

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

SASO/CD 32180 (E)

السيارات - حواجز الحماية الأمامية للشاحنات
Motor Vehicles-Front Underrun Protective Devices for
Trucks

SASO

ICS: 43.080.020

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مقدمة

قامت بالهيئة السعودية للمواصفات والمقاييس والجودة بإعداد مشروع المواصفة القياسية السعودية " السيارات - حواجز الحماية الأمامية للشاحنات " 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 2112:2011.

Foreword

The Saudi Standards, Metrology and Quality Organization (SASO) has prepared the draft of Saudi Standard " Motor vehicles- Front Underrun Protective Devices for Trucks " by technical committee of road vehicle based on relevant ADMO, International and National foreign Standards and references. These standards will be replace SASO GSO 2112:2011.

Motor vehicles - Motor Vehicles - Front Underrun Protection Devices for Truck

1- SCOPE AND FIELD OF APPLICATION

This standard is concerned with the requirements for the front underrun protective devices (FUPD) of vehicles category N1 and N2⁽¹⁾. This standard does not apply to off road vehicles and vehicles such that their use is incompatible with the provisions of front underrun protection.

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

3.2 Maximum weight: The vertical force (in newtons) required to support the same vehicle loaded to its maximum mass.

3.3 Unladen Vehicle: The vehicle in running order unoccupied and unladen but complete with fuel, coolant, lubricant, tools and a spare wheel.

3.4 Type of FUPD: means FUPD 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 Front Underrun Protection (FUP) : The presence at the front of the vehicle of either: a special FUPD or a body work, chassis parts or other components such that by virtue of their shape and characteristics, these elements can be regarded as fulfilling the function of the FUPD.

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)

4- REQUIREMENTS

The following shall be met:

4.1 General

4.1.1 All vehicles carrying goods, including tankers, mobile cranes, mobile workshops of maximum mass exceeding 3.5 tonnes, shall be equipped with front underrun protective devices to offer effective protection for passenger cars or vehicles carrying goods having maximum mass not exceeding 3.5 tonnes against underrunning in the event of a frontal collision.

4.1.2 The front underrun protective device shall comply with the requirements specified in item 4.4.

4.1.3 If the vehicle is so designed and equipped at the front that by virtue of their shape and characteristics, its component parts comply with the requirements specified in items 4.4 and 4.5, then the vehicle may not be necessary to be provided with front underrun protective device.

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

4.1.5 Vehicles of a maximum mass not exceeding 7.5 tonnes shall comply only with the ground clearance requirement of 400 mm set out in this standard.

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 (see 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 FUPD Technical requirement
- 4.4.1 The FUPD shall offer adequate resistance to forces applied parallel to the longitudinal axis of the vehicle and also satisfy certain dimensional requirements. These shall be checked in accordance with dimensions and Material specified in this standard.
- 4.4.2 The section height of the FUPD cross-member shall not be less than 100 mm for goods vehicles having a maximum mass between 3.5 and 12 tonnes and 120 mm for goods vehicles having maximum mass exceeding 12 tones (see Figure 3).
- 4.4.3 The lateral extremities of the cross-member shall not bend to the front or have a sharp outer edge; this condition is fulfilled when the lateral extremities of the cross-member are rounded on the outside and have a radius of curvature of not less than 2.5 mm.
- 4.4.4 The device may be so designed that its position at the front of the vehicle can be varied. In this event, there shall be a guaranteed method of securing it in the service position so that any unintentional change of position is precluded.
- 4.4.5 It shall be possible for the operator to vary the position of the device by applying a force not exceeding 40 daN (400 N);
- 4.4.6 The outermost surfaces of every front guard installation shall be essentially smooth or horizontally corrugated so that domed heads of bolts or rivets may protrude beyond the surface to a distance not exceeding 10 mm.
- 4.5 Installation of FUPD
- 4.5.1 The maximum mass of a vehicle type shall not exceed the value indicated on the approved FUPD intended to be installed on that vehicle.
- 4.5.2 The vehicle with the FUPD installed shall satisfy the dimensional requirements specified in item 6.4.

- 4.5.3 In measuring the distances, any part of the vehicle which is more than 2m above the ground shall be excluded.
- 4.5.4 The maximum ground clearance with respect to the underside of the FUPD shall be no more than 400 mm, between the two points (P₁) in the installed condition.
- 4.5.5 Outboard of each point (P₁) of the above-mentioned height may be greater than 400mm providing the underside is not above a plane passing through the underside of the FUPD directly below the point (P₁) and forming a slope at 15° above the horizontal (Figure 5).
- 4.5.6 The width of the FUPD shall at no point exceed the width of the mudguards covering the wheels of the foremost axle nor shall it be more than 100 mm shorter on either side than the foremost axle measured at the outermost points of the tyres, excluding the bulging of the tyres close to the ground (Figure 4), or 200 mm shorter on either side, measured from the outermost points of the access steps to the driver's cabin.

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

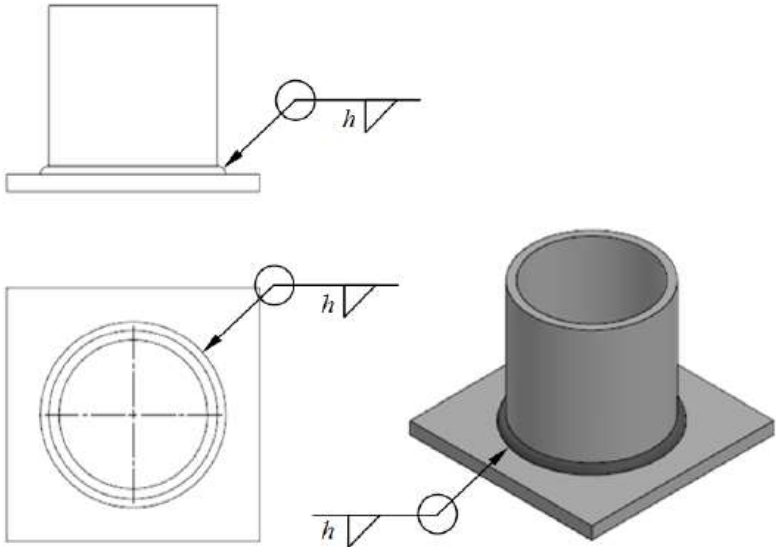
The instruments used shall permit measurement to an accuracy of (± 1) mm.

6.2 Approval Dimensions Specifications

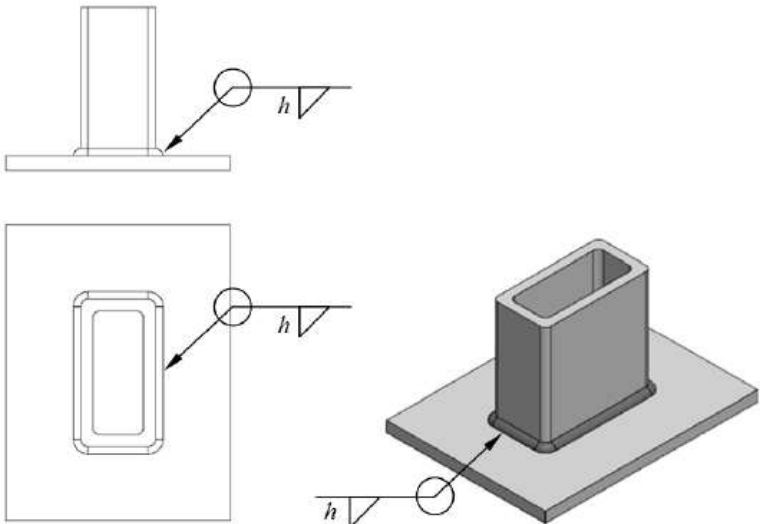
The dimensions specifications design for front underrun protective devices shall be followed at Annex 1.

