

<i>Stalprodukt S.A.</i>	Kind of document : Assembly manual	Reference No: IM/MD-45/16	
Title : ASSEMBLY MANUAL OF ROAD SAFETY BARRIER StalPro Rail su according to EN 1317-5:2007+A2:2012		Page: 1	Issue No:III
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Documentation of the producer

According to EN 1317:5 standard point 5.2 Product description

Equipment and employees

The Contractor should produce evidence that he has the possibility to use special equipment to assemble and transport barriers, which is safe to use. The team performing road works should be under continuous supervision, executed by a properly qualified employee. The Contractor shall equip employees with means of individual protection. Vehicle marking and protection of the working place should be compliant with current legal regulations binding in the place where works are performed.

Materials

Materials should be compliant with requirements stated in Documentation of the Manufacturer.

Individual barrier elements are packed in bundles with size depending on the weight of elements and the size of the commission. Small barrier elements are delivered in containers or cases.

Each bundle or case shall have a tag including at least the following information:

- name and address of the producer,
- name of the product, together with the name and marking of the element,
- date of production,
- weight of the bundle, container or case,
- number of items in one delivery

Barrier elements should be stored in places and conditions, in which they shall not be exposed to mechanical defects or intensive corrosion.

Stages of assembly works

Assembly works include the following stages:

- 1) **Preparatory works and measurements** (indication of barrier road with verification of the course of underground installations, determination of posts location, indication of possible passage routes, crossings as well as final and initial barrier sections)
- 2) **Placing posts of the protective barriers system** – placing posts within the distance from the edge of the road stated in Project Documentation. During this stage of works it is essential to verify settlement, height and distance between posts. In case when placing posts of protective barriers system shall be executed by vibrating, due to cyclical blows of the pile-driver head on the head of the post, deformation and partial damage of the galvanized layer on the post is allowed. The scope of deformations and damages of the galvanized layer depends on the soil class and the degree of its concentration. This is a common phenomenon

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and therefore it does not signify the quality of works. In such cases the damaged galvanized layer is repaired with zinc paint. The deformed head of the post cannot be cut.

- 3) **Assembly of protective barriers system** – Assembly of protective barrier elements should be made according to Documentation of the Producer and Project Documentation. When assembling protective barriers system it is forbidden to make any holes or cuts violating the galvanized layer of particular elements. Assembly of protective road barriers includes:
- a) assembly of distancing elements within the protective barriers system with the use of appropriate joining elements,
 - b) assembly of guides for distancing elements with the use of appropriate joining elements. During this stage of works adjoining segments of guides need to be connected according to the direction of vehicle movement, in a way, which in case of accident will enable the vehicle to slide along protective barriers system without touching edges of the guides,
 - c) assembly of initial and final segments of protective barriers system
 - d) regulation of joining element's tightening moment
 - e) checking the continuity of galvanized surface and repair of possible damages
 - f) fixing reflective elements on protective barriers system.
- 4) **Quality control of the works** should include:
- a) verifying the compliance between the assembly of protective barriers system with Project Documentation and Documentation of the Producer, with consideration of possible size deviations,
 - b) test of galvanized layer thickness and its appearance
- 5) **Site arrangement**

Technical specification for road restraint system StalPro Rail su on ground:

Steel quality: S235JR in accordance with EN 10025-2

Steel quality: S275JR in accordance with EN 10025-2

Hot-dip zinc coating:

- in accordance with EN ISO 1461
- continuous method according to EN 10346

Bolts:

Bolts in accordance with EN ISO 898-1

- M 16 x 25 according to drawing (appendix); property class 4.6. The usage of M16x27 is allowed.
- M 16 x 40 according to EN ISO 4017; property class 5.8

Nuts according to EN ISO 4032

Washers according to EN ISO 7091

Tightening torque of the bolts:

- M 16 - T = 70 ± 10 [Nm]

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The usage of Guardrail type A(W) and Guardrail type B is allowed on the base of the report number RSTA-20140806-A.

The local change in post spacing is allowed in compliance with Technical Opinion No IDM-TO/335/7792/2014 issued by Road and Bridge Research Institute.

