

الهيئة السعودية للمواصفات والمقاييس والجودة
Saudi Standards, Metrology and Quality Org (SASO)

SASO/CD 32182 (A)

السيارات - حواجز الحماية الخلفية للشاحنات والمقطورات
Motor vehicles-Rear Under Run Protective Devices for Truck
and Trailer

ICS: 43.040.60

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مقدمة

قامت بالهيئة السعودية للمواصفات والمقاييس والجودة بإعداد مشروع المواصفة القياسية السعودية " السيارات - حواجز الحماية الخلفية للشاحنات والمقطورات " عن طريق الفريق الفني لمركبات الطرق بعد استعراض المواصفات القياسية العربية والأجنبية والدولية والمؤلفات المرجعية ذات الصلة على أن تلغي هذه المواصفة القياسية السعودية SASO GSO 2114:2011.

Foreword

The Saudi Standards, Metrology and Quality Organization (SASO) has prepared the draft of Saudi Standard " Motor vehicles-Rear Under Run Protective Devices for Truck and Trailer" by technical committee of road vehicle based on relevant ADMO, International and National foreign Standards and references. These standards will be replace SASO GSO 2114:2011.

Motor Vehicles - Rear Underrun Protection Devices for Truck and Trailer

1- SCOPE AND FIELD OF APPLICATION

This standard is concerned with the requirements for the rear underrun protective devices (RUPD) of o vehicles of categories N2, N3, O3 and O4 ⁽¹⁾; This standard does not apply to Traction units for articulated vehicles, special trailers constructed for the carriage of very long loads such as timber, steel bars etc and vehicles where any RUPD is incompatible with their use.

2- COMPLEMENTARY REFERENCES

2.1 SASO 469 “Motor Vehicles - Weights and Dimensions”.

2-2 SASO Technical Regulation for Front, Rear and Side Barriers for Trucks and Trailers.

3- DEFINITIONS

3.1 Unladen mass: The mass of the vehicle in running order, unoccupied, and unladen but complete with fuel, coolant, lubricant, tools and spare wheel.

3.2 Maximum mass: The mass stated by the vehicle manufacturer to be technically permissible.

3.3 Rear underrun protective device (RUPD): It consists of a cross-member and links to the chassis side members or other structural members of the vehicle.

3.4 Type of RUPD: means RUPD which do not differ with respect to the essential characteristics such as shape, dimensions, attachment, materials and the markings cited for a sample of the type of RUPD as: the sample shall be clearly and indelibly marked on all its main components with the applicant's trade name or mark and the type designation.

3.5 Rear Underrun Protection (RUP) : The presence at the rear of the vehicle of either: a special RUPD or a body work, chassis parts or other components such that by virtue of their shape and characteristics, these elements can be regarded as totally or partially fulfilling the function of the RUPD.

3.6 The definitions in SASO Technical Regulation for Front, Rear and Side Barriers for Trucks and Trailers.

⁽¹⁾ **N2:** Vehicles used for the carriage of goods and having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes. (Commercial Truck)

N3: Vehicles used for the carriage of goods and having a maximum mass exceeding 12 tonnes. (Commercial Truck)

O3: Trailers (including semi-trailers) with a maximum mass exceeding 3.5 tonnes, but not exceeding 10 tonnes

O4: Trailers (including semi-trailers) with a maximum mass exceeding 10 tonnes

4- REQUIREMENTS

The following shall be met:

4.1 General

4.1.1 All vehicles carrying goods, including tankers, mobile cranes, mobile workshops, trailers and semi-trailers shall be equipped with rear underrun protective devices to protect against underrunning of vehicles in the event of rear collision with passenger cars, multi-purpose vehicles and light duty trucks having a maximum mass not exceeding 3.5 tonnes.

4.1.2 The rear underrun protective device shall comply with the requirements specified in item 4.2 to 4.6.

4.1.3 If the vehicle is so designed and equipped at the rear that by virtue of their shape and characteristics, its component parts comply with the requirements specified in items 4.5 and 4.6, then the vehicle may not be necessary to be provided with rear underrun protective device.

4.1.4 The maximum mass of a vehicle type for which the rear underrun protective device to be installed shall not exceed the value indicated on the rear underrun protective device for which it is designed for.

4.2 Material

4.2.1 The mechanical properties of the underrun protective device's material shall be either hot rolled high strength Steel with a minimum yield strength of 350 N/mm² and minimum tensile strength of 480 N/mm² or high strength Aluminum Alloy with a minimum yield strength of 350 N/mm² and minimum tensile strength of 480 N/mm².

4.2.2 The minimum mechanical properties of bolts should be made of Low-carbon martensite with 10.9 class bolt with minimum proof strength of 830 N/mm², minimum yield strength of 940 N/mm² and minimum tensile strength of 1040 N/mm².

4.3 Welding

4.3.1 Welding could only use between the UPD and the bridge/support. It is strictly prohibited to weld the UPD or the bridge/support to the chassis of the truck or trailer.

4.3.2 Welding should be fully welded. (Figure 1)

4.3.3 Welding thickness (h) should be compatible between the bridge/support and the UPD. (Figure 2)

4.3.4 The minimum requirements for the welder wire's material used in welding is AWS electrode number (E90xx), with minimum yield strength of 531N/mm² and minimum tensile strength of 620 N/mm².

4.4 The retro-reflective marking (Tape)

4.4.1 The retro-reflective marking (Tape) should be on the UPD, so that it can be seen at night or when the visibility is not clear. (Figure 3)

- 4.4.2 The retro-reflective marking (Tape) should be yellow. The width of a rear tape material shall be 100 mm, with tolerance +2 mm. It should be complied with the Saudi Standard (SASO 2913).
- 4.5 RUPD Technical requirement
- 4.5.1 The section height of the RUPD member shall not be less than 100 mm. (Figure 9)
- 4.5.2 The lateral extremities of the cross-member shall not bend to the rear or shall not have a sharp outer edge. This requirement can be considered as complied if the lateral extremities of the cross member are rounded on the outside and have a radius of curvature of not less than 2.5mm. (Figure 4)
- 4.5.3 In case, if the rear underrun protective device is designed to have several positions at the rear of the vehicle, there must be a guaranteed method of securing it in the service position, and the force applied by the operator to vary the position of the device shall not exceed 40 daN (400N).
- 4.5.4 For vehicles fitted with a platform lift at the rear, the underrun device may be interrupted for the purposes of the mechanism. In this case, the following special requirements apply:
- 4.5.4.1 The maximum lateral clearance measured between the elements of the underrun device and the elements of the platform lift, which move through the interruption when the lift is operated and which make the interruption necessary, may amount to no more than 2.5 cm.
- 4.5.4.2 The individual elements of the underrun protection, including those outboard of the lift mechanism, where provided, must have an effective surface area, in each case, of at least 350 cm² (Figure 5). However, in the case of vehicles having a width of less than 2000 mm and where it is impossible to achieve the above requirement, the effective surface may be reduced on the condition that the resistance criteria are met.
- 4.6 Installation of RUPD indicated in item 4.5 to the vehicle
- 4.6.1 The ground clearance with respect to the underside of the protective device, even when the vehicle is unladen shall not exceed 450 mm over its entire width. (Figure 4)
- 4.6.2 For the trucks, trailers and tow trucks with a weight exceeds 3 tonnes, the ground clearance with respect to the underside of the protective device, even when the vehicle is unladen, shall not exceed 450 mm, and the horizontal distance between the rear of the device and the rear extremity of the vehicle, shall not exceed 400 mm for departure angle 8°. (Figure 6)
- 4.6.3 For departure angle condition that does not met 8°, a movable protective device shall be installed which has the ability to be lifted forward or backward as shown in (Figure 7), or has the ability to slide up or down as shown in (Figure 8)
- 4.6.4 The width of the rear underrun protective device shall not at any point exceed the width of the rear axle measured at the outermost points of the wheels.

4.6.5 The width of the rear protective device shall not be more than 100 mm shorter on either side than the width of the rear axle measured at the outermost points of the wheels. (Figure 4)

4.6.6 The maximum mass of vehicle type for which the RUPD is installed shall not exceed the value indicated on the RUPD or with the approved document.

5- MARKING

5.1 The marking shall be comply with SASO technical regulation for Technical regulation for front, rear and Lateral Underrun Protective Devices for Trucks and Trailers.

6- DIMENSION SPECIFICATIONS

6.1 Measuring instruments

6.1.1 Dimension measuring instrument

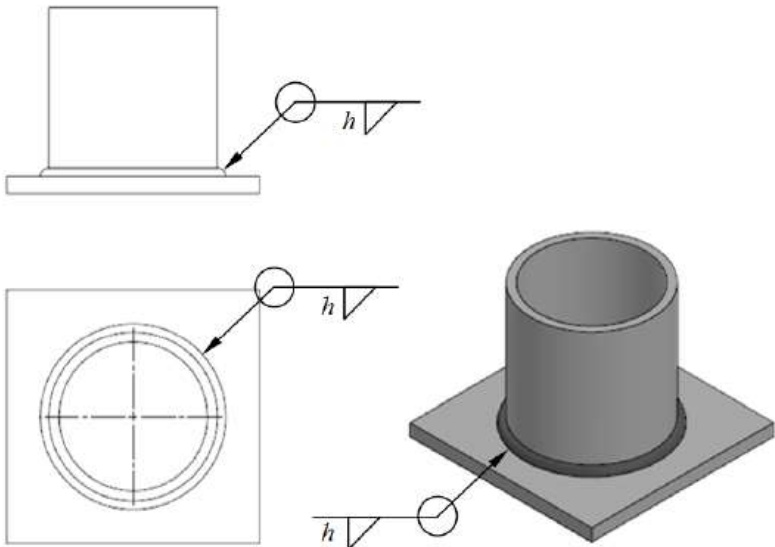
The instruments used shall permit measurement to an accuracy of (± 1) mm.