7- CRITERIA OF TECHNICAL CONFORMITY

- 7.1 The front 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 front underrun protective device shall be considered noncomplying



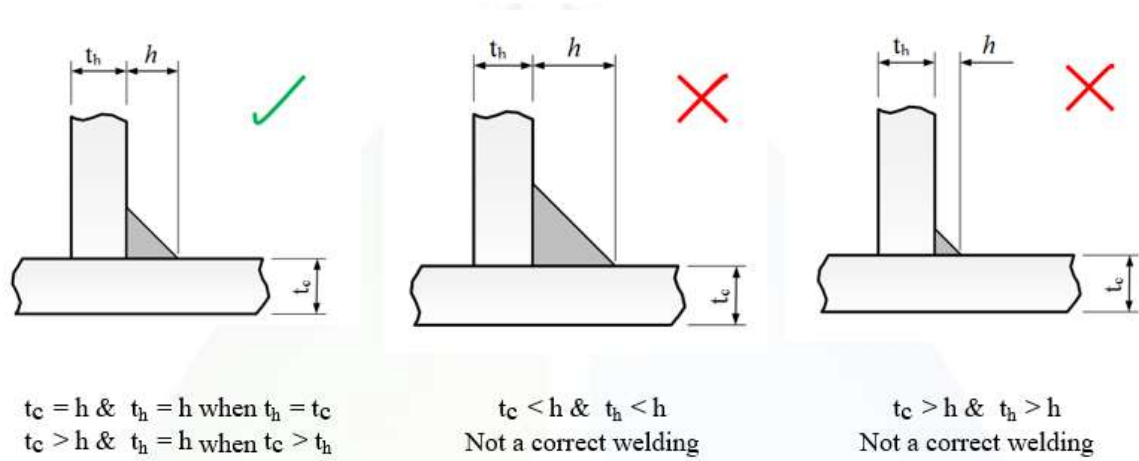
A) Welding a bar having a circular section to a flat surface.



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

Knowing that (h) means welding thickness.

Figure 1: Approved welding shape



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

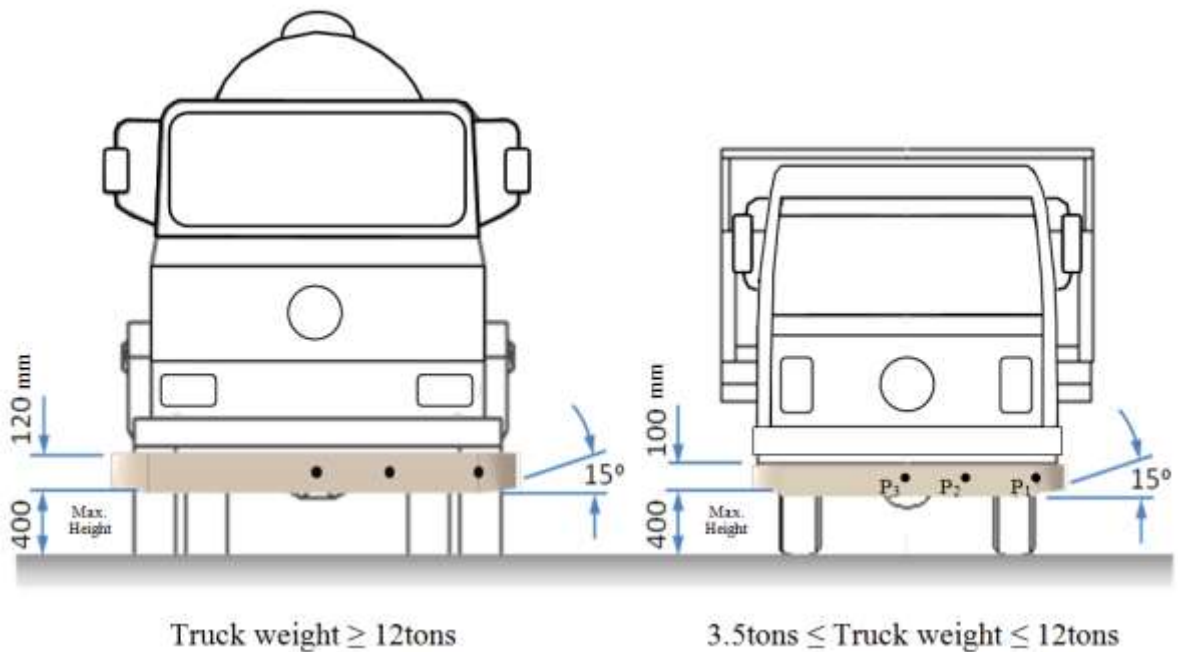
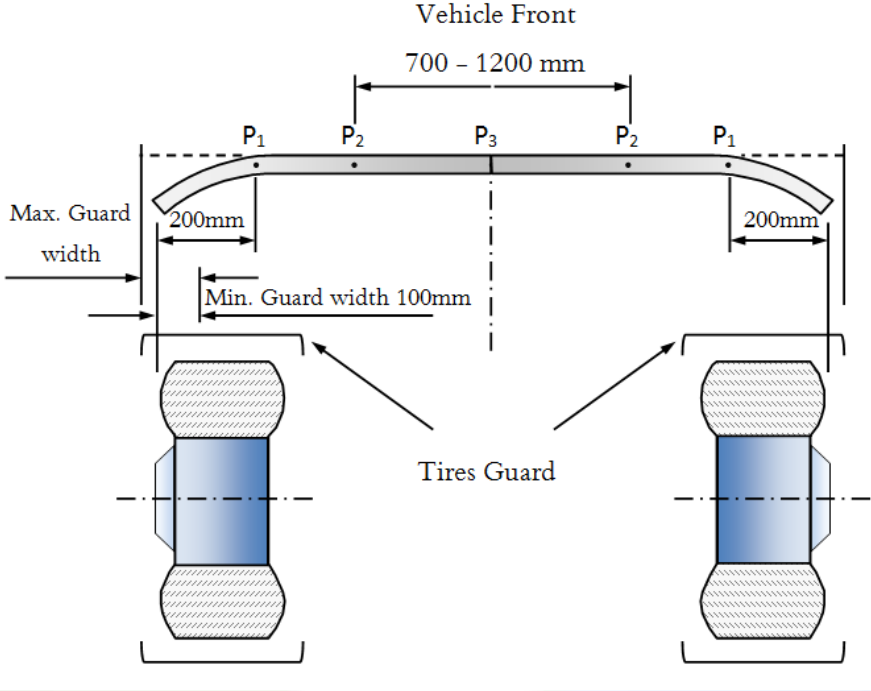


