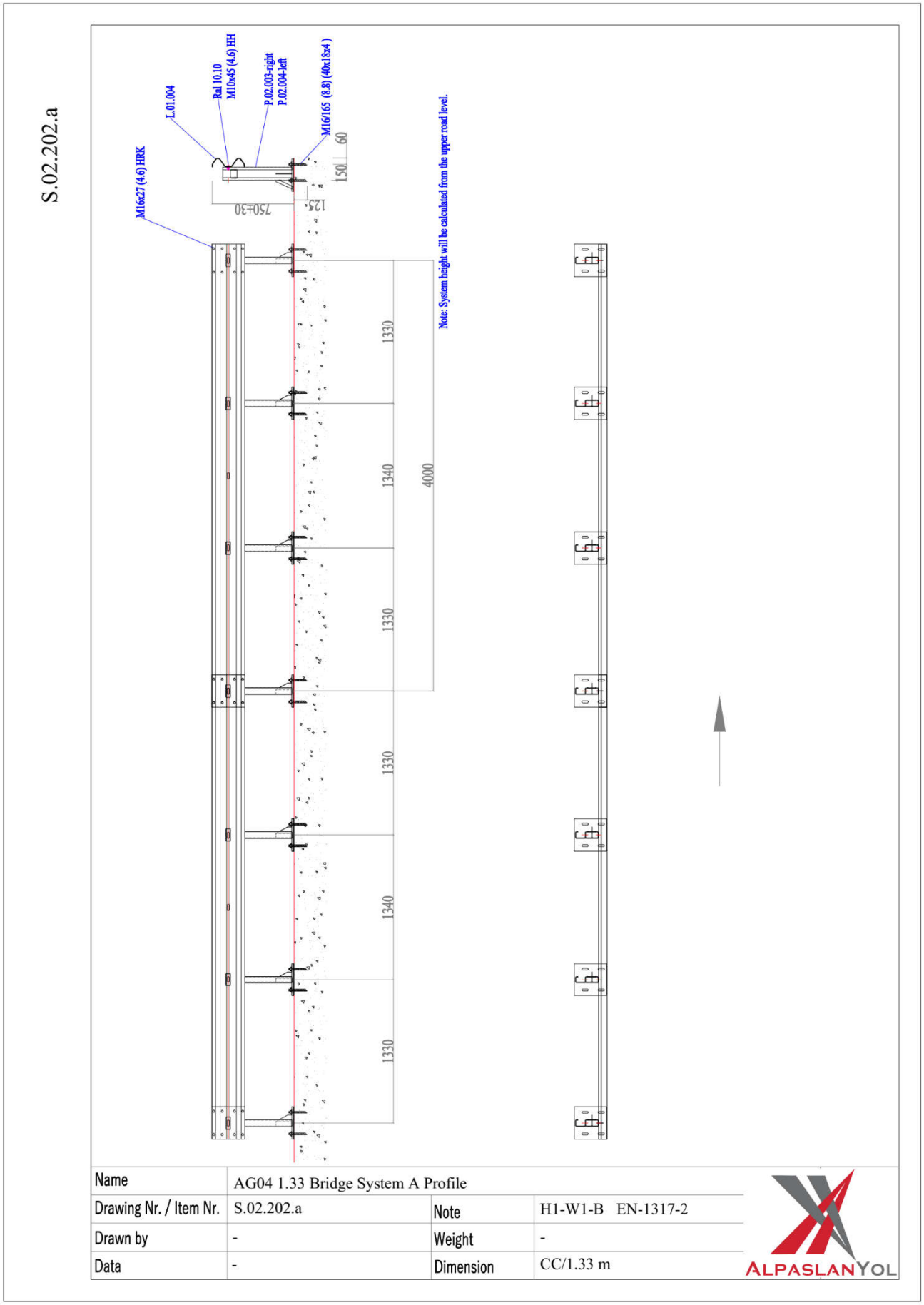
All parts of the systems are to be packed and stored professionally. They have to be stored and transported in such a way to protect from getting dirty, corrosion, acid and of influences that could harm. Construction parts that have been laid for installation have to be install in very shortly. During transportation, the load has to be assured against sliding and falling from the vehicle. Traffic rules and national regulations have to be obeyed during the transportation.