6.2 Approval Dimension Specifications

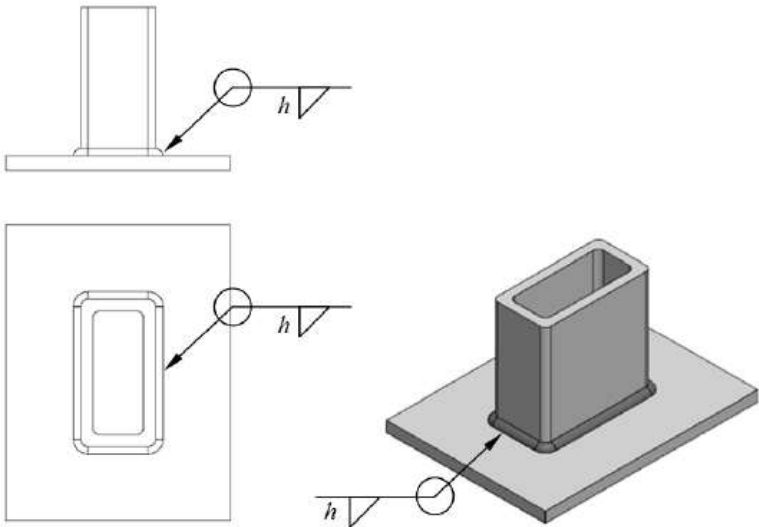
The following Dimension specifications design for rear underrun protective devices shall be followed at Annex 1.

7- CRITERIA OF TECHNICAL CONFORMITY

7.1 The rear underrun protective device shall be considered complying with all the requirements of this standard when the withdrawn sample from the consignment or the supplied sample by the manufacturer, otherwise the rear underrun protective device shall be considered noncomplying.



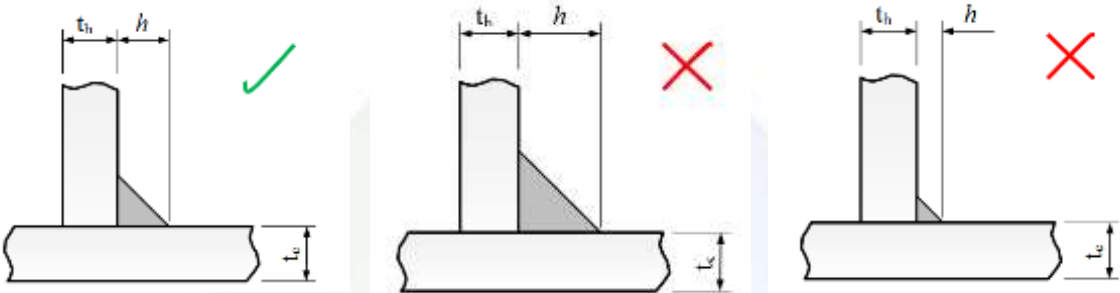
A) Welding a bar having a circular section to a flat surface.



B) Welding a bar having a rectangular section to a flat surface.

Knowing that (h) means welding thickness.

Figure 1: Approved welding shape



$t_c = h$ & $t_h = h$ when $t_h = t_c$
 $t_c > h$ & $t_h = h$ when $t_c > t_h$

$t_c < h$ & $t_h < h$
 Not a correct welding

$t_c > h$ & $t_h > h$
 Not a correct welding

Where, h (welding thickness), t_c (thickness of the bridge or support) and t_h (thickness of the UPD)

Figure 2: Correct methods followed in welding

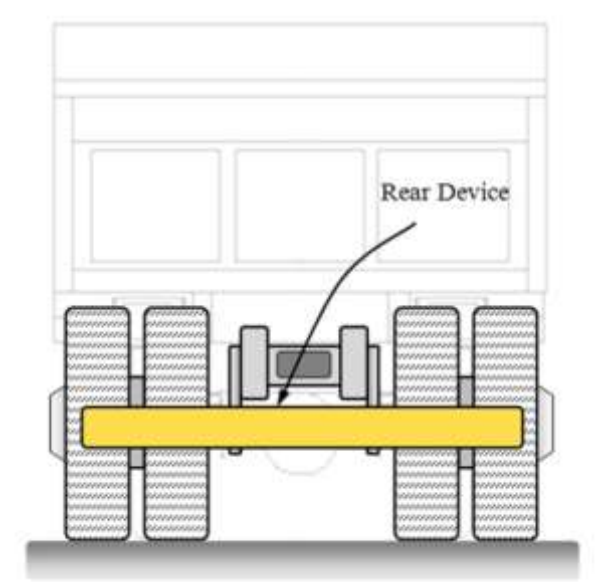


Figure 3: The way of installing the Retro-Reflective tape on the rear underrun protective device of a truck

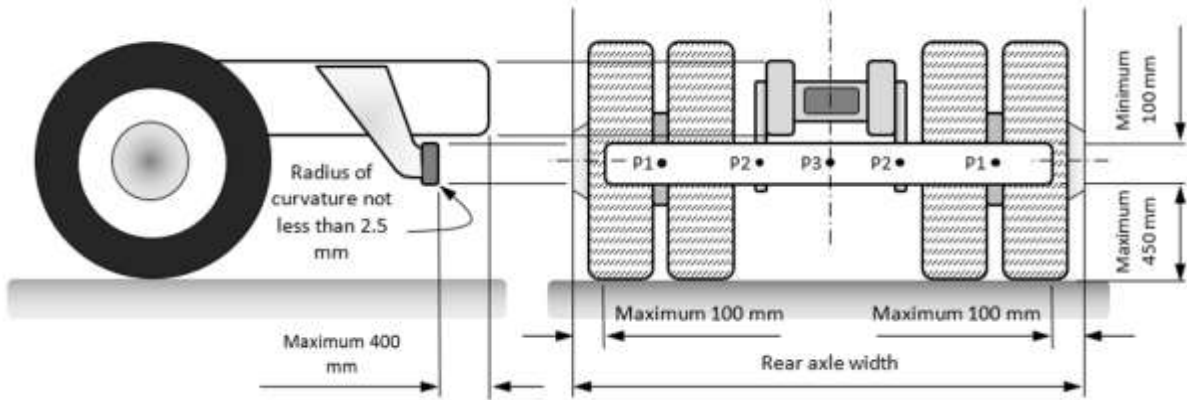


Figure 4: Rear view of a truck shown technical specifications of RUPD

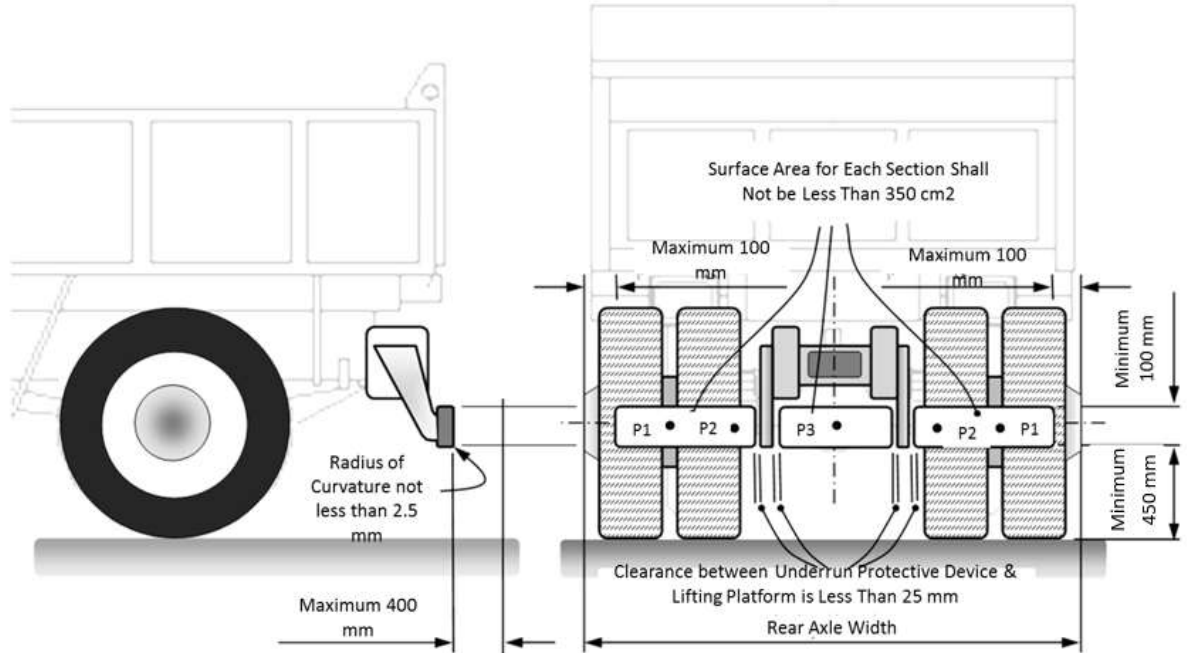


Figure 5: Rear view of a truck with load lifting platform indicating technical specifications of RUPDs