Figure 3: Front view of two trucks having different weights with a view of the FUPD



FUP Normally Consists of a Cross-Member and Links to the Chassis or Other Structural Members
Note: The Shape of FUPD is only an example

Figure 4: Top view of truck front part

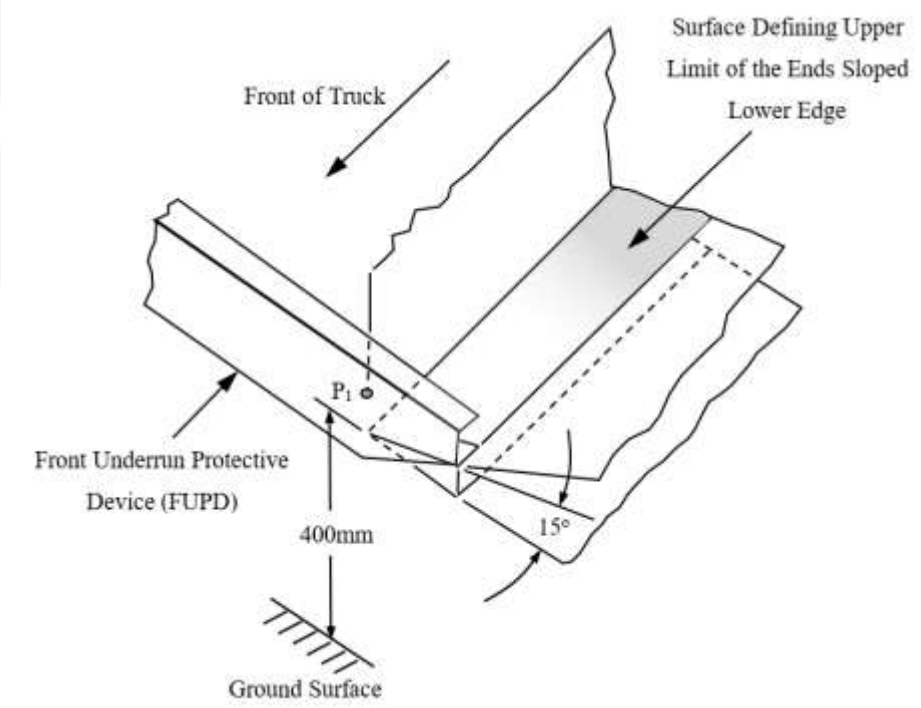


Figure 5: maximum ground clearance and forming a slope at 15° above the horizontal

Annex 1

Approval Dimensions and materials Specifications

1. The following Dimensions and materials specifications design for front underrun protective devices shall be followed in case of failing to do inspection test.

1.1 Visual inspection

The front 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 FUPD

1.3.1 Main models for the cross-sectional area of FUPD as in Figure 6.

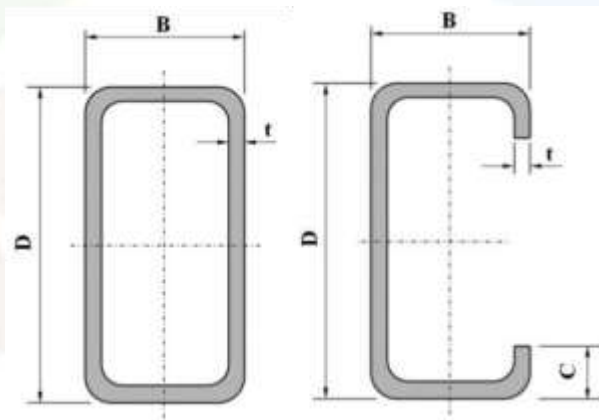


Figure 6: Main models for cross-sectional area of the front barrier.

1.3.2 Dimensions of the cross-sectional area

Table 1: Trucks with a maximum weight between 3.5 to 12 tones.

Type of cross-sectional area	minimum D (mm)	B (mm)	C (mm)	minimum t (mm)
C- Section	100	50	20	5
Rectangle section	100	50	-----	5

Table 2: Trucks exceeding weight 12 tones.

Type of cross-sectional area	minimum D (mm)	B (mm)	C (mm)	minimum t (mm)
C- Section	120	60	20	5
Rectangle section	120	60	-----	5

1.3.3 Different Main Models of FUPDs

The underrun protective device consists of front underrun protective device and the carrier bridge that connects the front underrun protective device to the truck chassis as in Figure 7.