2. Technical Data

2.1. System Description

Initial type testing (ITT)	TB11:**0047/ME/HRB/14** TB42: **0041/ME/HRB/14**
Containment Level according to EN 1317	**H1**
Working Width	**W1** (W=0,50 m)
ASI Value	**B**
Test length	52 m. (+ terminals 8,50 m and 8,50 m)
Construction height (from the upper level road surface)	75 cm with a tolerance of + /- 3 cm
Anchoring	4 x M16x165 8.8 bolts and chemical resin
Construction width	21,5cm
Post spacing	1,33 m
Material	Steel S235JR, S275JR and S355JR
Corrosion protection	Hot dip galvanizing acc. to EN ISO 1461 and EN 1179
Expected durability	Approx. 20 years, depending on atmospheric corrosion e.g. weather conditions acc. EN14713

2.2.General Drawing Of The System



Name	AG04 1.33 Bridge System A Profile		
Drawing Nr. / Item Nr.	S.02.202.a	Note	H1-W1-B EN-1317-2
Drawn by	-	Weight	-
Data	-	Dimension	CC/1.33 m

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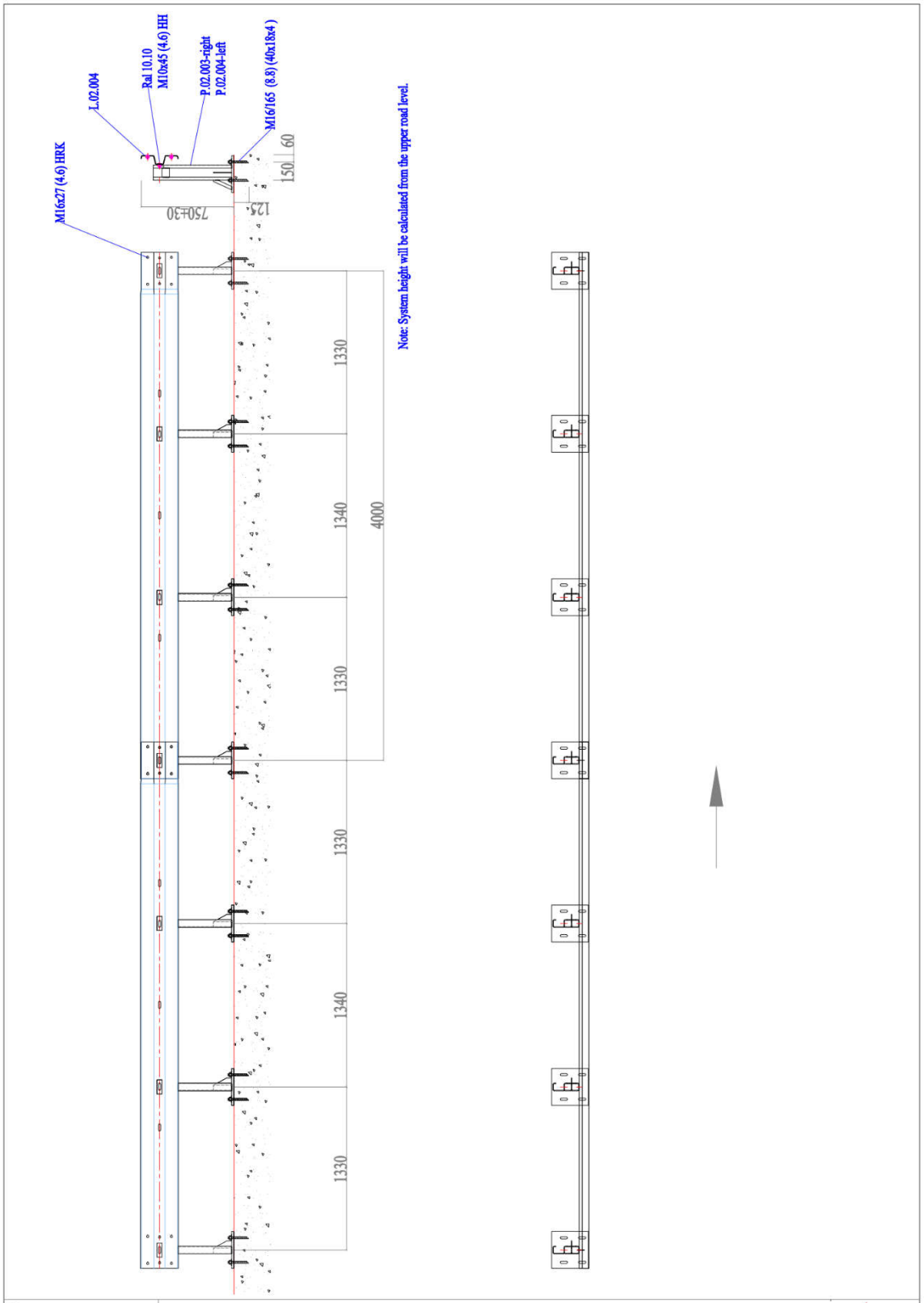
S.02.202.b