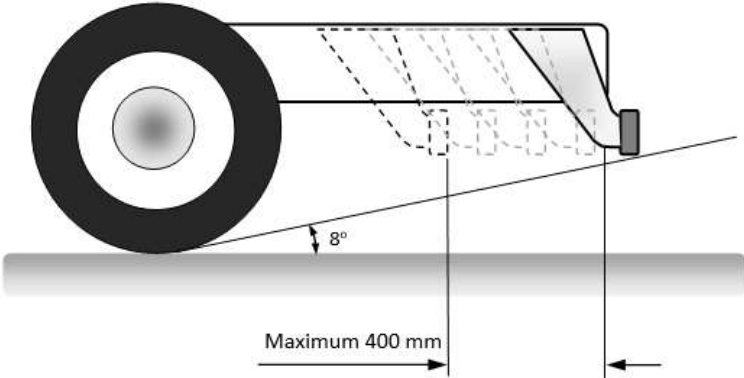


Figure 6: The horizontal distance between the rear of the device and the rear extremity of the vehicle for departure angle 8°

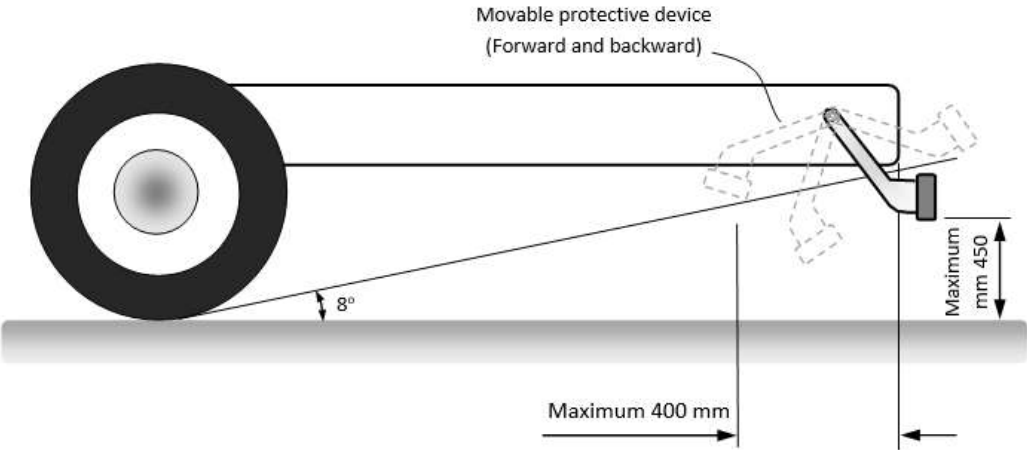


Figure 7: Movable proactive device (Forward and backward) for departure angle condition that does not met 8°

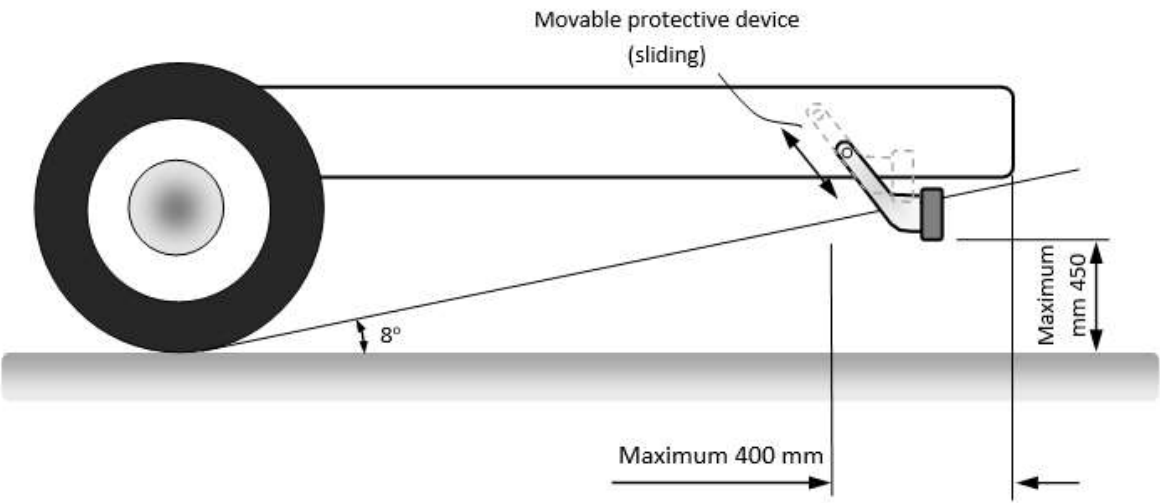


Figure 8: Movable proactive device (sliding) for departure angle condition that does not met 8°



Annex 1

Approval Dimension and materials Specifications

1. The following Dimension and materials specifications design for rear underrun protective devices shall be followed.

1.1 Visual inspection

The rear underrun protective device shall be visually examined to check for exact dimensions, bolts type, welding standard, any damage, crack, sharp outer edge, and any apparent defects.

1.2 The mechanical properties of the underrun protective device's material shall be as follows:

Material Used	Type	Min. Yield Strength	Min. Tensile Strength
Steel	Hot Rolled	350 N/mm ²	480 N/mm ²
Aluminum Alloy	(Al-Cu Alloy)	350 N/mm ²	480 N/mm ²

1.3 General Dimensions of RUPD

1.3.1 The main cross-section area for the RUPD are shown in Figure 6.

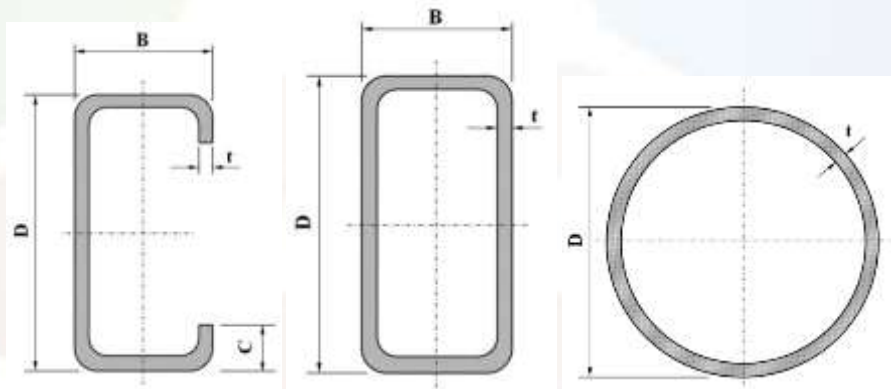


Figure 9: Main cross-sectional area models of RUPD

1.3.2 Dimensions of the cross-sectional area

For trucks and trailers with a weight exceeding 3.5 tones.

Model Cross-sectional Area	D (mm)	B (mm)	C (mm)	minimum t (mm)
C- section	100	50	20	5
Rectangle section	100	50	-----	5
Circle section	100	-----	-----	5

Table 1

1.3.3 Different Main Models of RUPDs

1.3.3.1 A Model of RUPD.

It consists of RUPD and the carrier bridge that connects the RUPD to the truck chassis as in Figure 7.

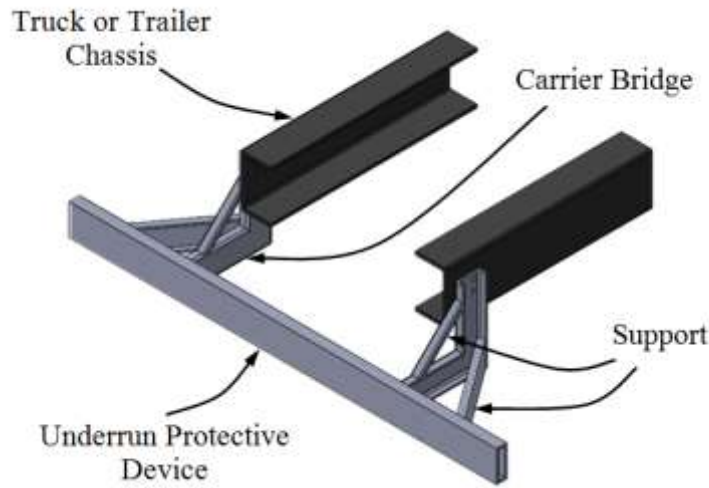


Figure 10: Model of RUPD for a truck or trailer
Location at where the RUPDs attached to the carrier bridges

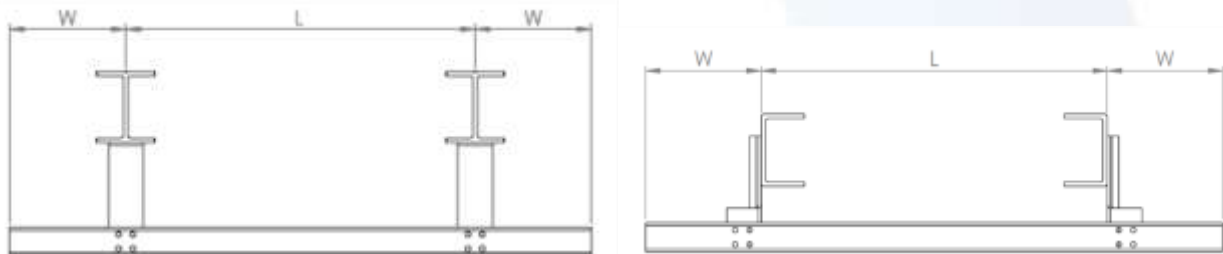


Figure 11: Front view showing the position of installing the RUPD to the carrier bridge

A table clarifying the position of installing RUPD to the carrier bridge.