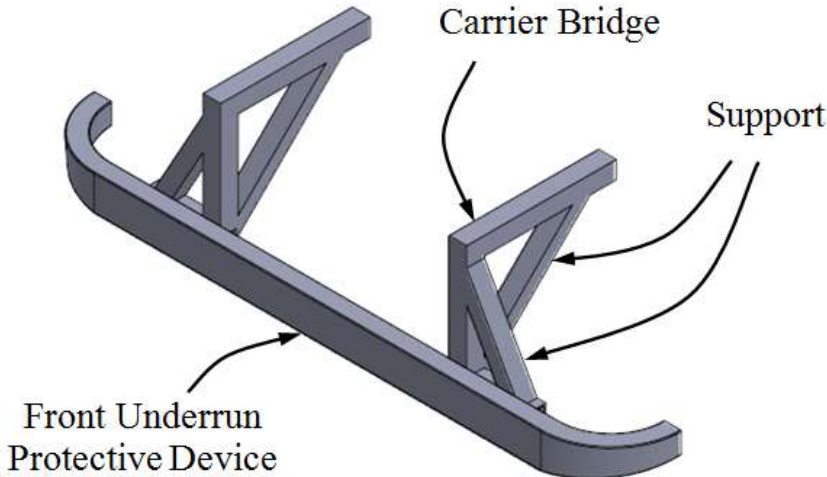


Figure 7: A model of FUPD and its carrier bridge

1.3.3.1 Front Underrun Protective Device (FUPD)

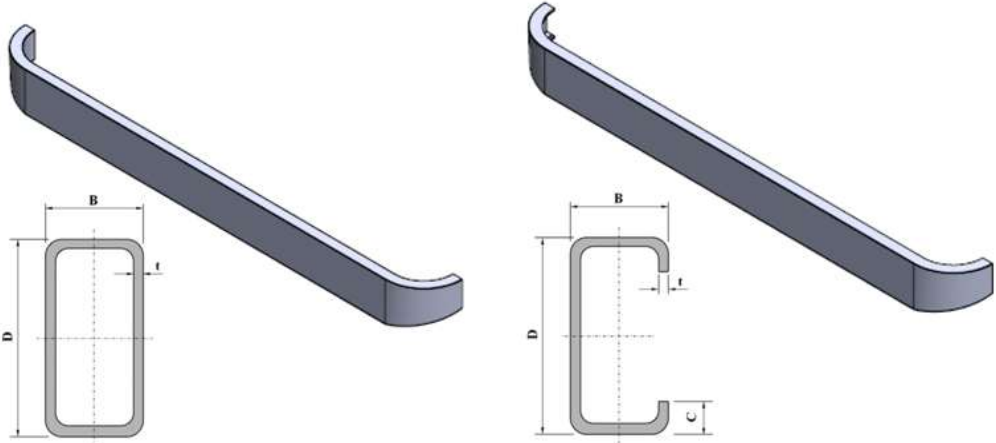


Figure 8: General model of truck FUPD

- Location at where the place of FUPDs attached to the carrier bridges

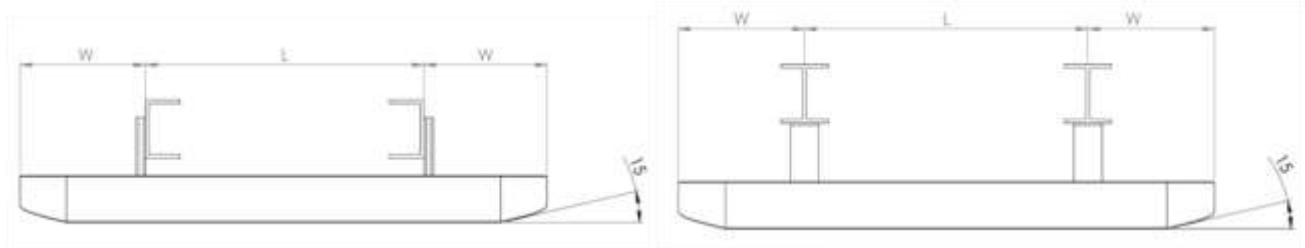


Figure 9: Front view illustrating the place of FUPD is fitted to the carrier bridge

Table 3: Adding support between bridge and FUPD

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 to 400mm	The distance is over 400mm
Aluminum Alloy	700-1200	Less or equal to 400mm	The distance is over 400mm

1.3.3.2 Carrier Bridge Connecting FUPD to Truck Chassis

- When the truck has a chassis of (I-section beam), this type of carrier bridge is used.

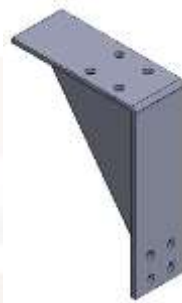


Figure 10: Model of carrier bridge used with (I-section beam) truck chassis

- When the truck has a chassis of (C-section beam), these types of the carrier bridge is used.

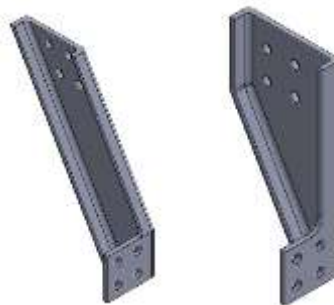


Figure 11: Models of carrier bridge used with (C-section beam) truck chassis

1.3.3.3 Adding Support to Carrier Bridge between FUPD and Truck Chassis

- If the distance (W) after fixing the carrier bridge on the FUPD exceeds 400mm, a rear support shall be installed as shown in Figure. 12.

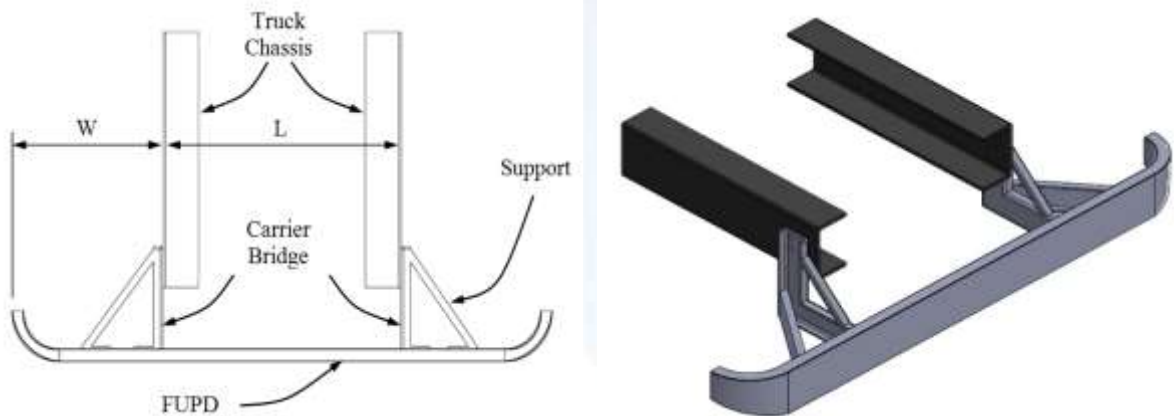


Figure 12: Support must be added between FUPD and carrier bridge when distance (W) exceeds 400 mm

1.3.3.4 Connecting FUPD Parts

- Connection can be done by welding or using bolts, as clarified in item 4.2. For bolts, they shall be as shown in Table 4.

Table 4: recommendation of minimum number of bolts and diameter used for trucks

Trucks with a maximum weight between 3.5 to 12 tones		Trucks exceeding weight 12 tones	
Number of Bolts	Bolts Diameter (mm)	Number of Bolts	Bolts 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