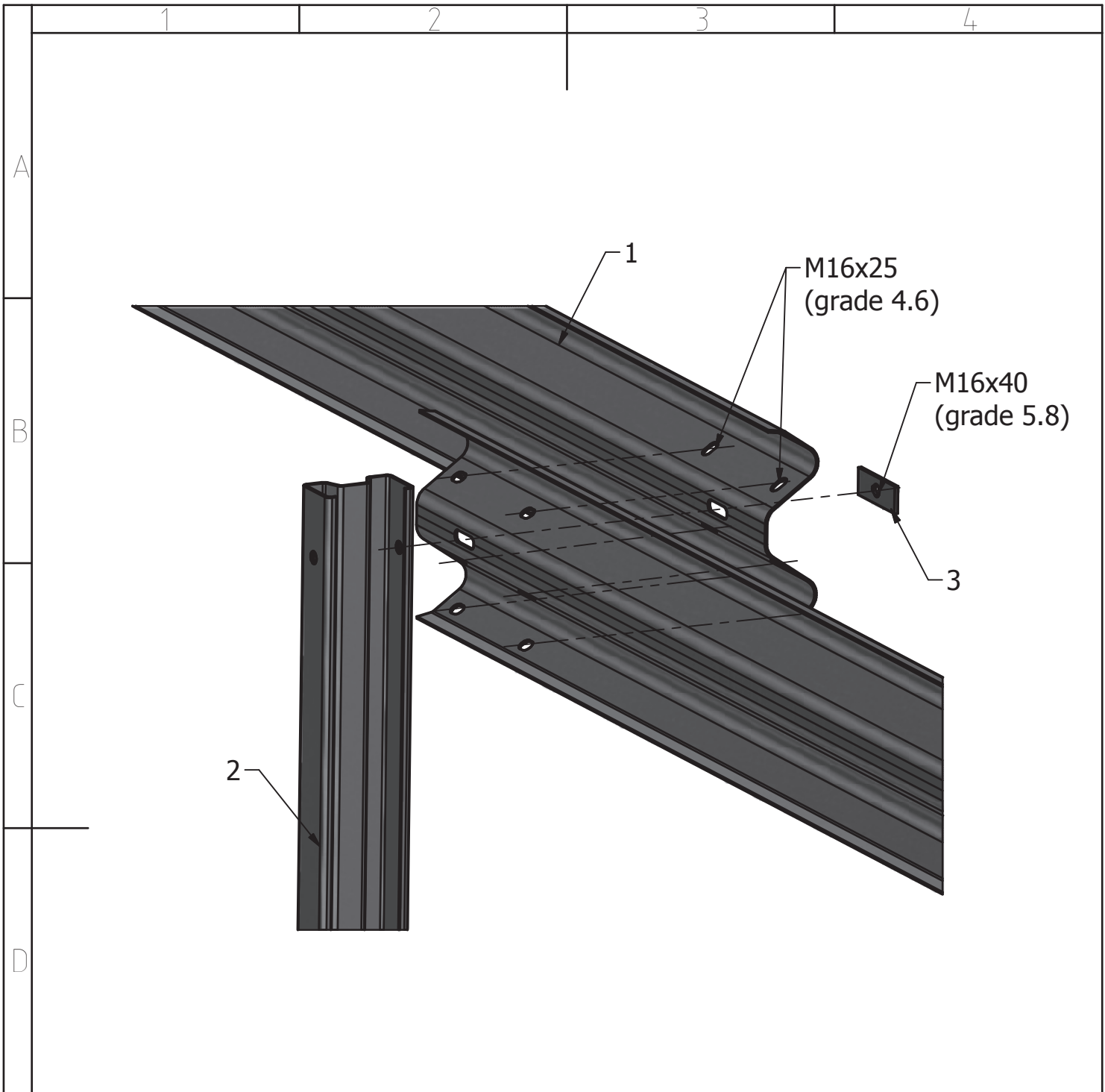
List of elements StalPro Rail su

ID	Part name	Material	Theoretical mass [kg]
1	Guardrail type B or A(W)	S275JR	43.0/47.3
2	Sigma Post StalPro L=1650[mm]	S275JR	17.3
3	Sigma Post StalPro L=1200[mm]	S275JR	12.6
4	Frontal Single Joining Piece	S235JR	10.0
5	Washer M16	S235JR	0.16


Sequence of assembly in accordance with attached drawings:

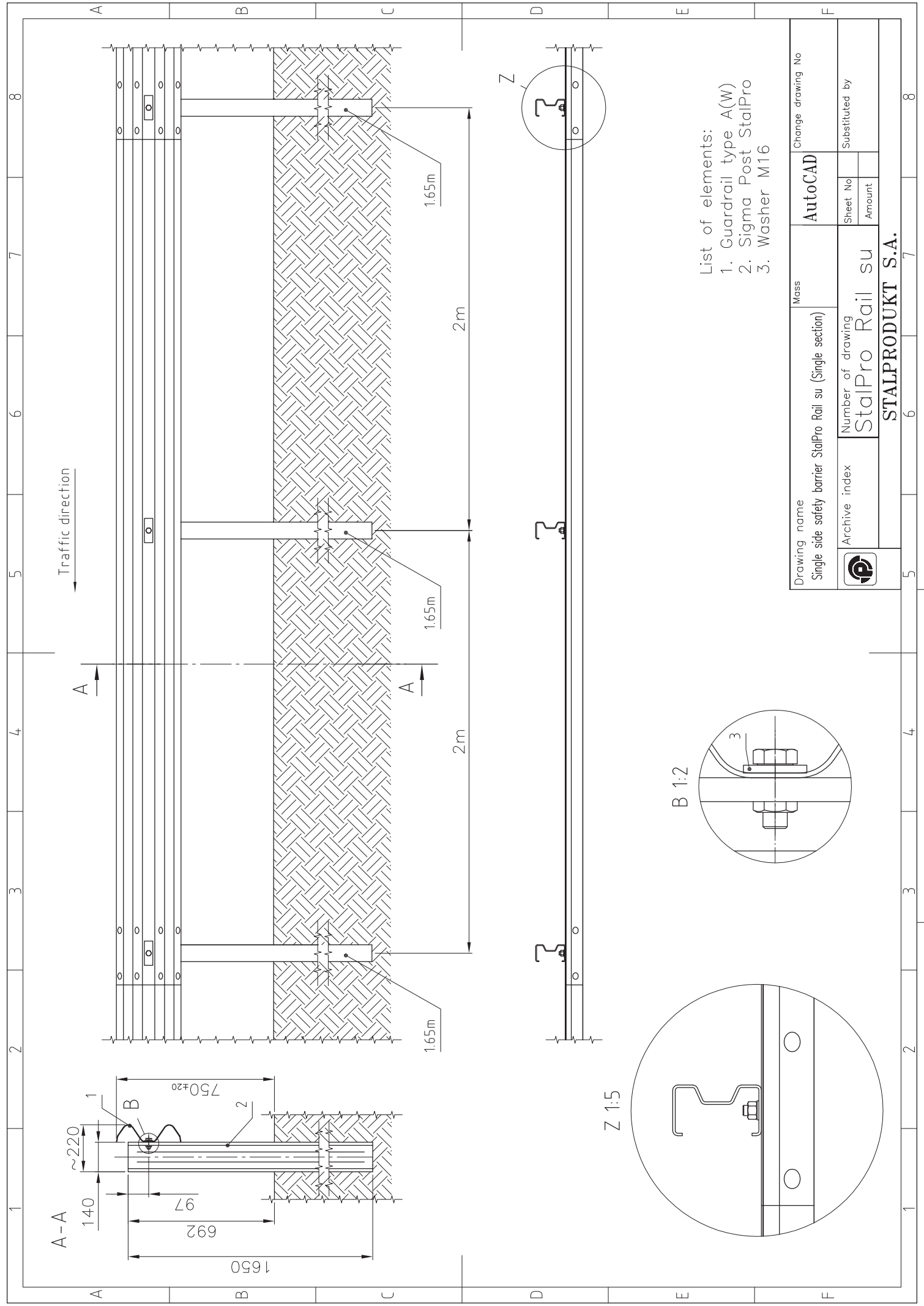
StalPro Rail su - Assembly drawing safety barrier StalPro Rail su
StalPro Rail su - Single side safety barrier StalPro Rail su (Single section)
StalPro Rail su - Terminal for system StalPro Rail su
StalPro Rail su - Single side safety barrier StalPro Rail su
StalPro Rail su - Assembly of bolt M16x40 for system StalPro Rail su
StalPro Rail su - Assembly of bolt M16x25 for system StalPro Rail su
Bolt M16xL

The tolerance for height of the top of the system is ± 20 mm
The minimum length of system is 60 m (without terminals).