Type of Material	L (mm)	W (mm)	
		Optional to add a support between bridge and FUPD	Must add a support between bridge and FUPD
Steel	700-1200	Less or equal 400	Over 400
Aluminum Alloy	700-1200	Less or equal 400	Over 400

Table 2

1.3.3.2 Carrier Bridge Connecting RUPD to Truck or Trailer Chassis
When a truck or trailer has a chassis of (I-section beam), the type used for the carrier bridges is:



Figure 12: Sample of a carrier bridge used with (I-section beam) chassis truck or trailer

When a truck or trailer has a chassis of (C-section beam), the type used for the carrier bridges is:



Figure 13: Sample of a carrier bridge used with (C-section beam) chassis truck or trailer

1.3.3.3 Adding Support to Carrier Bridge between RUPD and Truck or Trailer Chassis

In case the distance after installing the RUPD to the carrier bridge known as (W), exceeds 400mm, a rear support should be added to the bumper as in Figure 11. Note that the beam is installed between the carrier bridge and the RUPD outer edges.

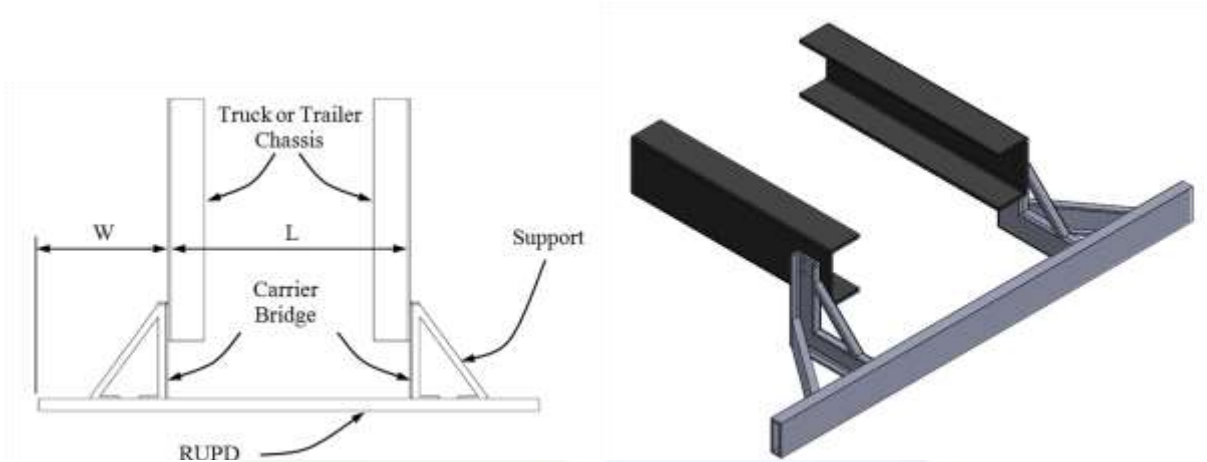


Figure 14: A supporter is installed between the RUPD and carrier bridge when distance, known as (W), exceeds 400mm.

1.3.3.4 Connecting RUPD Parts

Connection can be done by welding or using bolts. For bolts, they should be as follows:

Trucks with a weight less than 12 tones Trailers with a weight less than 10 tones		Trucks with a weight exceed 12 tones Trailers with a weight exceed 10 tones	
Number of Bolts	Bolt Diameter (mm)	Number of Bolts	Bolt Diameter (mm)
4	16	4	18
5	14	5	16
6	13	6	15
7	12	7	14
8	11	8	13
9	10	9	12

Table 3

1.3.3.5 Models of RUPDs for Truck and Trailer

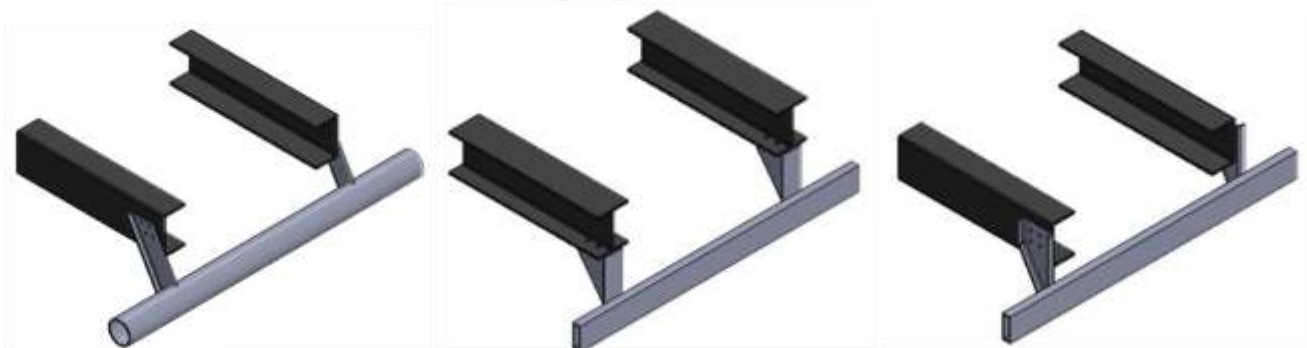
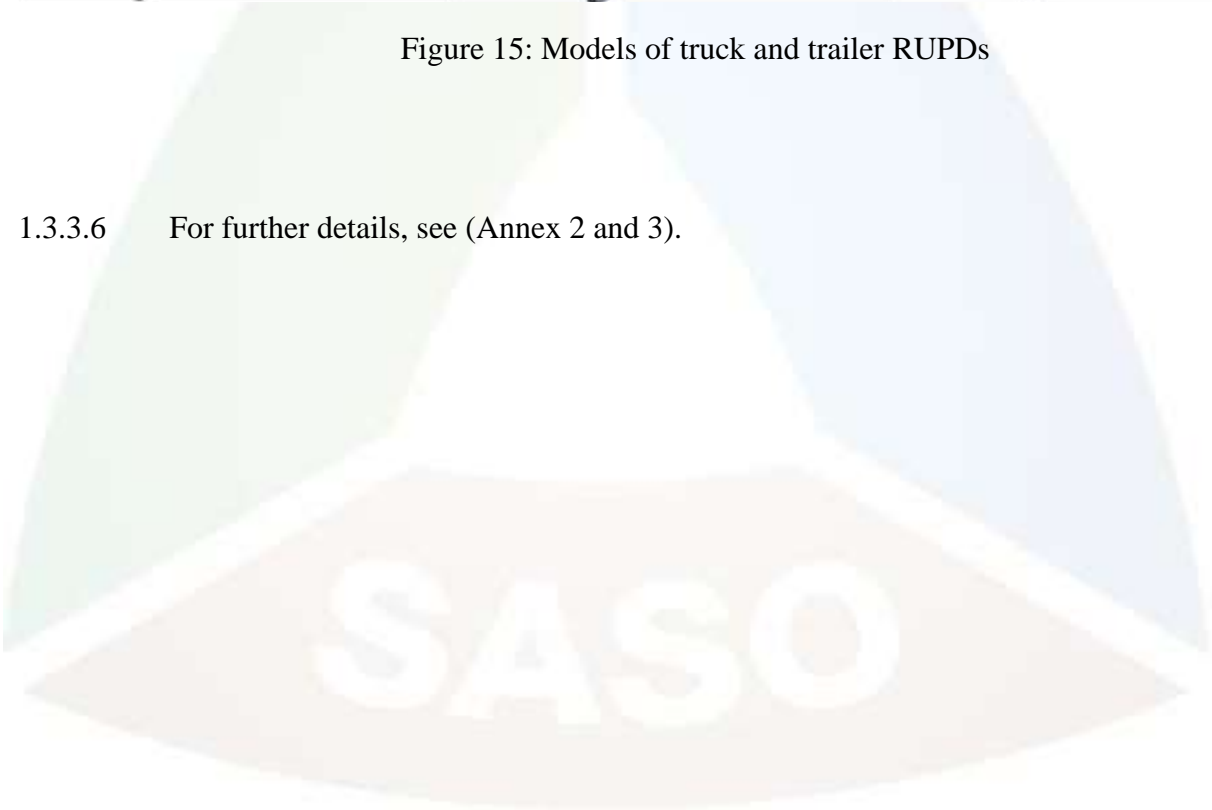