1.3.3.5 Sample of FUPDs Models

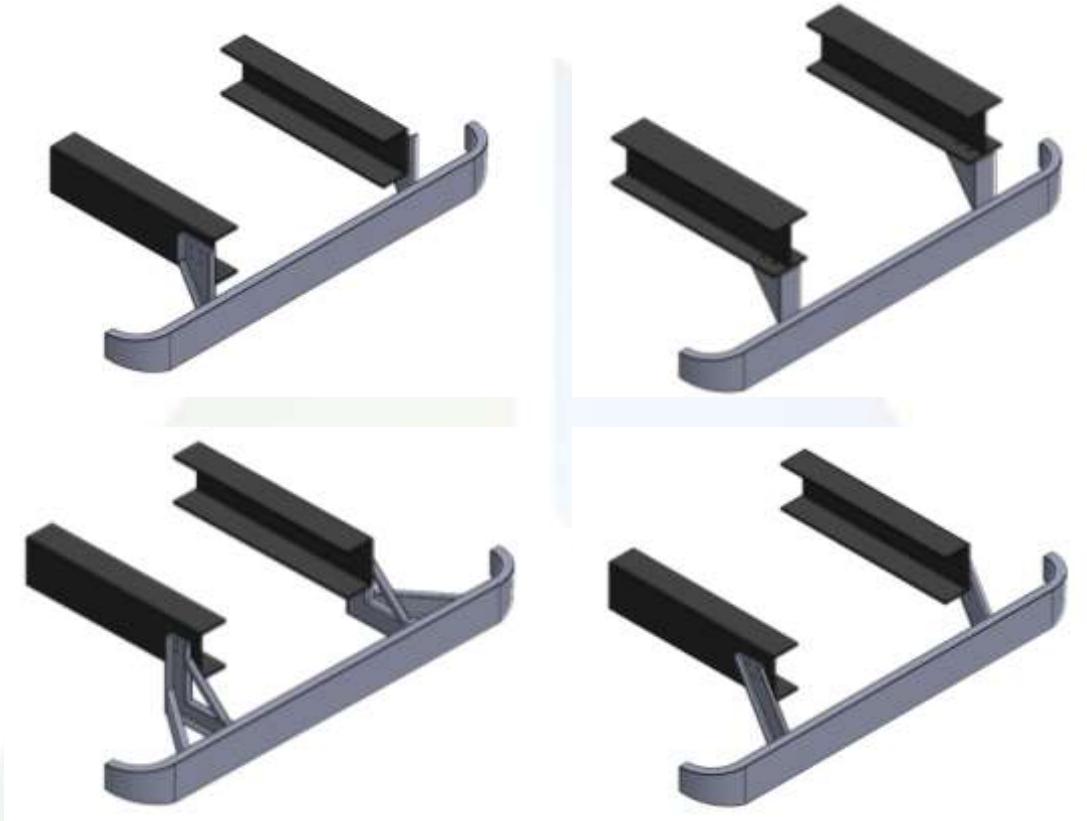
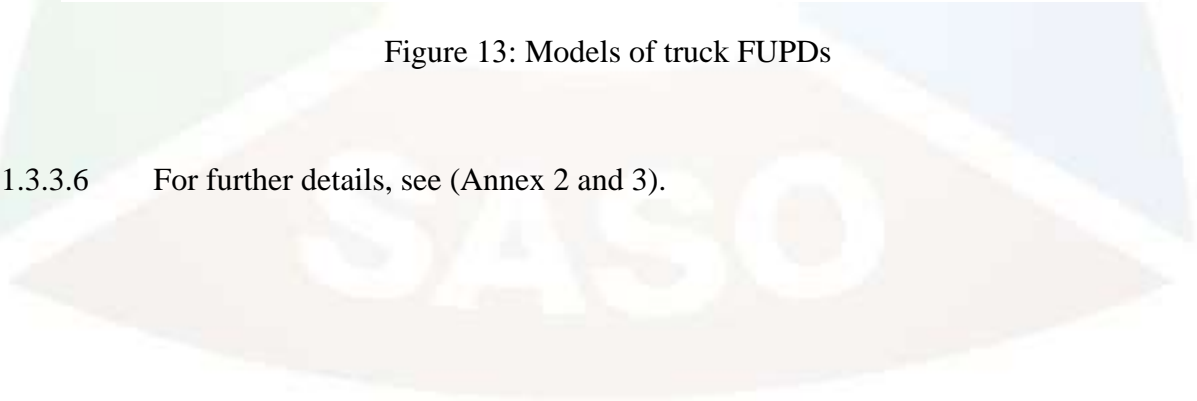


Figure 13: Models of truck FUPDs

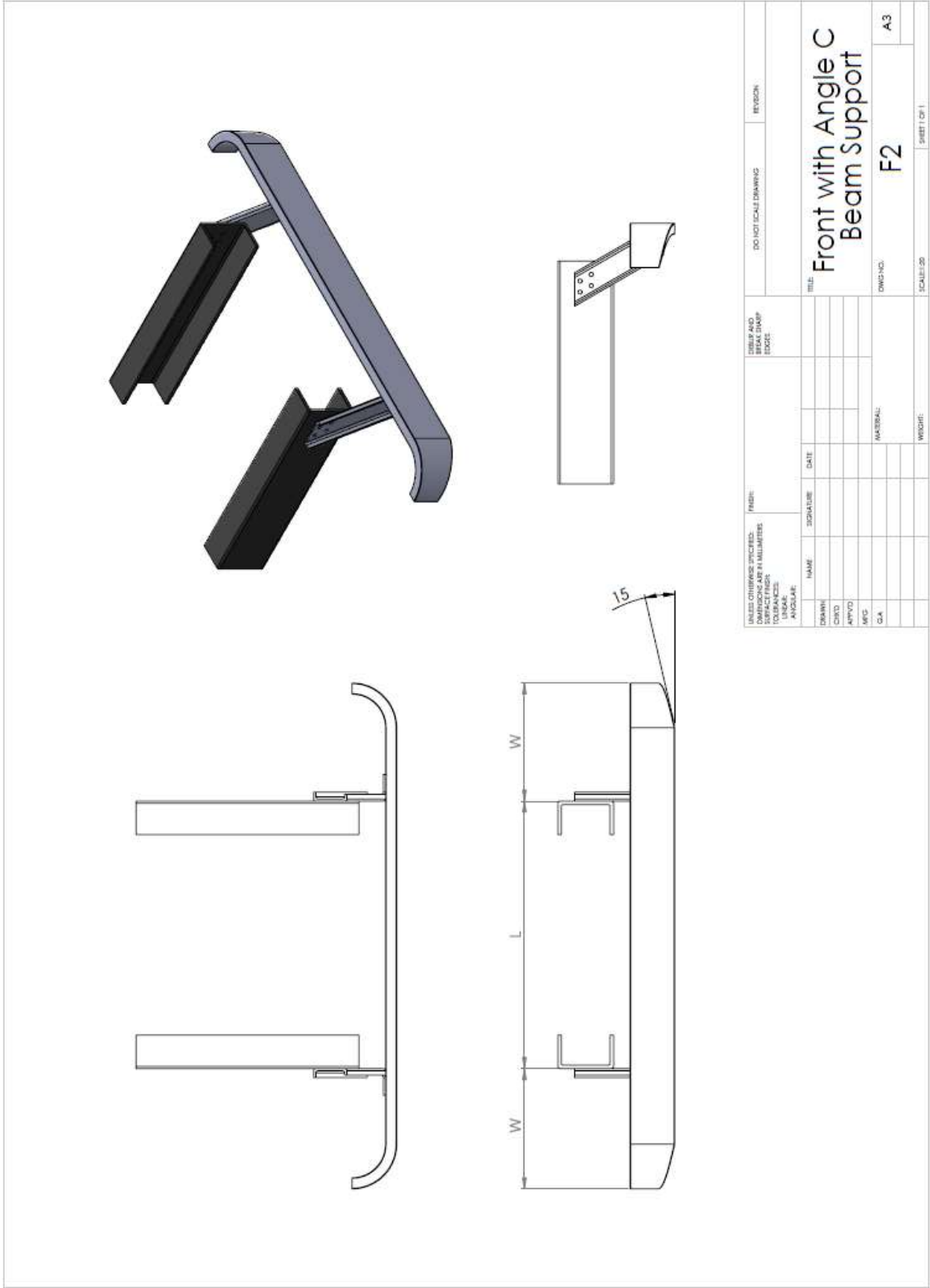
1.3.3.6 For further details, see (Annex 2 and 3).