Name	AG04 1.33 Bridge System B Profile		
Drawing Nr. / Item Nr.	S.02.202.b	Note	H1-W1-B EN-1317-2
Drawn by	-	Weight	-
Data	-	Dimension	CC/1.33 m

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3. Installation Instructions

3.1.Preparatory measures

3.1.1. Personal Protective Devices

Workers are to be provided with and to use protective warning clothes as well as foot, head, ear and hand protection. Further to be provided and used are reflective safety vests.

3.1.2. Tools for Installation

- Pneumatic or hydraulic rammer to ram the posts
- Air compressor (for pneumatic machines)
- Drilling machine to drill posts, safety barriers and drillers with appropriate diameter
- A cutting motor and engineered stone
- Torque wrenches up to 140 Nm with appropriate sockets
- Other tools

3.2. Installation phases

3.2.1. Survey of the Installationground and Determination of the Installation Points

Before the start of the works, the contractor has to get information on the location and the positioning of cables, pipes, lines, natural gas lines, sewerage system, telephone-Internet lines and all lines under ground. Drilling in the field of underground lines is not allowed without taking necessary measures and permissions in advance. In general, the instructions of the cable, pipe-line etc. owners are to be followed.

3.2.2. Preparation of the installation site

In order to start the installation, first of all the normal traffic safety measures have to be taken on construction sites in line with the current national regulations. The installation equipment is to be placed on appropriate points. System components are to be transported to the installation site by truck. The material will be packed out, controlled and laid down along the construction line according to the installation. The carrier will be informed on the damages on material caused by the transportation. Upon having packed out, the packing material will be disposed in line with the current local wastage regulations.

3.2.3. Minimum installation length

The minimum installation length of the system AG04 1.33 Bridge is 52 m. Should it not be possible to conform to the required test length of the construction, so you can avoid the set –up of the test construction and thus from the system. The construction changed (shortened) this way is an untested special construction.

3.2.4. Installation area and location

AG04 1.33 Bridge is an anchored safety barrier system on beton ground, of which the crash test was carried out according to EN 1317-2 and that proved following performance classes:

- **H1 W1 B**

When choosing the construction site to be followed are the relative national regulations and the performance of the system as proved by the results of crash tests carried out according to EN 1317.
Basically, the construction site should be so, that the field available behind the safety barrier shows an appropriate working width, that has proved itself in the crash tests carried out according to EN 1317.

3.2.5. Foundation of the System

Profiled posts on base plates are fixed to the concrete foundation every 1.33m by means of 4 pieces M16x165 8.8 threaded studs and 4 pcs. M16 hexagonal nuts and 4 pcs. washer Ø50x18x4. The threaded studs seal the concrete with a chemical resin.

3.2.6. Permitted Installation Temperatures

If the assembly is in Europe, it will be independent of the environmental temperature at the time of the installation. In regions, where the minimum outdoor temperature T_{min} is under -24 ºC acc. to EN 1991-1-5/NA, the installation is to be carried out with the written consent of the manufacturer.

3.2.7. Requirements for the Installation Team

Installation is carried out by trained and qualified personnel. The assembly teams must be constantly supervised by qualified persons of the installation company and every step of self-monitoring is to be documented. (See 3.10)

3.3.Installation

3.3.1. Screw Connections of The System

The installation of the safety barrier system will be carried out only according to the given information related to the connection as shown in the table.

Bolt size	M_{min}	M_{max}
M 10	handtight	20 Nm
M 16	90 Nm	140 Nm

During the alignment of the safety barrier system, attention shall be given that the galvanized surface is not damaged. The posts have to be fixed vertically. When alignment necessary, always use a post-head-piece for protection of the material surface, hitting with the hammer directly on galvanized surfaces shall be avoided.

Small defects on the zinc surface have to be improved after careful preparation by an application of an appropriate zinc powder layer according to EN ISO 1461.