Figure 15: Models of truck and trailer RUPDs

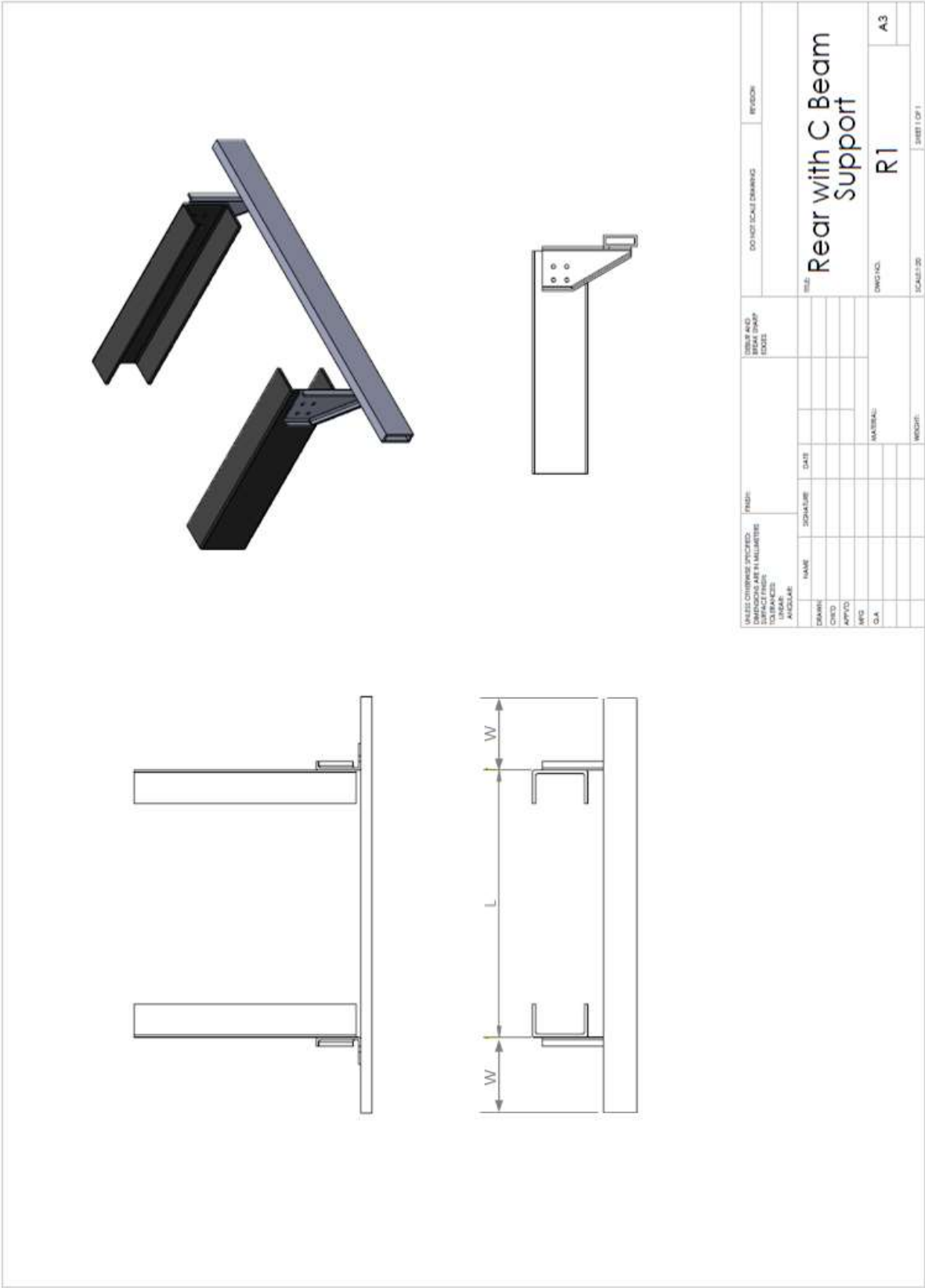
1.3.3.6 For further details, see (Annex 2 and 3).