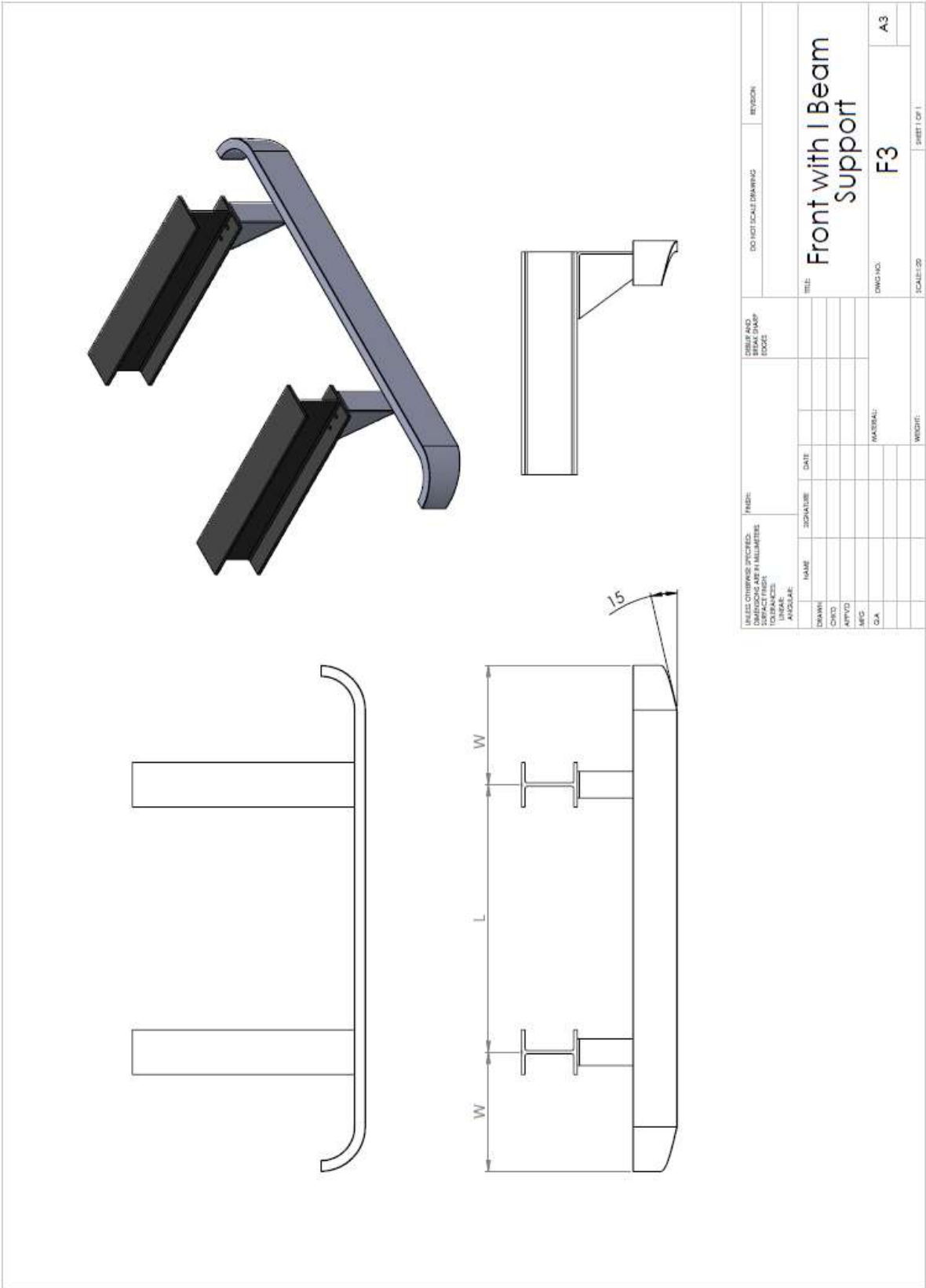
Annex 2

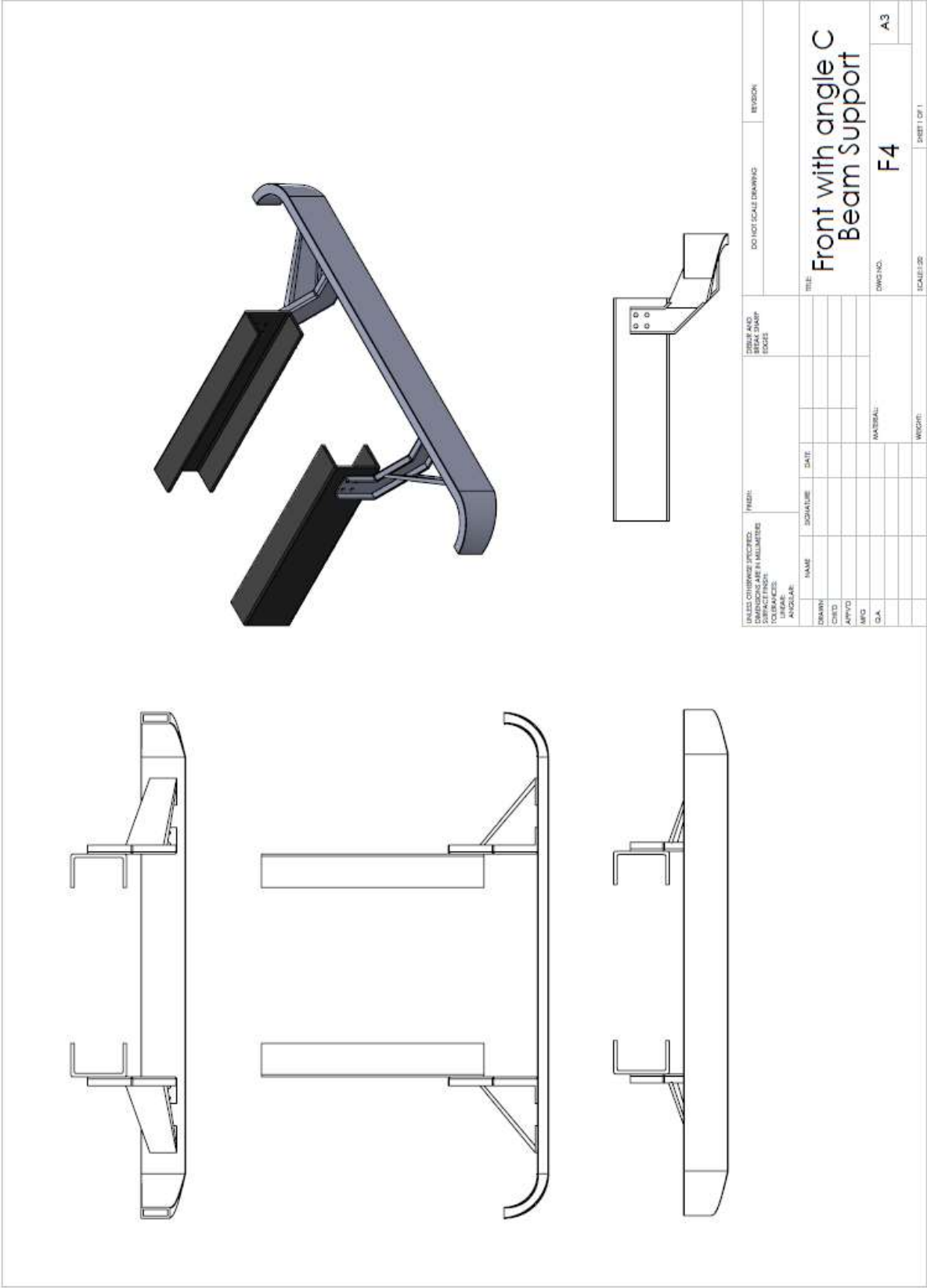
Sample Models of FUPDs in Truck

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MATERIAL: _____		MATERIAL: _____		MATERIAL: _____		MATERIAL: _____		MATERIAL: _____		MATERIAL: _____	
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A3		A3		A3		A3		A3		A3	
F1		F1		F1		F1		F1		F1	
Front with C Beam Support		Front with C Beam Support		Front with C Beam Support		Front with C Beam Support		Front with C Beam Support		Front with C Beam Support	
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REVISION		REVISION		REVISION		REVISION		REVISION		REVISION	



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Annex 3

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

Angle C Beam Holder

• 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.