For the installation of the safety barrier as well for the installation and repair works of the new manufactured material, used shall be only new bolts, nuts and washers.
In order to get a perfect connection, the bolts have to place vertical to the construction parts to be connected and tightened duly.
The screwing devices have to be aligned accordingly. In order not to damage the zinc surface of the nuts when tightening, to be used is a washer for each nut. A plate is not a replacement for a washer.
Tools required for screwing are appropriate socket sets or screw wrench.

3.3.2. Installation Height of the System over the Road Surface

In general, for flanges up to a height difference 7.5 cm to the road surface, the installation height of the AG04 1.33 Bridge system is 75 cm ± 3 cm. The distance between the system front and edge pavement should not be higher than 0,3 m then the installation height will be measured from the surface of the road. Should this distance higher, so is the installation height to be measured directly from the installed surface.

Deviating installation heights have to be agreed with the employer and require written confirmation of the manufacturer.

3.3.3. Screwing

In order to get a perfect connection, the bolts have to sit vertical to the construction parts to be connected and tightened duly.
The screwing devices have to be aligned accordingly. In order not to damage the zinc surface of the nuts when tightening, to be used is a washer for each nut. A plate is not a replacement for a washer.
Tools required for screwing are appropriate socket sets or screw wrench.

3.3.4. Installation of the guardrails

Basically, the rails have to overlap in the direction of traffic. When making the butt joint connection, the pointed end of the rail have to be placed in the direction of traffic under the previous rail.

3.3.5. Deviation from the Basic construction

The safety barrier system AG04 1.33 Bridge has been tested according to EN 1317 on an even and straight running line. Due to the location, when it became necessary any derogation from this basic construction, it will be an untested construction. In any case the safety barrier line is to be parallel to the direction of traffic.
Where a subsequent working of guardrail components needed, no deviations from the standard parts must be performed, which may affect their working mechanism. This specification is required especially for the production of cut pieces (distance of holes, diameter of holes, number of bolts, and space between butt joints) and the shortening of posts. Edges of cut have to be covered with adequate zinc rich painting for protection against corrosion.

3.3.6. Cut pieces

In order to construct the required length of the safety barrier line in line with local conditions, it can be necessary to use shorter rails than the standard building parts. Rails can be cut to fit on site. The following conditions must be adhered to during production:

- Minimum length should be 750 mm (Profile overlapping)
- The post spacing of the safety barrier system must not be extended on installation.
- Professional cuts using angle grinder or saw.
- Professional drilling for bolt holes,
- Professional re-work of cuts and drill holes by spraying of zinc painting.

The installation of cut pieces has to be kept at minimum. Only use them in exceptional circumstances such as between 2 bridge structures.

With reference to constructional measures for the median, as well as crossings, tunnels or bridge constructions, connection to concrete safety barriers etc. not more than 1-2 cut pieces should be used between such measures.

The same applies for bridge constructions. Here, maximum 1 cut piece should be added between 2 overpasses of road per section. The dilatation rail of the safety barrier is not to be shortened.

Construction parts can only be replaced by using a drilling machine or a cutting device. Processing by welding and flame cutting or punching and striking tools as well as bending tools are not allowed.

3.3.7. Implementation of Radius

The rails have to be installed without tension. In curves with a radius of less than 30 m, pre bended rails (the so-called radius rails) have to be used. Radii are available in steps of 2,5 m.

25 m. 22,5 m. 20 m. 17,5 m. 15 m. 12,5 m. 10 m. 7,5 m. 5 m. 2,5 m.

In external curves are convex and in internal curves are concave radii to be used. It is not allowed to bend on site or when installing resulting in permanent deformation of safety barrier systems.

Especially in concave radii (inner curves) attention should be paid, that the joint overlap when screwing does not gape. Therefore it is recommended to screw first the joint overlapping and then to connect the rail to the spacers or post. The widening of the holes, i.e. by spikes is not allowed.

3.3.8. Installation of Flared Ends

Flared ends with a slope of 1:20 and in exceptional cases 1:12 are allowed. If the beginning of a safety barrier line is in the area of a rising embankment, it is possible to slide aside and connect into the cleft slopes from the board onwards. With reference to the connection into the clef slope, the rules for post distance, screwing and sinking of the end part by 12 m shall be applied. Installation height will be applied as in item 3.3.2. .

3.3.9. Terminal constructions

For granting the pulling force of the system, the beginning and ending constructions have to be made as indicated in the test report.