Annex 2

Sample Models of RUPDs in Truck

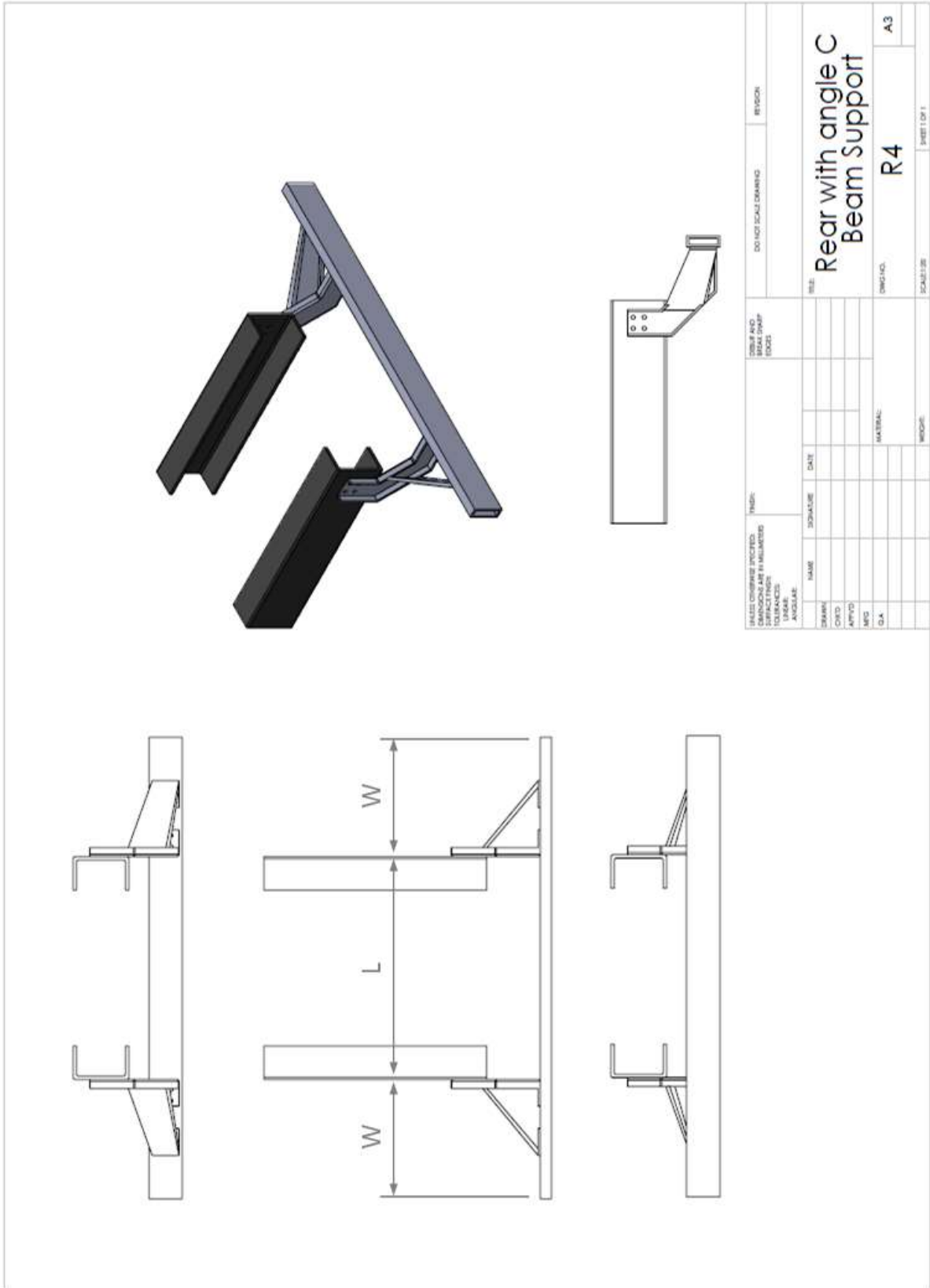


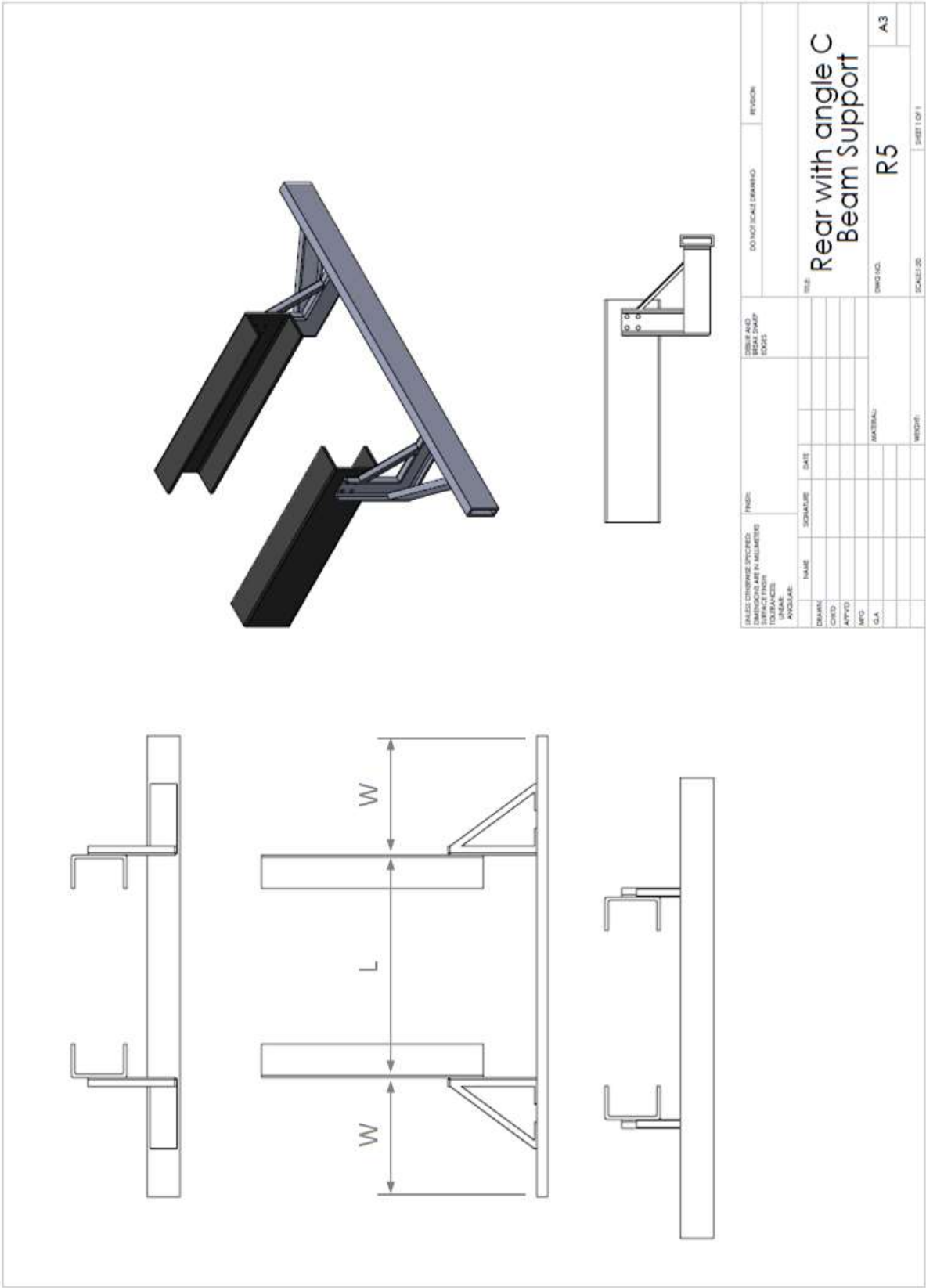


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DATE	MATERIAL	DRAWN	CHECKED	APPROVED	MFG					G.A.
DATE	MATERIAL	DRAWN	CHECKED	APPROVED	MFG					G.A.

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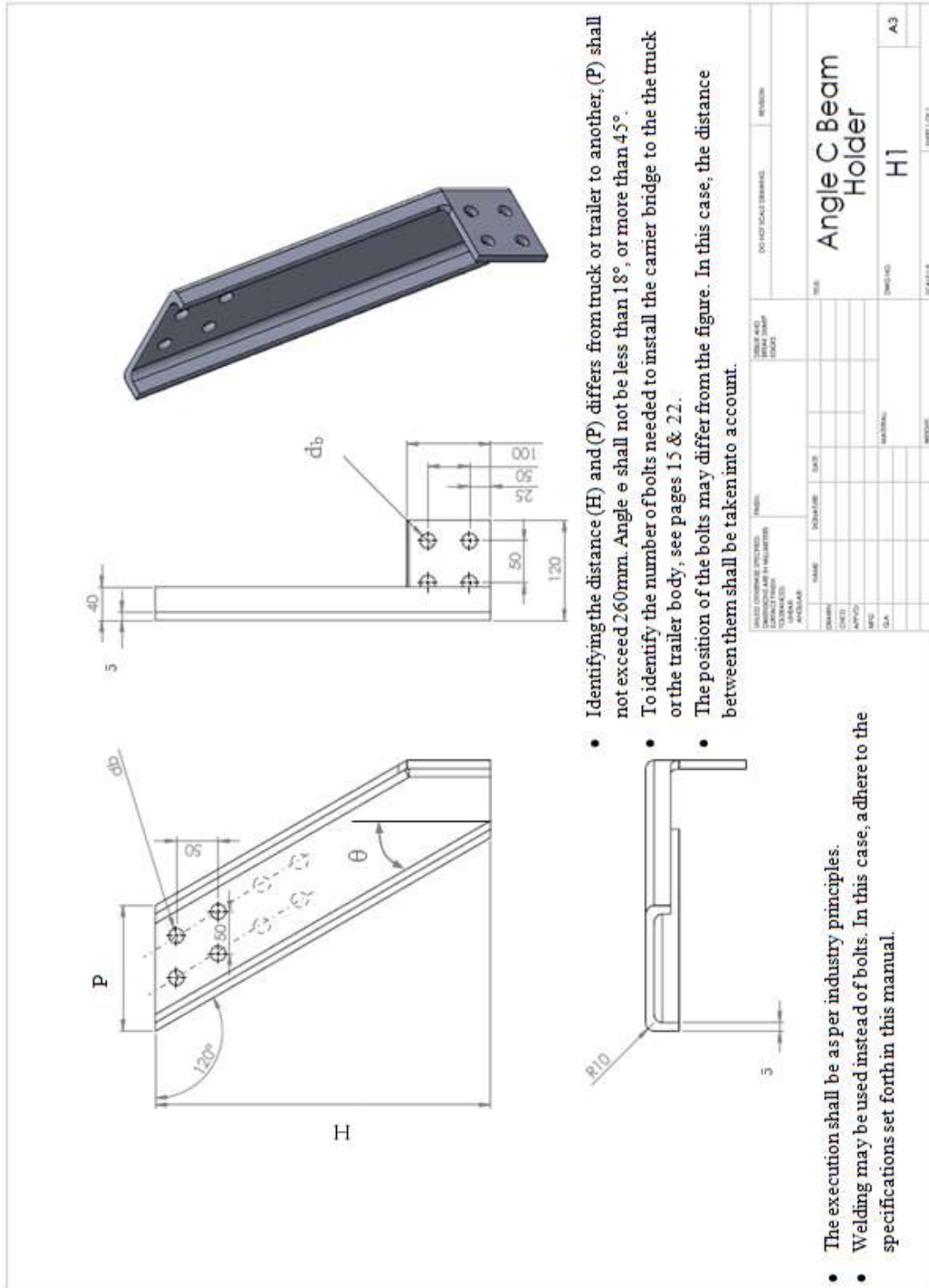




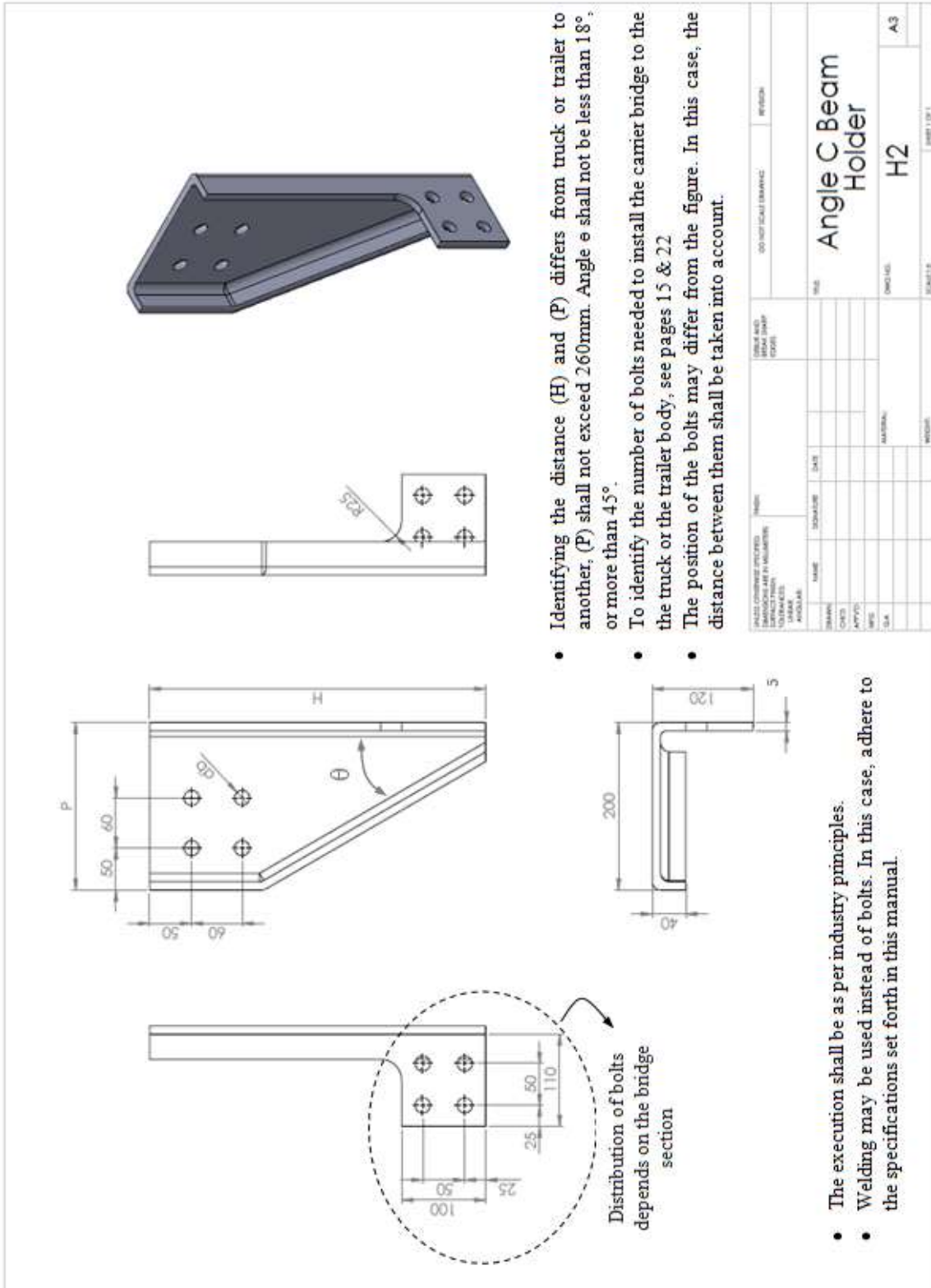
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MFG		DATE		Rear with angle C Beam Support	
G.A.		DATE		R5	
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Annex 3