• 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.

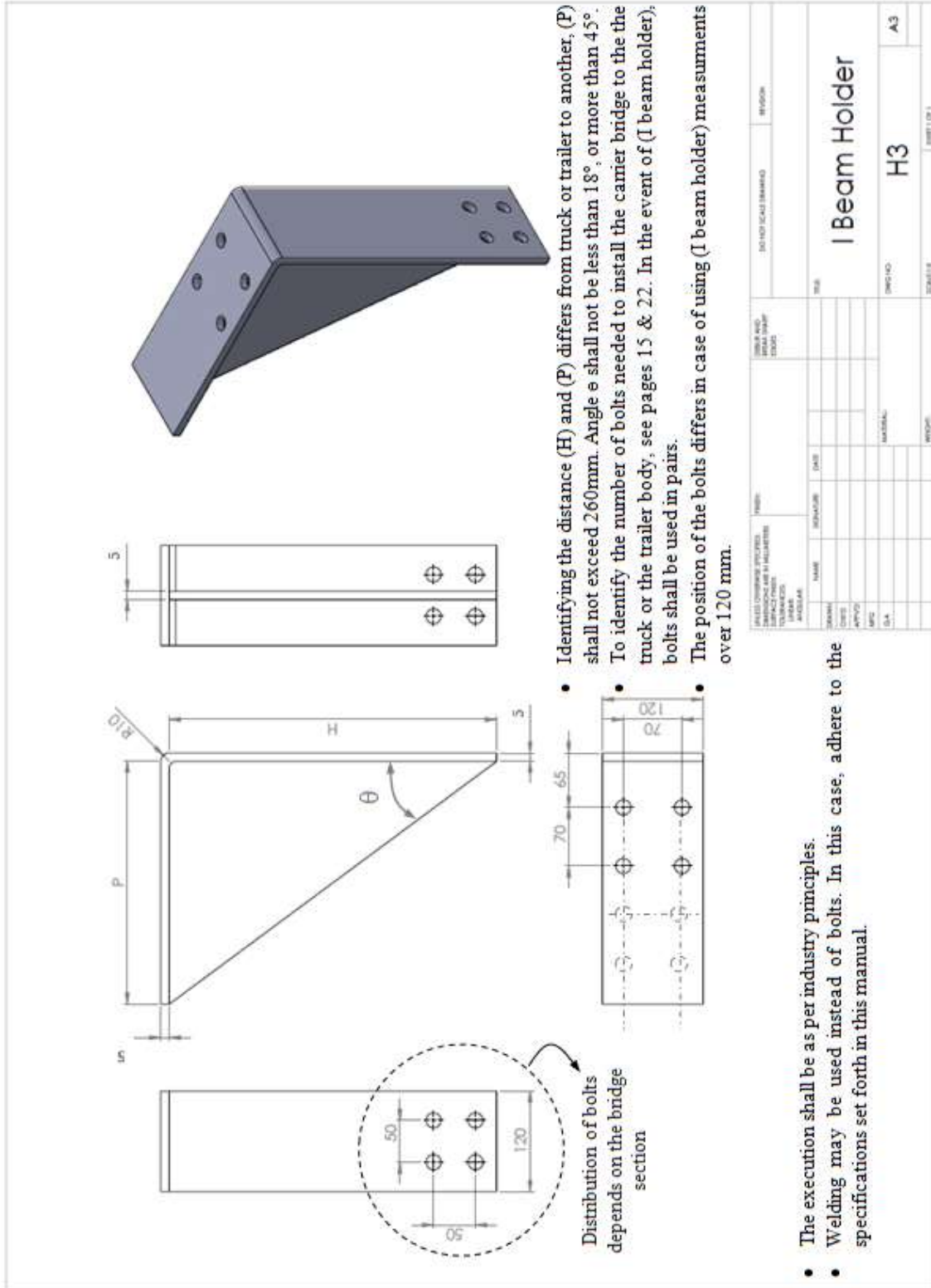
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A3				H1			

Distribution of bolts depends on the bridge section

- 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.

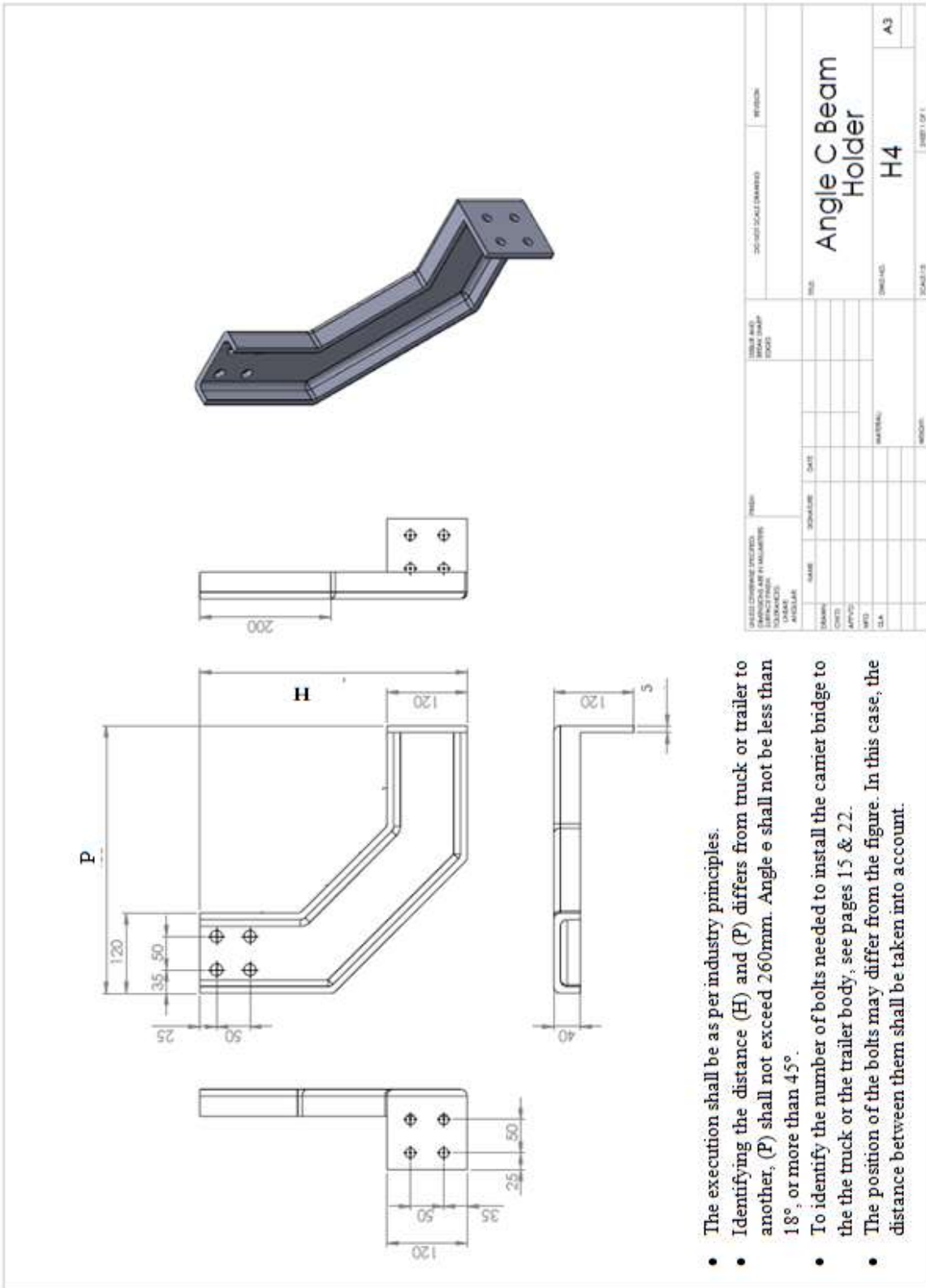
- The execution shall be as per industry principles.
- Welding may be used instead of bolts. In this case, adhere to the specifications set forth in this manual.