3.3.10. Additional Equipment

Following additional equipment can be installed to AG04 1.33 Bridge:

- Additional guiding top post, that is to be fixed at the post.
- Additional guiding top post, which will be connected to the rail with the joints. In this case, instead of the M16x27 HRK bolt a bolt M16x45 HRK has to be used at that point.
- Road signs, as long as they do not cause any danger.
- Reflectors on the safety barrier, those have to be fixed into the central hole with HRK bolts.
- Post coverings, additional special rails and their supporting parts for the protection of motorcycle drivers.

The written consent of the manufacturer is required for the fixing of additional equipment (i.e. anti-glare systems, underrun protection etc.)

The erection of road signs is not allowed. Road signs are only allowed to be erected within the working width as long as they are frangible or can be sheared off.

3.3.11. Installation Tolerances

Installation tolerances are as follows:

Measure	Tolerance
Post spacing	± 21 mm
Post or Beam deviation from alignment	on 12 m length: ± 30 mm
Deviation Of Upper Level Beam vertical	± 30 mm

3.4.Repairs

Basically, you need to replace only those components that have any residual (plastic) deformation. As such parts have lasting deformation; they will not provide the necessary safety in the system.

Not permanently deformed construction parts of a safety barrier that has fled away up to approximately 30 cm, can be re-aligned on the construction site.

If damaged safety barrier components have to be replaced, special care has to be given on undamaged rails at transition areas. After disassembly, attention has to be paid, that rails do not get damaged. Mostly, during the connection of the new rails with the existing rails, the bolt holes in length do not fit due to changes of length based on temperatures or major deflection upon heavy crashes. If the distance between the hole axis is less than 5 cm, the difference can be adjusted mostly through the unscrewing of the bolts with severel strokes. Otherwise, proceed as follows:

If the repairs are carried out at low temperature, the new rails are too short in general. The installation length between the axis of the post is higher than 4,00 m (i.e. 4,07 m), that means the overlapping is less than 30 cm. This is not allowed. So, 2 cut pieces have to be added in order to get a total installation length (i.e. 2,00 m + 2,07 m = 4,07 m).

In general, at higher temperatures or greater deflection, the overlapping of the rails is more than 30 cm. In such case, it is not necessary to add a cut piece. Instead, new holes have to be drilled. However, this is only allowed when the distance between the new edge and the existing holes is more than 2,5 cm.

Basically, cut pieces as well as the drilling of new holes should be avoided even if it means additional efforts by disassembling and installing of the neighbouring areas.

3.5. Re-usability of Safety Barrier Parts

Safety barrier components can be re-used for modifications and/or alterations when:

- the construction parts do not show any visible deformations and/or damages (i.e. torn, punched or burned holes),
- the construction parts show a galvanized layer of minimum 55 µm,
- the marked building parts, the manufacturer sign and the marking is still readable,

the already installed connection material (bolts, nuts, washers, plates, connection plate) should not be used again. Use always new material. When repairing damages caused by accidents, to be used exclusively new material.
Construction parts that cannot be used again have to be made non-useful by for example by severing or cutting the parts. Also disconnected screwing material have to be disposed in line with national regulations.

3.6. Disposal/Recycling Of System Components

Damaged construction parts and parts that cannot be used again are to be disposed/recycled entirely or to be used again in other implementation areas.

3.7. Information Related To Toxic Material

The safety barrier components consist of 2 basic construction material:

- Steel
- Zinc (Hot dip galvanising)

Both materials are not toxic and do not require any special treatment or processing.