Models of Carrier Bridges and Supporters used in Connecting UPD to Chassis.

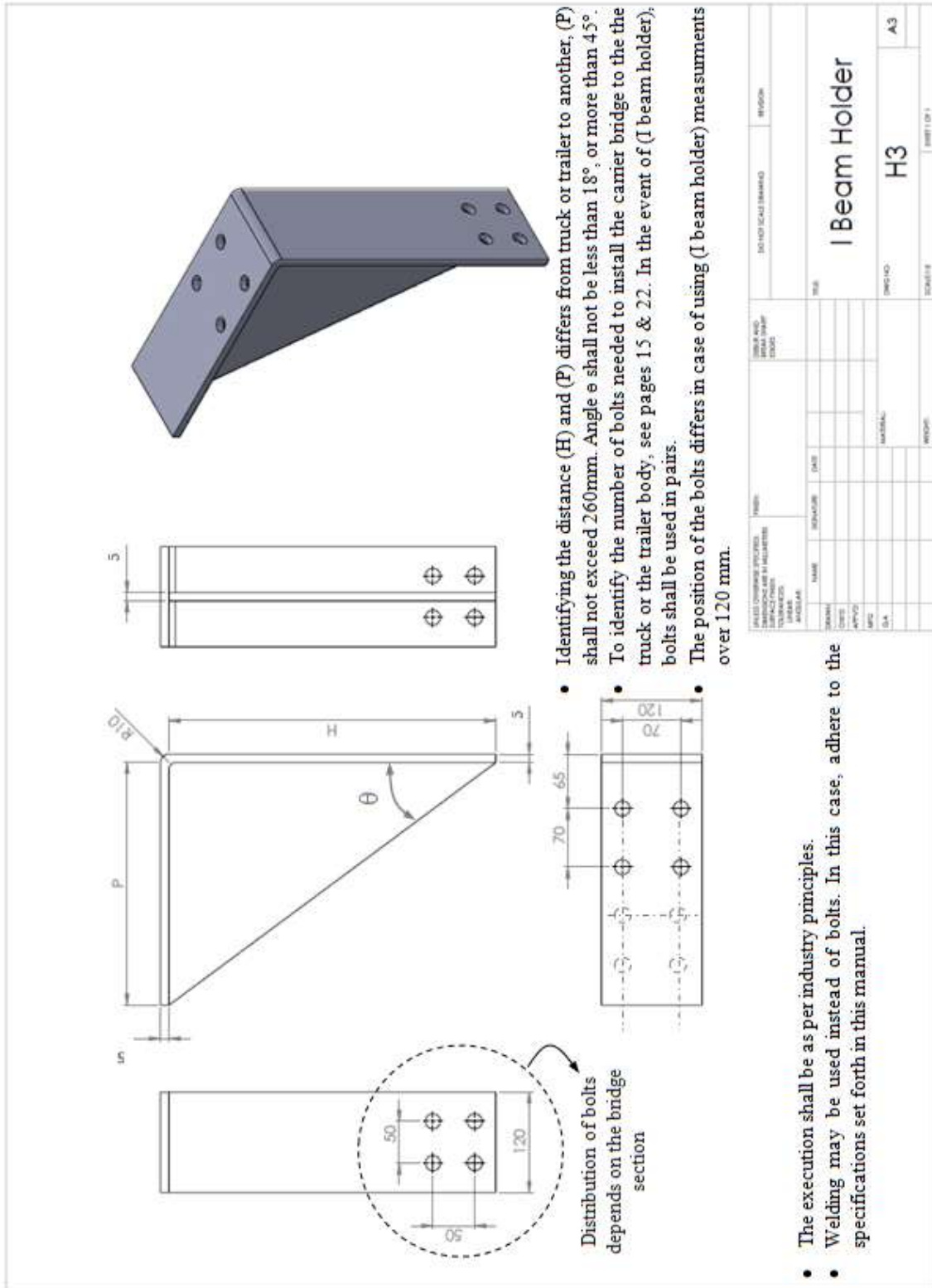


*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to another.

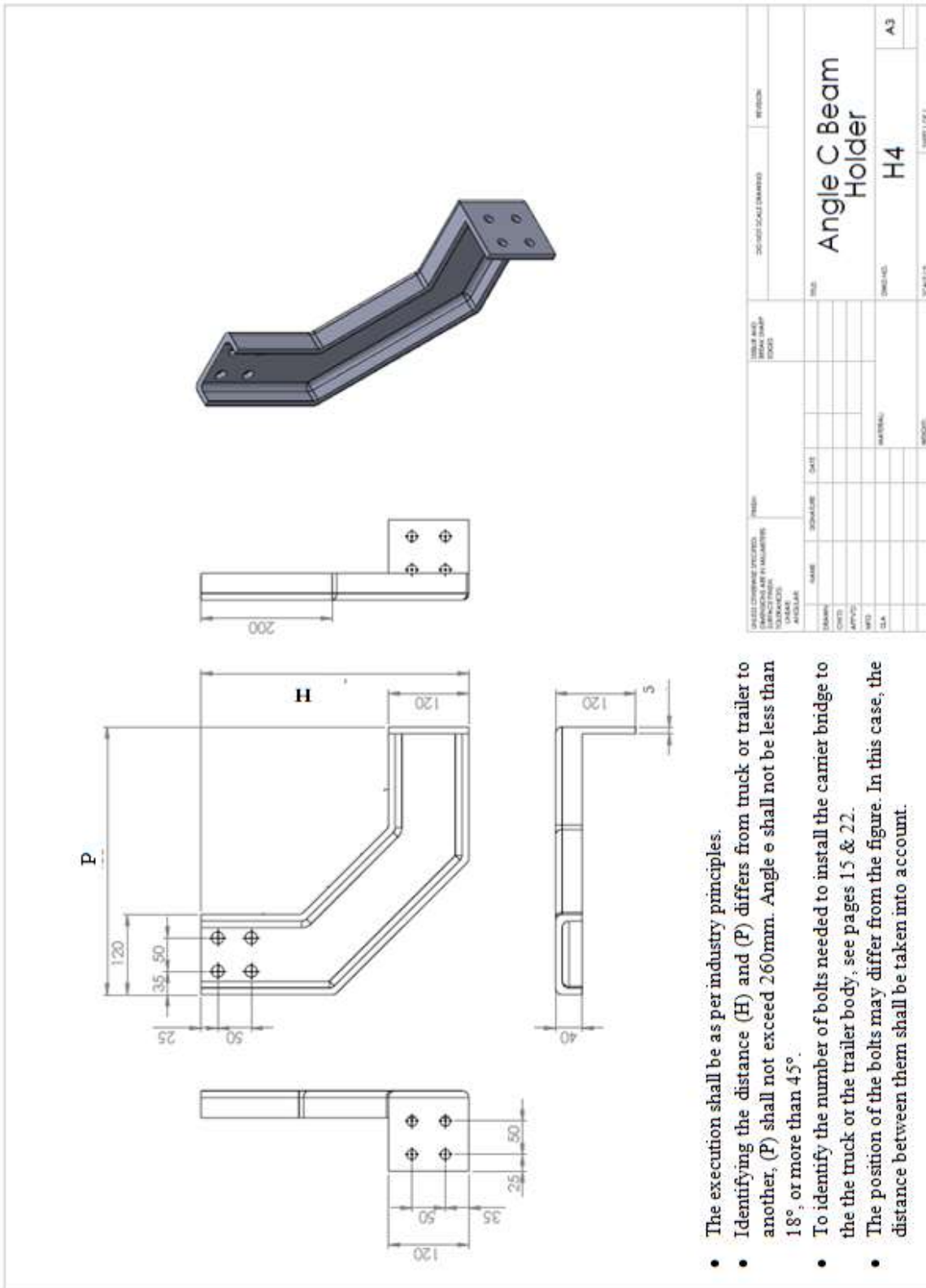


- The execution shall be as per industry principles.
- Welding may be used instead of bolts. In this case, adhere to the specifications set forth in this manual.

*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to another.

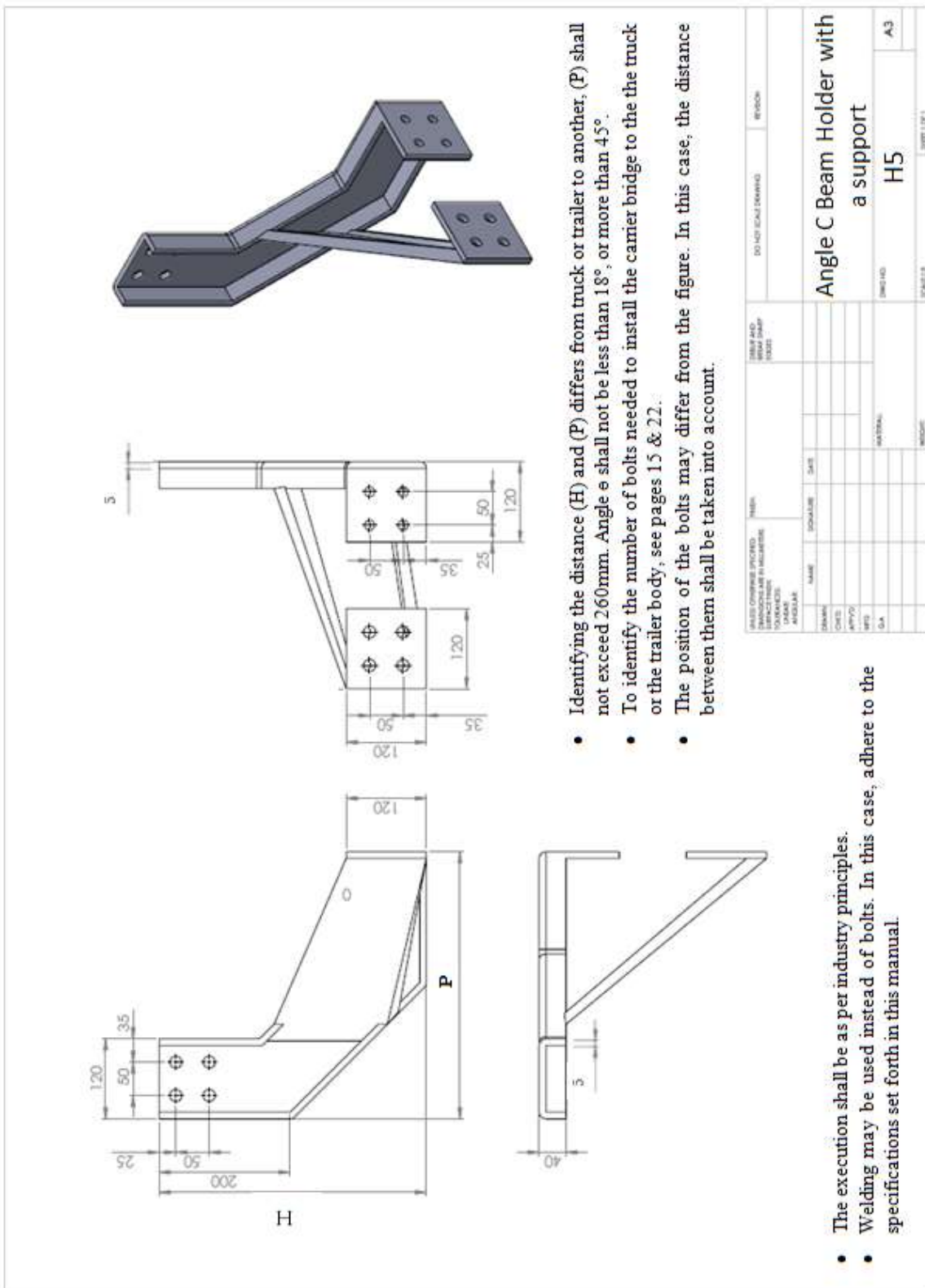


*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to another.



- The execution shall be as per industry principles.
- Identifying the distance (H) and (P) differs from truck or trailer to another, (P) shall not exceed 260mm. Angle θ shall not be less than 18°, or more than 45°.
- To identify the number of bolts needed to install the carrier bridge to the truck or the trailer body, see pages 15 & 22.
- The position of the bolts may differ from the figure. In this case, the distance between them shall be taken into account.

*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to another.

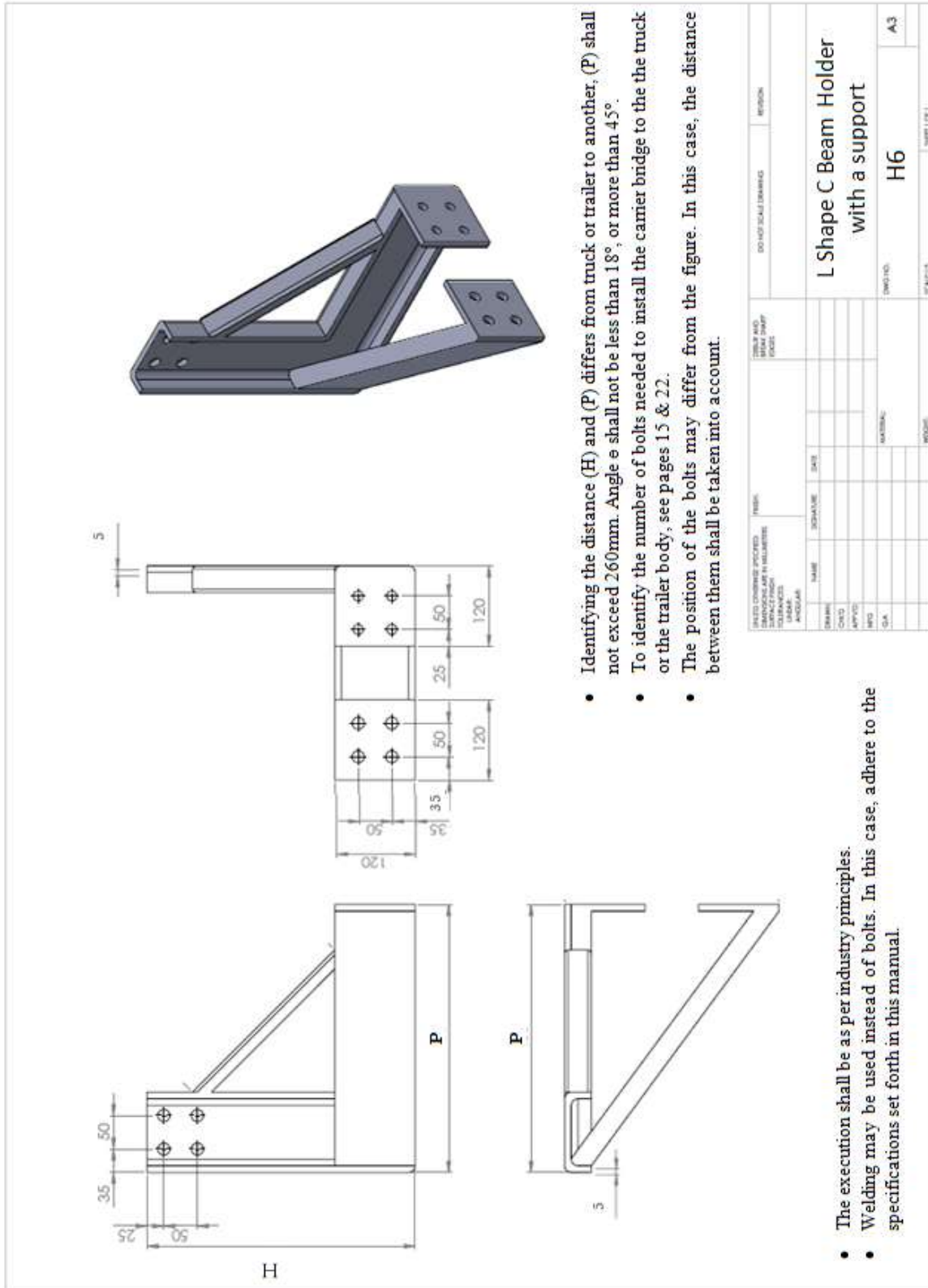


- Identifying the distance (H) and (P) differs from truck or trailer to another, (P) shall not exceed 260mm. Angle θ shall not be less than 18°, or more than 45°.
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REVISION	DATE	BY	CHKD	APP'D	DATE	REVISION	DATE	BY	CHKD	APP'D	DATE
TITLE: Angle C Beam Holder with a support SHEET NO: H5 SHEET TOTAL: A3											

*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to another.



*Dimensions in this Figure represent overall view in mm, and may differ from one truck or trailer to a