SHALL COMPLY WITH THE FOLLOWING STANDARDS: SAE J413 SAE J414 SAE J415 SAE J416 SAE J417 SAE J418 SAE J419 SAE J420 SAE J421 SAE J422 SAE J423 SAE J424 SAE J425 SAE J426 SAE J427 SAE J428 SAE J429 SAE J430 SAE J431 SAE J432 SAE J433 SAE J434 SAE J435 SAE J436 SAE J437 SAE J438 SAE J439 SAE J440 SAE J441 SAE J442 SAE J443 SAE J444 SAE J445 SAE J446 SAE J447 SAE J448 SAE J449 SAE J450 SAE J451 SAE J452 SAE J453 SAE J454 SAE J455 SAE J456 SAE J457 SAE J458 SAE J459 SAE J460 SAE J461 SAE J462 SAE J463 SAE J464 SAE J465 SAE J466 SAE J467 SAE J468 SAE J469 SAE J470 SAE J471 SAE J472 SAE J473 SAE J474 SAE J475 SAE J476 SAE J477 SAE J478 SAE J479 SAE J480 SAE J481 SAE J482 SAE J483 SAE J484 SAE J485 SAE J486 SAE J487 SAE J488 SAE J489 SAE J490 SAE J491 SAE J492 SAE J493 SAE J494 SAE J495 SAE J496 SAE J497 SAE J498 SAE J499 SAE J500		TITLE AND SCALE TITLE: Angle C Beam Holder SCALE: H2	DRAWN BY CHECKED BY APPROVED BY DATE	DO NOT SCALE DRAWING REVISIONS
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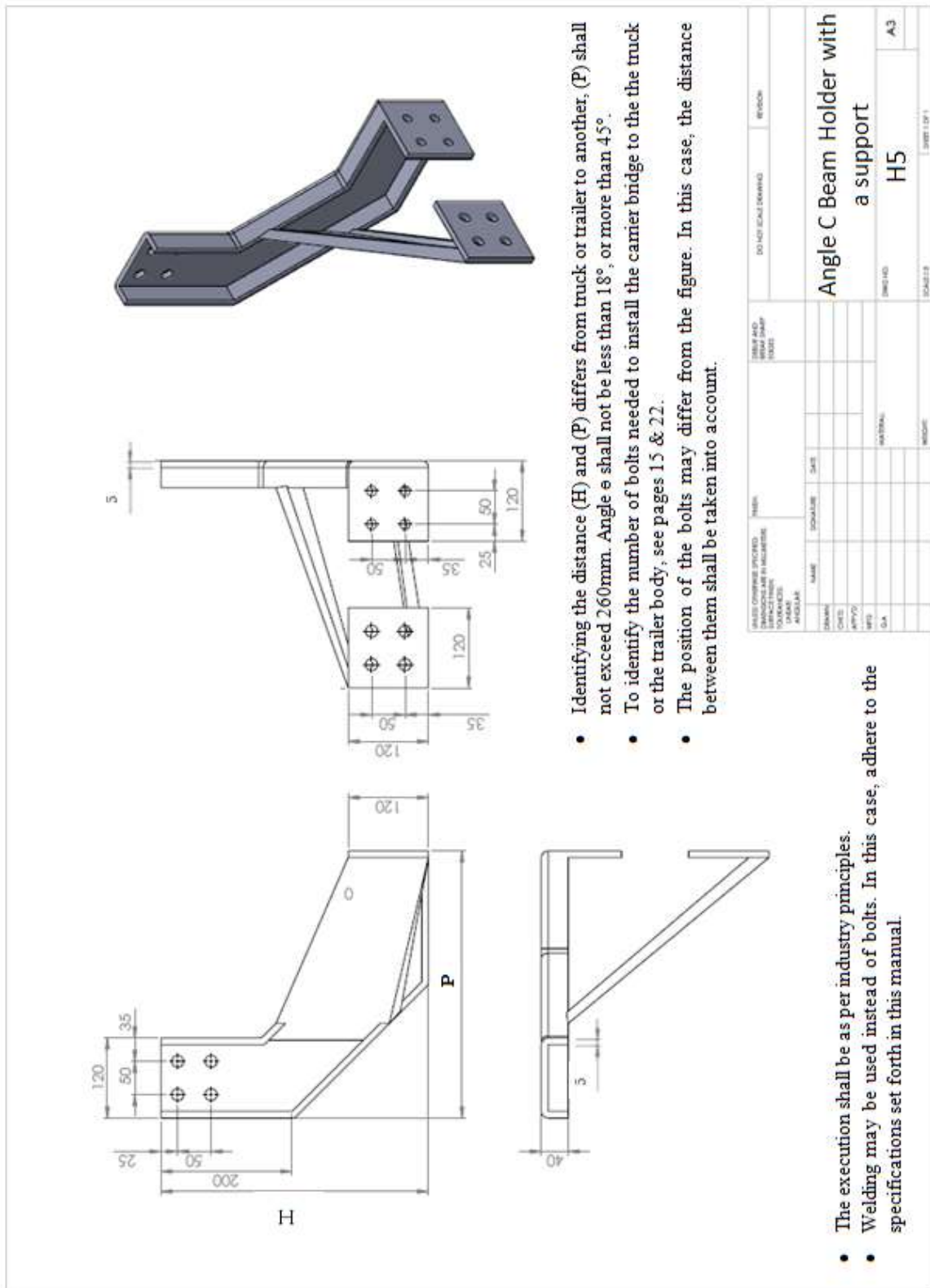
- The execution shall be as per industry principles.
- Welding may be used instead of bolts. In this case, adhere to the specifications set forth in this manual.

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- 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.

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Angle C Beam Holder				
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SHEET 1 OF 1				



- 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.

- 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.

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