3.8.Detailed List of System Components

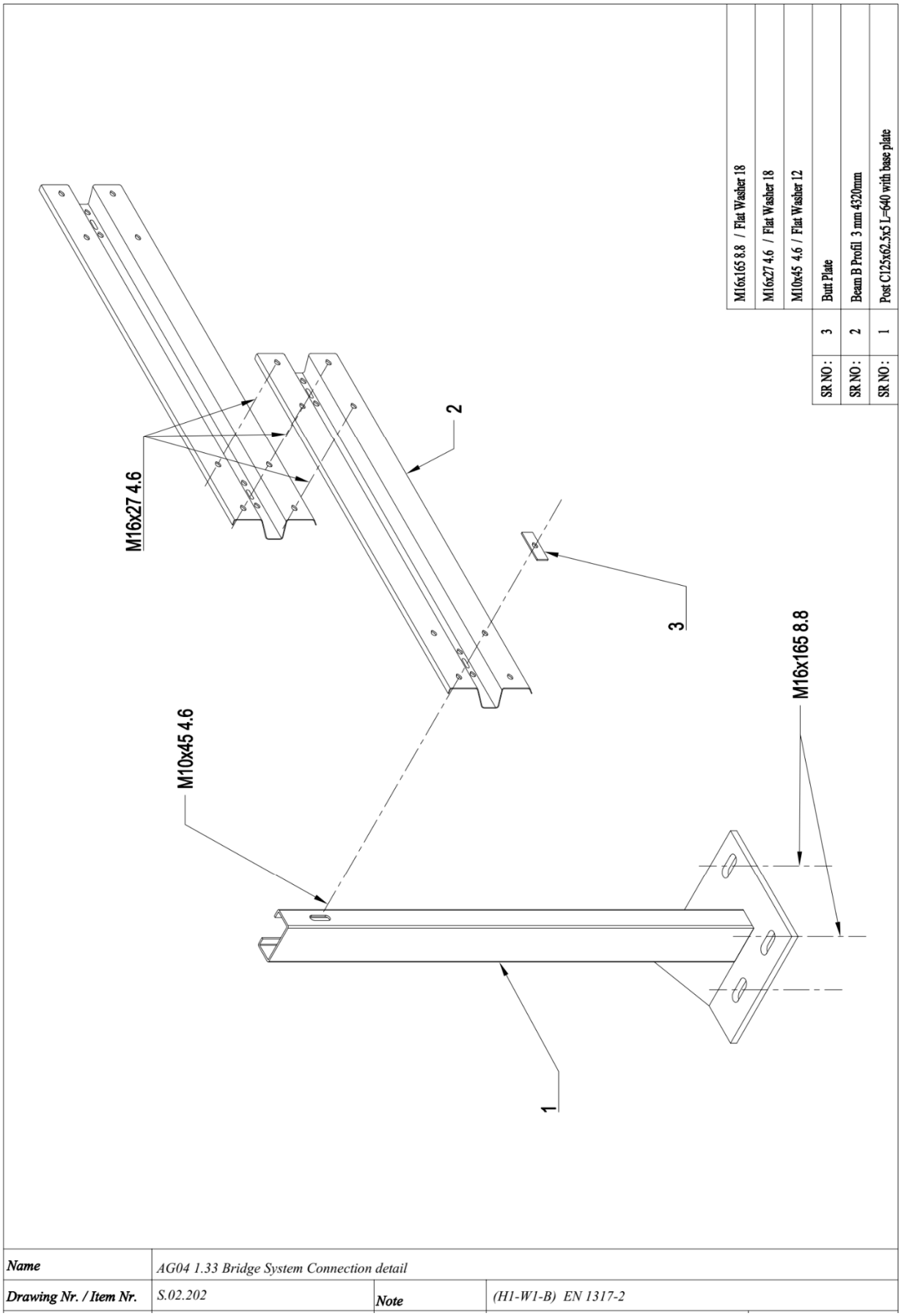
System Elenets (Profil A)

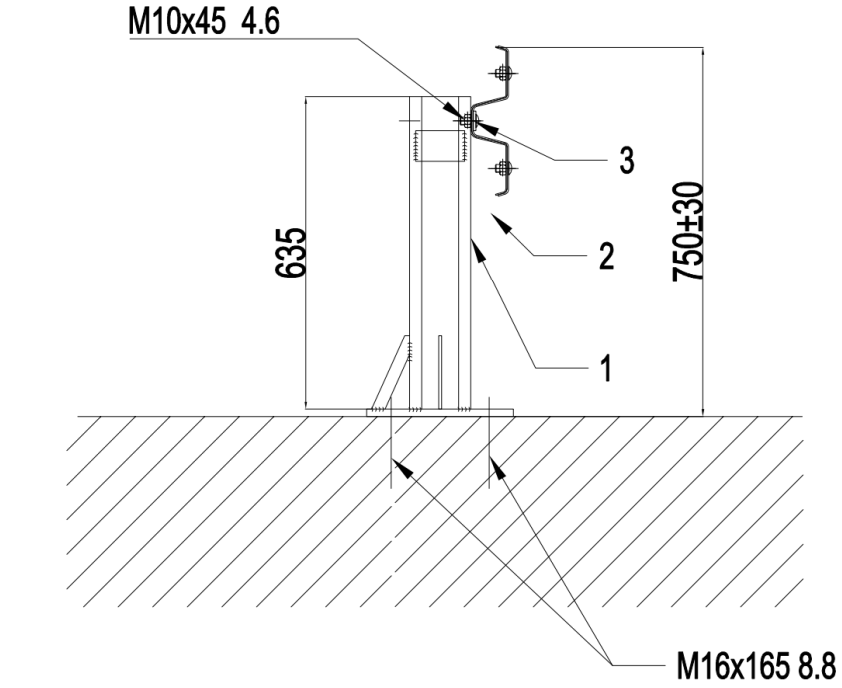
Part number	Quantity (for 4 m)	Description
P.02.001/002	3	Post C125x62.5x5 L=779 mm (S355 JR)
L.01.003	1	Barrier Beam 3 mm L=4320 mm (S275JR) Profil A
10.10	3	Butt Plate 115x40x5mm M10 (S235JR)
40.40	6	M16x27 (4.6) Set
40.42-46	3	M10x45 (4.6) Set
041.00.1	12	M16x165 8.8 anchors + 50x18x4 mm Washer
41.25	3	Gasket (300X300X3 mm)