- List of elements:
1. Guardrail type A(W)
 2. Sigma post StalPro
 3. Washer M16

Drawing name Assembly drawing safety barrier StalPro Rail su		Mass -	INVENTOR		Change drawing No
	Archive index	Number of drawing StalPro Rail su		Sheet No	1
				Amount	1
STALPRODUKT S.A. - BOCHNIA					

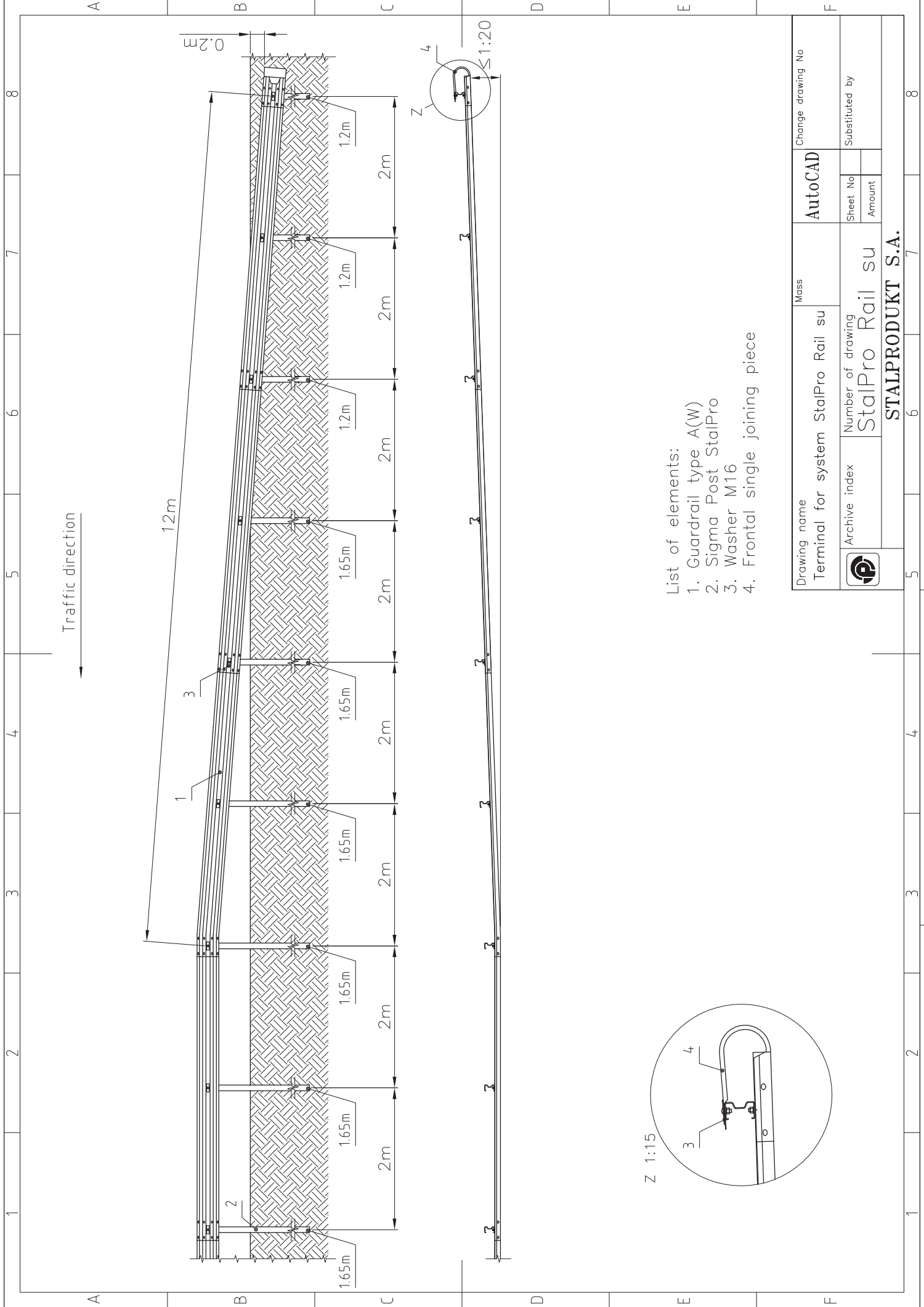


- List of elements:
1. Guardrail type A(W)
 2. Sigma Post StalPro.
 3. Washer M16

Drawing name Single side safety barrier StalPro Rail su (Single section)	Mass StalPro Rail su	AutoCAD		Change drawing No
		Archive index	Number of drawing StalPro Rail su	Sheet No Amount
STALPRODUKT S.A.				

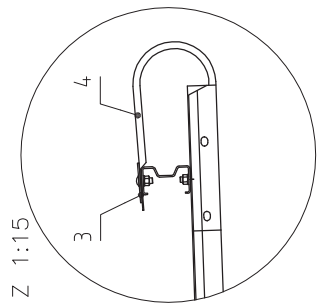
B 1:2

Z 1:5

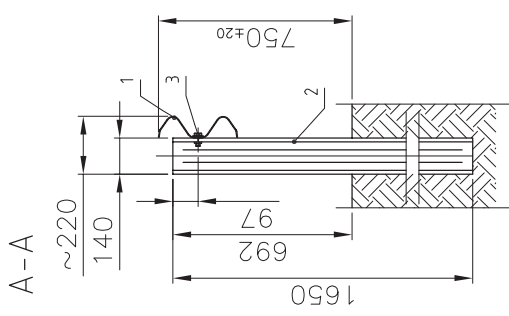
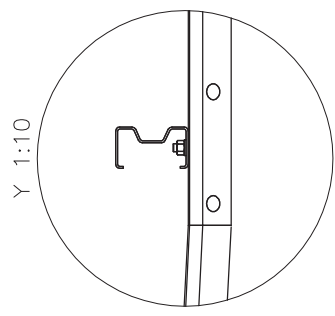
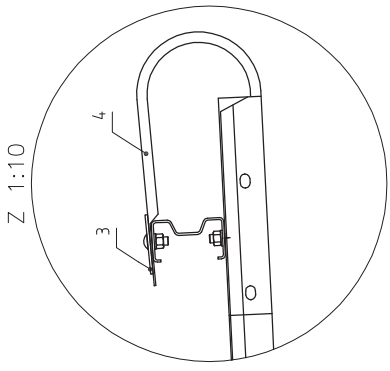
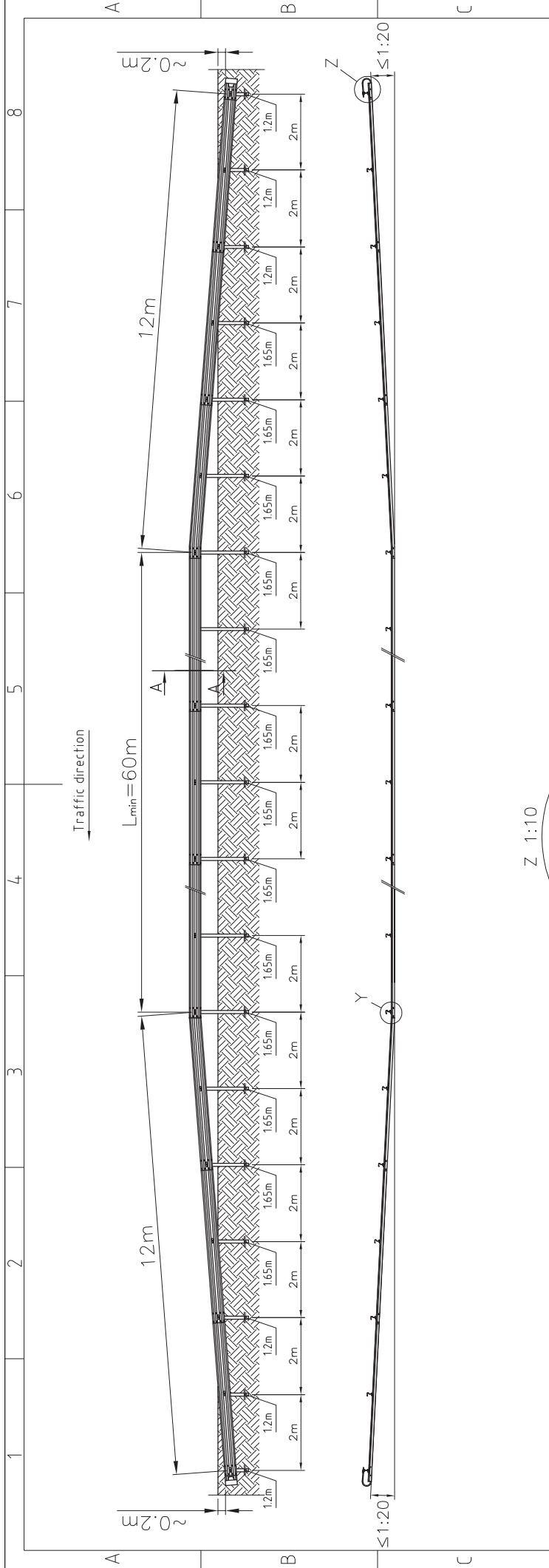


Traffic direction

- List of elements:
1. Guardrail type A(W)
 2. Sigma Post StalPro
 3. Washer M16
 4. Frontal single joining piece



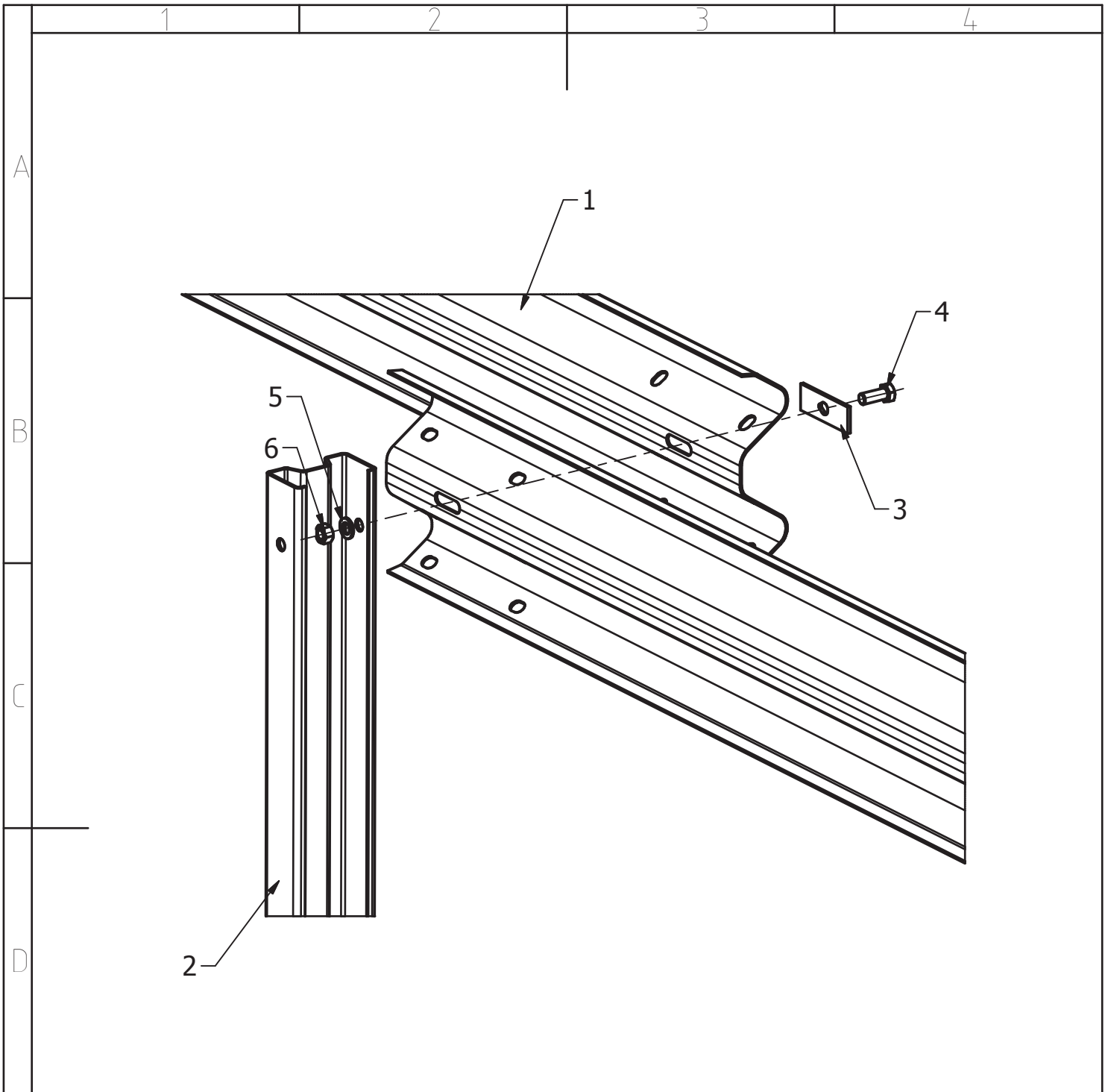
Drawing name		Mass		Change drawing No	
Terminal for system StalPro Rail su		StalPro Rail su		AutoCAD	
Archive index	Number of drawing	Sheet No	Substituted by		
		Amount			
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List of elements:


1. Guardrail type A(W)
2. Sigma Post StalPro
3. Washer M16
4. Frontal single joining piece

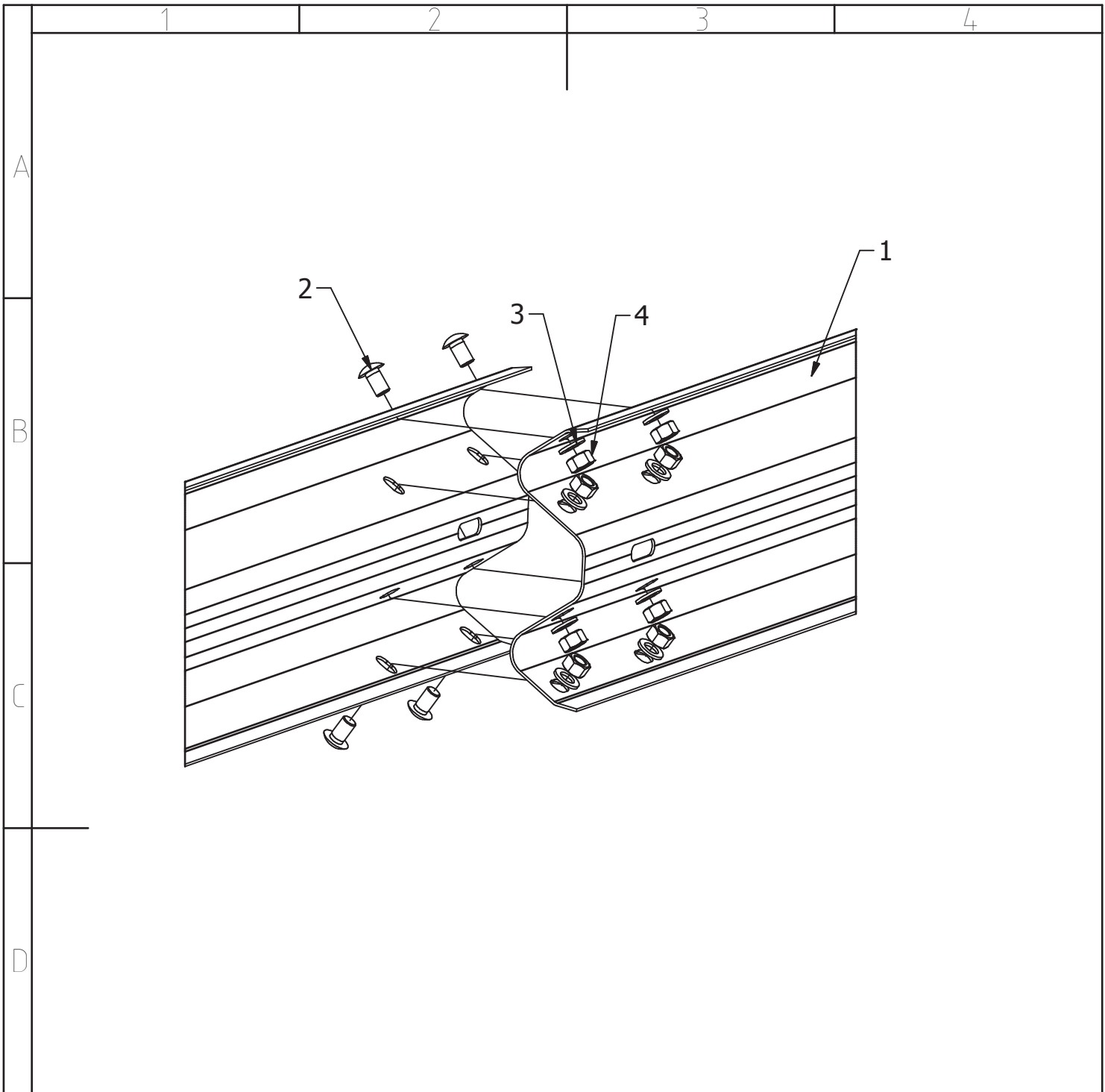
Drawing name		Mass		Change drawing No	
Single side safety barrier StalPro Rail su		StalPro Rail su		AutoCAD	
Archive index	Number of drawing	Sheet No	Substituted by		
		Amount			
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List of elements:


1. Guardrail type A(W)
2. Sigma post StalPro
3. Washer M16
4. Bolt M16x40 (grade 5.8)
5. Round washer
6. Nut M16

Drawing name Assembly of bolt M16x40 for system StalPro Rail su		Mass -	INVENTOR	Change drawing No
	Archive index	Number of drawing StalPro Rail su		Substituted by
		Sheet No	1	
		Amount	1	
STALPRODUKT S.A. - BOCHNIA				

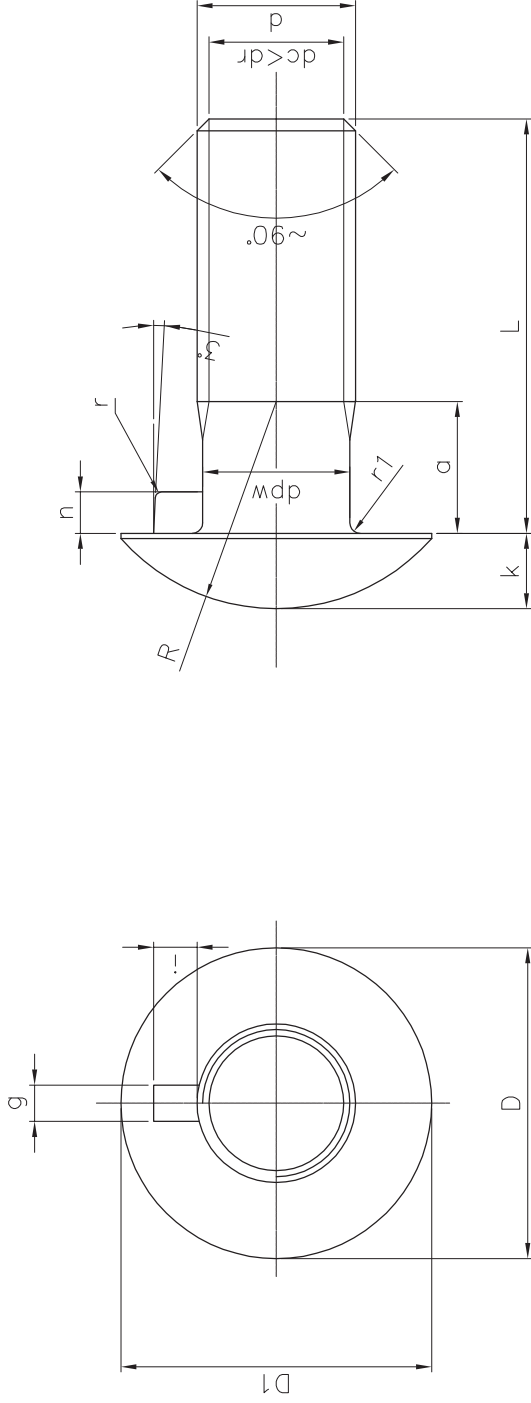


List of elements:

1. Guardrail type A(W)
2. Bolt M16x25 (grade 4.6)
3. Round Washer M16
4. Nut M16

Drawing name Assembly of bolt M16x25 for system StalPro Rail su		Mass -	INVENTOR		Change drawing No
	Archive index	Number of drawing StalPro Rail su		Sheet No	1
				Amount	1
STALPRODUKT S.A. - BOCHNIA					

BOLT M16 x L



Dimension	Thread	M16
L		25,27 or 40
d	min	15.235
	max	15.685
dp	min	14.02
	max	14.22
dr	min	12.904
	max	13.231
d_{pw}	min	14.13
	max	14.20
r	max	1
D	min	29.35
	max	30.65
D_1	min	29.0
	max	29.55
k	min	7.55
	max	8.45
R	~	20.0
g	min	3.25
	max	3.8
n	min	4.0
	max	4.2
i	min	4.2
	max	4.2
r_1	~	0.6
	max	-
dc	max	13.0

Drawing name	Mass	Change drawing No
Bolt M16xL		AutoCAD
Archive index	Number of drawing	Sheet No
M16XL	M16XL	Amount
Substituted by		
STALPRODUKT S.A.		