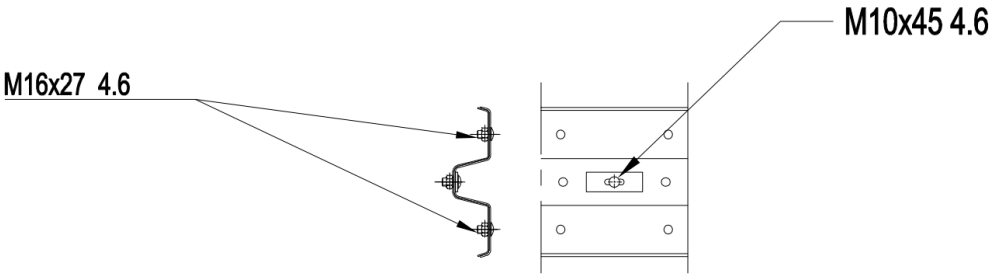
System Elenets (Profil B)

Part number	Quantity (for 4 m)	Description
P.02.001/002	3	Post C125x62.5x5 L=779 mm (S355 JR)
L.02.003	1	Barrier Beam 3 mm L=4320 mm (S275JR) Profil B
10.10	3	Butt Plate 115x40x5mm M10 (S235JR)
40.40	6	M16x27 (4.6) Set
40.42-46	3	M10x45 (4.6) Set
041.00.1	12	M16x165 8.8 anchors + 50x18x4 mm Washer
41.25	3	Gasket (300X300X3 mm)

3.9. Installation details







		M16x165 8.8 / Flat Washer 18
		M16x27 4 .6 / Flat Washer 18
		M10x45 4.6 / Flat Washer 12
SR NO :	3	Butt Plate
SR NO :	2	Beam B Profil 3 mm 4300mm
SR NO :	1	Post C125x62.5x5 L=640 with base plate

Name	*AG04 1.33 Bridge System Connection detail*		
Drawing Nr. / Item Nr.	*S.02.202*	*Note*	*(H1-W1-B) EN 1317-2*

3.10. Form For Installation Control

Please use the following marks when filling in the form:
+ = Conform, 0=Non-conform, Not Controlled

Material control	Visual control of the construction line:
Are all components of the safety barrier system available in line with the information in the installation manual and the main components are marked (“AG04 1.33 Bridge”)?	
	Is the system in the correct position in length?
Set-up of the system	Additional safety devices (i.e. cut pieces):
Is the butt joint of the rails set in driving direction?	Is the minimum length of the cut pieces 435 mm?
Are the posts terminated in driving direction (at the road side) and is the distance between posts correct?	Is the butt joint minimum 300 mm? (without exemption)
Are the plates installed?	Is the diameter of the drilling whole 18 mm (without expansion, punches or burned hole)
Screwing:	Rammed post
Are all bolts and washers screwed?	Is there any shortened post?
Are the bolts tightened? Are the bolts M16 tightened with a torque of 70 Nm and all other bolds by hand?	Are all former post holes covered with material before ramming?

Installation height: 0,75 m + / 0,03 m

Note:

Name and Signature of the Supervisor: Signature of the Representative Of the Installation Company: