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Application Procedure Specification Dhatec System88: Block C

Dhatec Document No.: DHA415-APS-S88C

Rev.	Date	Status	Prepared by	Reviewed by	Approved by
00	12.04.2017	For Construction	D. Eens	I. van Assema	I. van Assema
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General Information

Equipment	System88
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Disclaimer of liability: Every effort has been made to ensure that the information in this document is accurate and correct to the best of our knowledge, correct at the date of publication. However, Dhatec B.V. cannot be held responsible for consequences that follow from the claims that were made in this document.

Do not carry out any repairs or modifications on the equipment without consulting Dhatec B.V., doing so will invalidate the guarantee. The guarantee is also invalidated if accidents and damage of any form are caused as a result of improper use and/or not obeying the warnings in general as explained in this user guide. Dhatec B.V. accepts no responsibility for any personal accidents as a consequence of not following the safety instructions and warnings. This is also the case for consequential loss in any form.

Safety Requirements

These are general guidelines, all personnel involved should adhere to the safety requirements of the particular location at which they are performing their operations.

Dhatec recommends wearing of suitable PPE while handling their products. This includes gloves, safety shoes, safety glasses, safety helmet, hearing protection and suitable work clothing.

The working areas should be kept tidy at all times in order to minimize the risk of trips and slips.

All personnel involved should use suitable manual handling techniques and follow industry recommended guidelines for lifting and moving, such as those described in “Ergonomic Guidelines for Manual Material Handling” published by the National Institute for Occupational Safety and Health (Publication 2007-131), or those otherwise prescribed by the client.

Introduction

System88 is a safe and flexible system to efficiently transport pipes by train or truck. It is a flexible system that can easily be adjusted for different pipe diameters. The blocks are made out of a PE-compound and are safe for coated pipes.

System88 is an engineered system based on extensive research and designed following EN1025 and VDI 2700 regulations. All static and dynamic calculations for pipe transport on truck and train are evaluated and approved by TÜV Germany. As developer and manufacturer of the System88 program, Dhatec gives full technical support and advice.

Equipment

A minimum of 2 profiles per vehicle are required to support the pipes. Blocks will be secured on the profiles. Each bottom pipe is supported by a minimum of 4 blocks. The blocks are secured to the profile by Locking pins with Securing clips.

Systm88 steel profile (Figure 1)
The square profile is available in the standard width of a truck`s trailer: 2.450mm or a train`s trailer: 2.700mm
The weight of the profile is approx. 20 kg (truck) / 22kg (train)

Figure 1. System88 steel profile

System88 Block C (Figure 2)
This block will be placed on the bottom-profile.
Diameter range: ø 558,8 – 1.422,4 mm.
Weight of the Block: approx.7,5 kg.

Figure 2. System88 block C

System88 block K (Figure 3)
This block will be placed on a mid-profile.
Diameter range: ø 219,1 – 558,8 mm.
Weight of the Block: approx.2,8 kg.

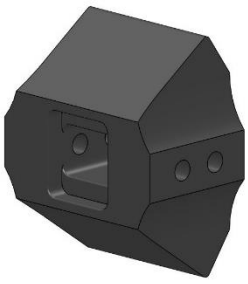


Figure 3. System88 block K

System88 block L (Figure 4)
This block will be placed on a mid-profile.
Diameter range: ø 406,4 – 1.219,2 mm
Weight of the Block: approx. 7,4 kg.

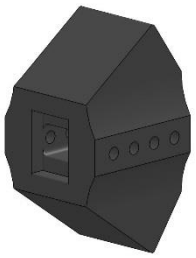


Figure 4. System88 block L

Locking pin for blocks (Figure 5)
This pin is used to secure the block on the rail. When the block and the rail align, a pin is placed through the aligned holes.
Weight of the Locking pin: approx. 0,6 kg

Figure 5. Locking pin

Securing clip for Locking pin (Figure 6)
This is a safety attribute which will decrease the chances of the pin failing to secure the block on the rail.
Weight of the clip: approx. 0,1 kg.

Figure 6. Securing clip for Locking pin

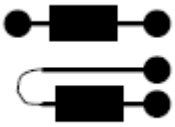
Anti-skid (NOT used when working on trains)
Anti-skid increases the friction between System88 and the load (0.3 → 0.6). Although it is not mandatory, Dhatec strongly recommends using it.
Weight of the anti-skid: approx. 1,4 kg/m.

Figure 7. Anti-skid

Tie down

Loads need to be secured to prevent movement of goods and to be allowed to travel on public roads. Each country has its own laws regarding the amount of securing needed. Dhatec bases their calculations on the norm VDI2700. Customer specific calculations can be done on request.
Using Anti-skid (truck) can greatly reduce the number of tie downs necessary. A calculation example can be found in Appendix B.

Tie downs are available in lengths of 9m or 12m.
Lashing capacity: 2500 daN (single)
5000 daN (looped)



S_{hf} = 50daN, S_{tf} = 750 daN
Norm: EN 12195-2

Connector belt

When a layer consists of 2 pipes, there is a chance the system will tilt when placing a pipe on a mid-section. To prevent this, the rail of that layer is connected to the rail of the section below.

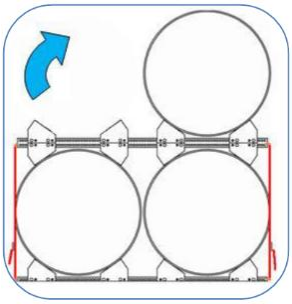
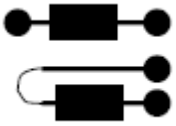


Figure 8. Tilting S88

Lashing capacity: 1000 daN (single)
2000 daN (looped)



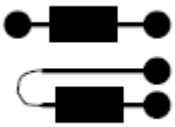
S_{hf} = 50daN, S_{tf} = 100 daN
Norm: EN 12195-2

Connector belts are 1,75m long and sold as a pair, since the rail has to be connected on both sides.

Figure 9. Connector belt

Profile-to-trailer connector

Similar to the connector belt, the Profile-to-trailer connector connects the profile to the trailer. This will prevent tilting and displacement of the bottom layer.
Lashing capacity: 1000 daN (single)
2000 daN (looped)

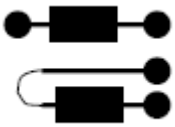


Norm: EN 1492-1
Profile-to-trailer connectors are 0,7m long and sold as a pair.

Figure 30. Profile-to-trailer connector

Hoisting belt

When the blocks are assembled on the rail, the total weight can be high. That`s why lifting is best performed by a crane or forklift using Hoisting belts.
Lashing capacity: 1000daN (single)
2000daN (looped)



Dhatec`s hoisting belts are 2m long.

General instructions for System88

Before using System88, all parts should be subjected to a visual inspection. If any below listed defect is observed, discard the relevant part.

Product failures:

- The System88 blocks (as shown in Fig. 2-4) may not show permanent imprints of pipes on the supporting faces.
- The edges of the System88 blocks may not be worn off more than 10 mm.
- The System88 blocks should always fit over the System88 profile without any problems.
- The holes in the System88 blocks may not show signs of permanent deformation or fractures. They should not be oval or have a diameter larger than Ø 23 mm.
- The holes of the System88 profile may not show signs of permanent deformation or fractures. They should not be oval or have a diameter larger than Ø 23 mm.
- The System88 profile should not show signs of bending or deflection after installation.
- The System88 steel profile (as shown in Fig. 1) may not show signs of corrosion, permanent deformation or cracks.
- The anti-skid rubber mats (figure 7) may not be torn or crushed, during or after installation.
- The Locking pin (figure 5) may not show signs of permanent deformation, fractures or corrosion.
- The Securing clip (figure 6) must have its original shape. The ring must lock under spring tension.

When using System88, the procedures listed below should always be regarded. The following list is only a brief overview of the procedures that should be respected, a complete elaboration can be found in the following paragraphs of this chapter.

A. Installation of System88
- A.1. Preparation
- A.2. Installation of profile
- A.3. Installation of block B

B. Loading of pipes
- B.1. Verification of block settings
- B.2. Placement of bottom pipes
- B.3. Verification of support of bottom pipes
- B.4. Installation of blocks K or L
- B.5. Placement of remaining layers

C. Securing of pipes
- C.1. Applying safety features

D. Unloading of pipes
- D.1. Checking stability of pipe stack
- D.2. Unloading pipes

E. Disassembly of System88
- E.1. Removal of S88 parts

A. Installation of System88 on truck

A.1. Preparation of truck

- Make sure the trailer is free of ice, snow, oil or anything else that could influence the friction.
- Make sure the trailer is solid. There should be no weak or rotten spots where the system will be placed.
- Make sure the trailer fits the bill. This means checking if it can handle the weight, is wide and long enough and all safety features are present.
- Place Anti-skid on places where the bottom profiles will come (truck only).

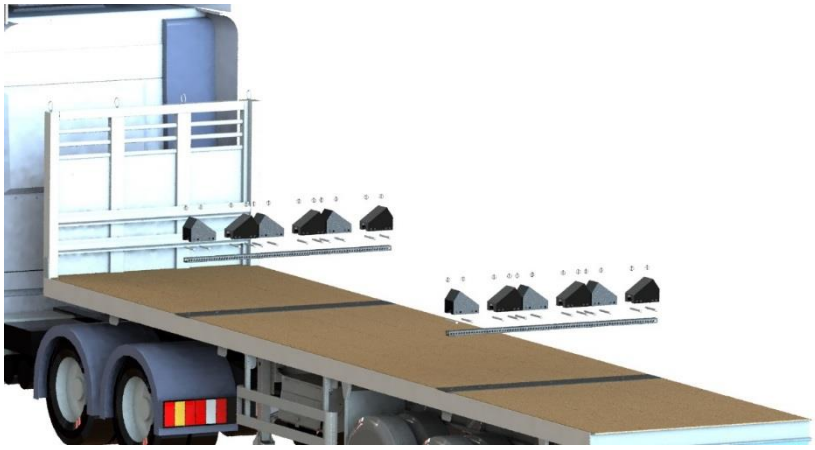


Figure 11. Start set-up with Anti-skid in place (trucks only)

A.2. Installation of the profiles

Place the base profiles on the trailer. When the base profiles are in place, fasten (screw 10x) it to the trailer or use profile-to-trailer connectors.

Figure 12. Fasten profile to trailer

A.3. Installation of Block C

If the base profiles are attached to the trailer, block C can be placed. Check the configuration supplied by Dhatec for their exact placement.

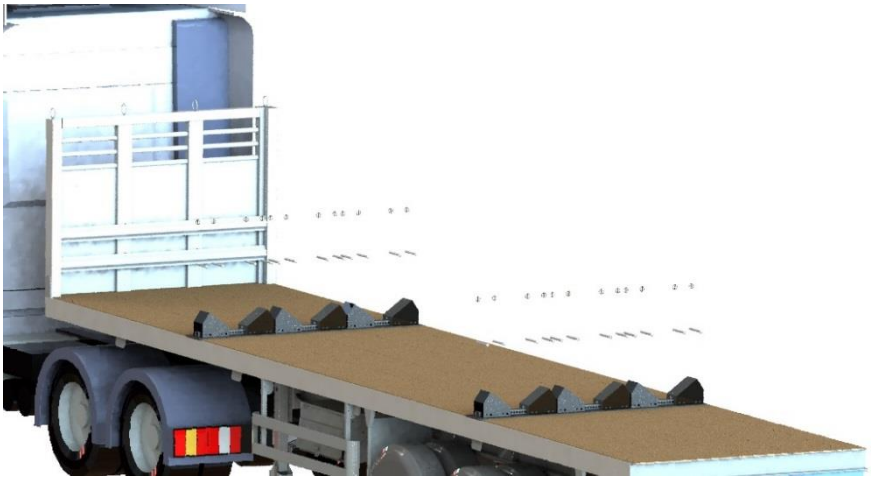


Figure 13. Place block on profile

- When the blocks are placed on the base profile, secure them with the Locking pins and Securing clips.

Optional, but strongly recommended when driving without load on the system:
Make sure the rail is connected to the trailer with a Profile-to-trailer connector. Unconnected rails can cause tilting and are extremely dangerous.

Figure 14. Lock the blocks with a pin and place profile-to-trailer connectors

Fasten the Profile-to-trailer connector with a pin to the profile, secure the pin with a clip. Hook the other end to the trailer. Only fasten the Profile-to-Trailer Connector and do not tension it. Place the Profile-to-Trailer Connector on the other side in a similar way, when both sides are fastened, they can be tensioned.

Place Anti-skid on top of the blocks (Truck only). This will increase the friction between pipe and block and reduce the number of tie downs required to secure the pipe.

Figure 15. Place Anti-Skid on top of the blocks (truck only)

B. Loading of pipes

B.1. Verification of block settings

When everything is in place, re-check the distances between the blocks. When the measurements don't comply, start over.

B.2. Placement of bottom pipes of stack

If everything is checked and approved, it's time to place the first layer of pipes onto the system.

- Make sure that the pipe surface is free from snow, ice, oil or anything that could influence friction between pipe and block.
- Although not mandatory, we strongly recommend placing an Anti-skid layer on the PE-blocks. There should be Anti-skid:
  - Between the rail and the trailer
  - Between the base blocks and the pipes
  - Between the pipes and the mid blocks (both sides)

Place the first pipe. Check the gap between the rail and the pipe and see if it matches the dimensions on the configurations.

Figure 16. Place pipes on the bottom blocks

B.3. Verification of support of bottom pipes

Figure 17. Place Anti-skid on the bottom layer (Trucks only)

When the first layer is in place, make sure every pipe is stable. Check the distance between the pipes and between the pipes and rail and compare with the configuration.

B.4. Installation of Blocks K or L

When the first layer of pipes is in place, another rail needs to be placed. The easiest way to prepare this rail is to place blocks K or L when the rail is not yet in place. Check the positioning of the blocks in the configuration and secure them the same way as the blocks on the base profile (Locking pins with Securing clips).

After everything is secured, place the rail on top of the pipes as shown in figure 18. Due to the weight, we advise to use a hoisting belt to place the mid-section on the pipes.

Make sure both the blocks and the rails align. Connect the rail to the bottom rail using a Connector belt. This will prevent tilting of the load while loading pipes.

Figure 18. Place the mid-section with blocks on top of the bottom layer

Figure 19. Place the Connector belts

Figure 20. Place Anti-skid on the mid-section (Truck only)

B.5. Placement of remaining layers

If the first layer is stable and approved, the next layers can be placed likewise.
(Remember to use Anti-skid (truck only) and connector belts where choosing to)

Figure 21. Place remaining layers

C. Securing of pipes

C.1. Applying safety features

Before securing the pipes, check if the measurements of the load match the measurements on the configuration. Using anti-skid is not mandatory, neither is using a profile-to-trailer connector when driving with a load and connector belts when transporting layers that consists of 3 or more pipes.

Figure 22. Place other safety attributes

A couple of safety features could already be in place: Profile-to-trailer connector, connector belts, anti-skid (truck). The last step is placing tie downs (and optional Slide Stops) along the length of the trailer.

The number of tie downs depends on the weight of the load.

	Number of tie-downs (S_{TF}750 daN, LC 2500)	
Total weight of the pipes	With Anti-skid layers	Without Anti-skid layers
30.000 kg	9	45
25.000 kg	8	38
20.000 kg	6	30
15.000 kg	5	23
10.000 kg	3	15
5.000 kg	2	8

A calculation example of the required number of tie downs for a 20t load is provided in Appendix C.
Anti-skid may only be used on trucks, NOT on trains!

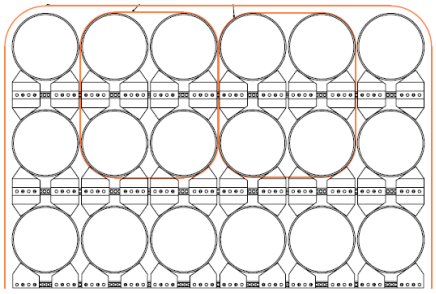


Figure 43. Example Strapping scheme

As seen in the table above, using anti-skid significantly lowers the number of tie downs needed to secure the load. Always use enough tie downs.
Divide the tie downs evenly along the length of the load. Make sure they are not twisted.

If the top layers contain more than 2 pipes, the middle pipes on top are not secured with tie downs. This can be rectified by using Slide Stop. Because Slide Stop is an engineered pre-shaped beam, when tensioned it will secure the middle pipes. This can also be done by placing tie downs around smaller sections of pipes. When necessary, ask Dhatec for a strapping scheme.

Figure 54. Working principle of Slide stop

Figure 25. Truck ready to go

Figure 26. Flatcar ready to go

When finished, re-check every tie down, connector belt, Profile-to-trailer connector and Slide Stop.
Every driver is responsible for his or her own load. Adapt driving style to weather conditions.

D. Unloading of pipes

D.1. Check stability of pipe stack

Before unloading the pipes, be sure the stack is stable. This means no pipe will shift or start to roll when unloading another pipe.
Be careful when removing tie-downs because of the high tension.

D.2. Unloading pipes

Start unloading with the outer pipes. Make sure the connector belts and profile-to-trailer connectors stay in place until the entire parent layer is unloaded.

When unloading the outer pipes, unload the corresponding pipe on the other side next to minimalize the risk of tipping.

If an entire layer is unloaded, the connector belt from that layer can be removed. With a hoisting belt, the rail and blocks can be lifted off as 1 piece.

E. Disassembly of System88

E.1. Removal of S88 parts

When the pipes are unloaded, the System88 parts can be disassembled. Follow steps A3-A2-A1.

Collect every pin with Securing clip used to hold the blocks in place. Make sure the Securing clips don't show deformations. If any show deformations, discard them.

Check the blocks for pipe imprints. If any deformation is permanent, the block needs to be replaced. The wear on the edge shouldn't exceed 10mm.

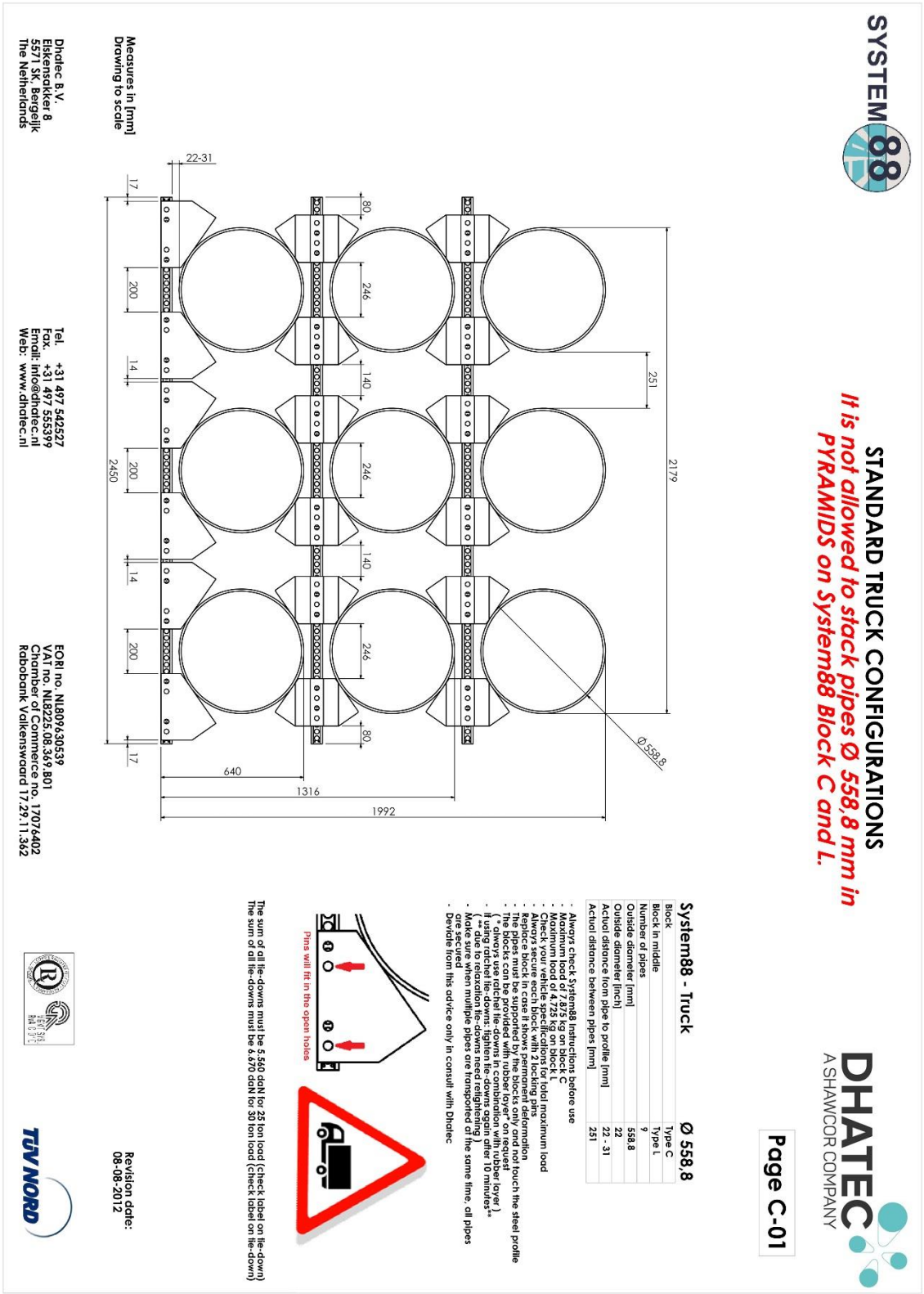
End note

This recommended practice is put together with great care. When safety risks are noticed which are not covered by this instruction please contact Dhatec to share this finding.

[1] Pipe Configurations are supplied with the first delivery, contact our office for copies and updates.

[2] Truck drivers should have been educated to load their vehicles properly and therefore are assumed to be familiar with loading prescriptions.

Appendix A Standard Configurations Truck block C



SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

It is not allowed to stack pipes Ø 609,6 mm in PYRAMIDS on System88 Block C and L.

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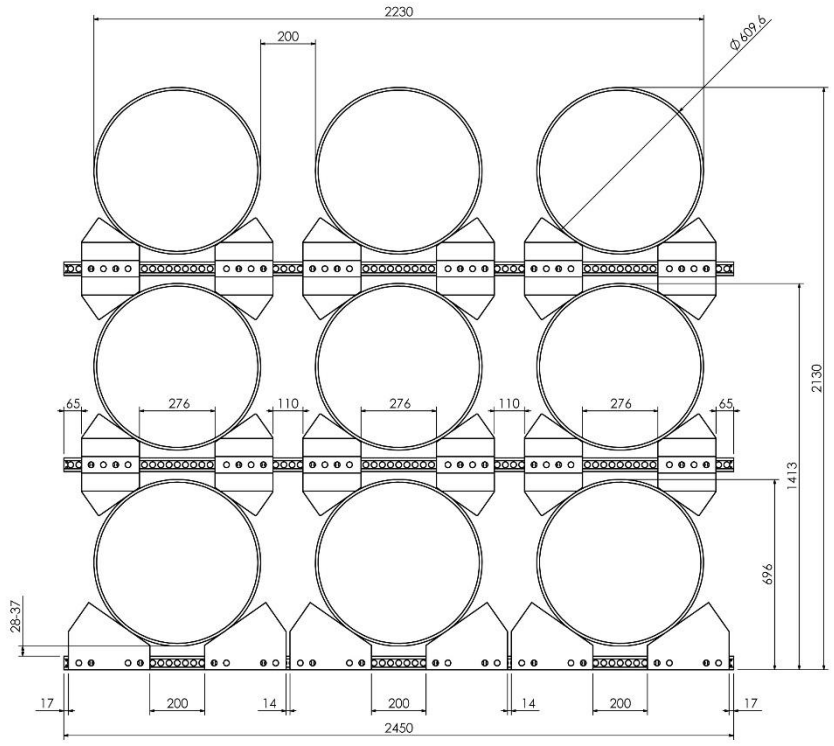
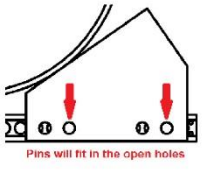
Page C-02



System88 - Truck	Ø 609,6
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	609,6
Outside diameter [inch]	24
Actual distance from pipe to profile [mm]	28 - 37
Actual distance between pipes [mm]	200

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
  (** due to relaxation tie-downs need retightening)
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



The sum of all tie-downs must be 5.560 daN for 25 ton load (check label on tie-down)
The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)

Measures in [mm]
Drawing to scale

Revision date:
08-08-2012

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Chamber of Commerce no. 17076402
Rabobank Valkenswaard 17.29.11.362

TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

It is not allowed to stack pipes Ø 660,4 mm in PYRAMIDS on System88 Block C and L.

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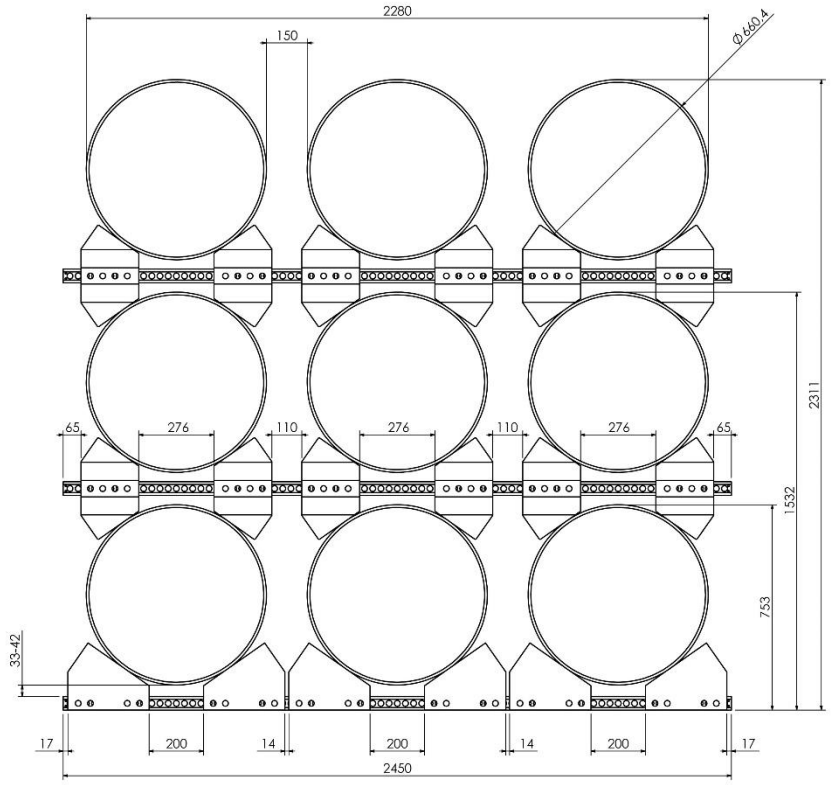
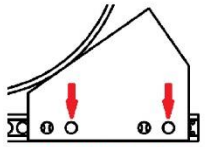
Page C-03



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 660,4
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	660,4
Outside diameter [inch]	26
Actual distance from pipe to profile [mm]	33 - 42
Actual distance between pipes [mm]	150

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
  (** due to relaxation tie-downs need retightening)
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



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SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

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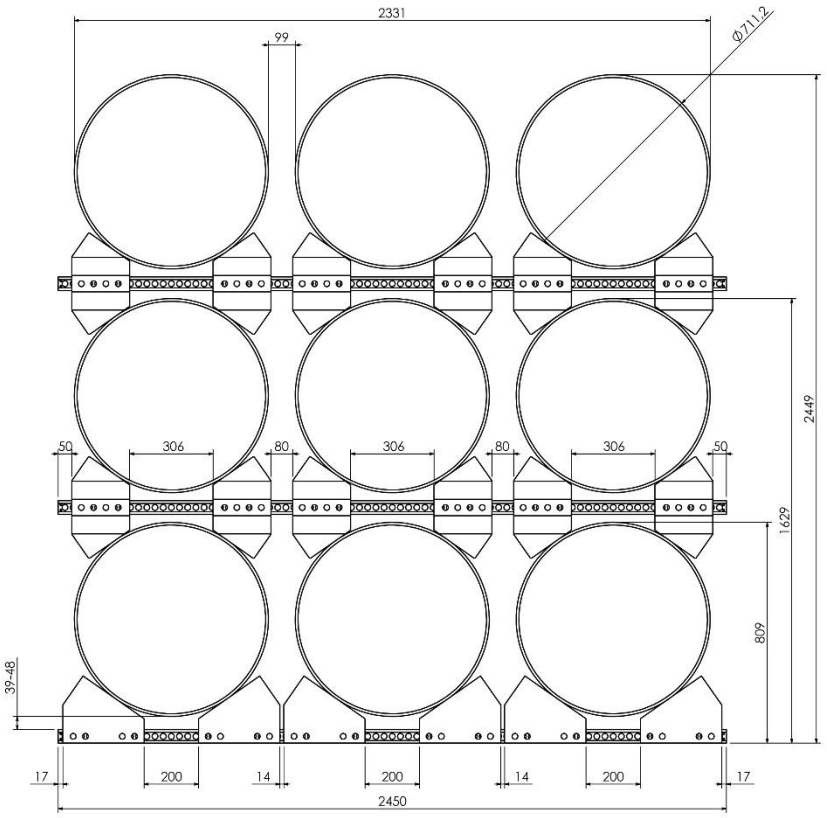
Page C-04



System88 - Truck	Ø 711,2
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	711,2
Outside diameter [inch]	28
Actual distance from pipe to profile [mm]	39 - 48
Actual distance between pipes [mm]	99

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
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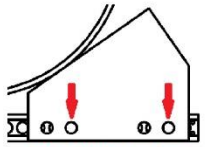

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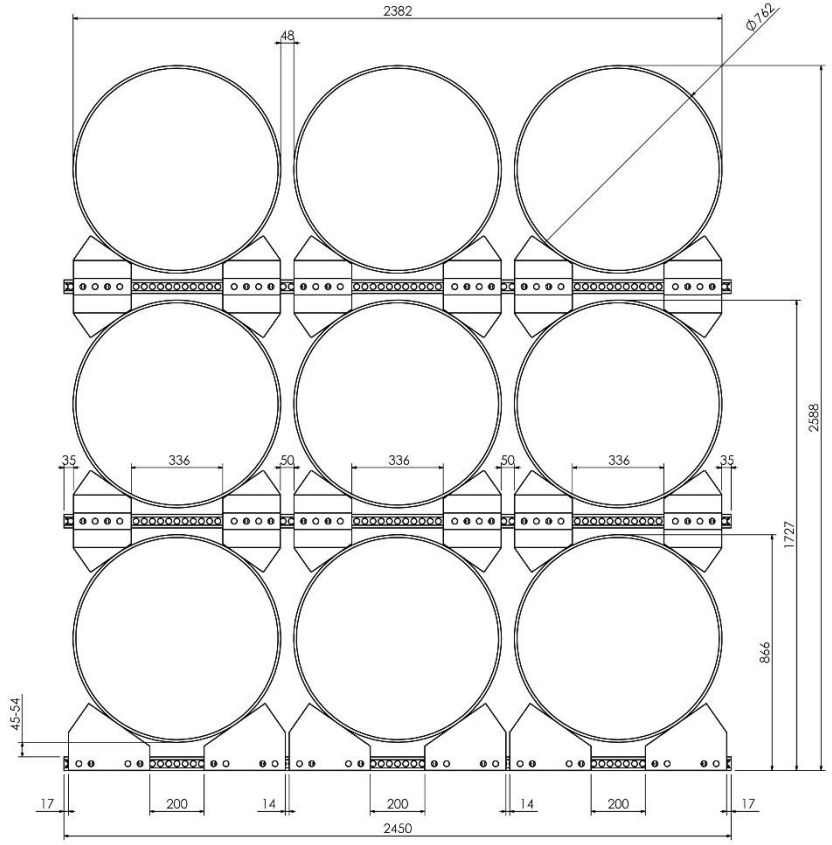
Page C-05



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 762,0
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	762,0
Outside diameter [inch]	30
Actual distance from pipe to profile [mm]	45 - 54
Actual distance between pipes [mm]	48

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
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- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
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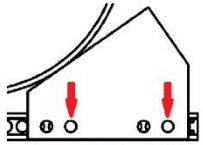

The sum of all tie-downs must be 5.560 daN for 25 ton load (check label on tie-down)
The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)

Revision date:
08-08-2012

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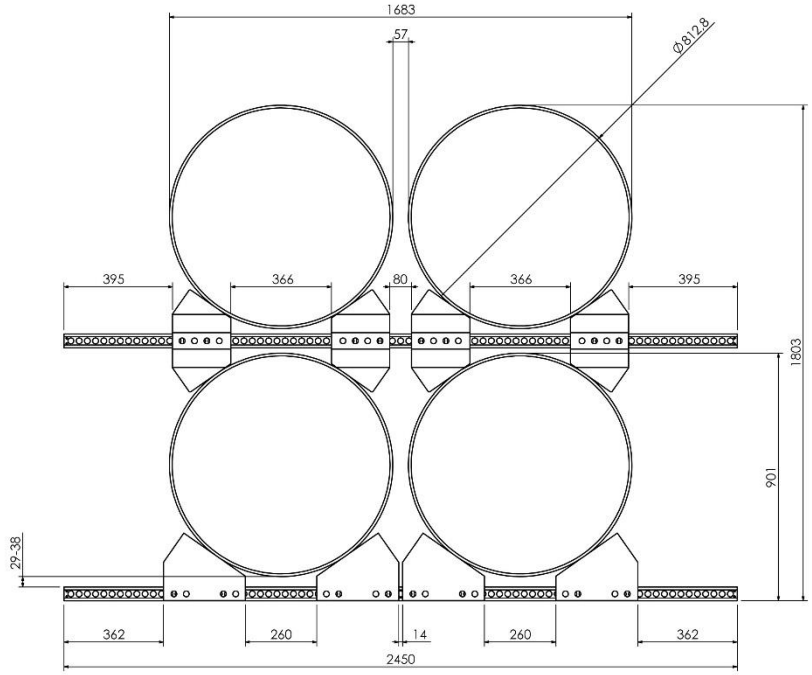
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-06



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 812,8
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	812,8
Outside diameter [inch]	32
Actual distance from pipe to profile [mm]	29 - 38
Actual distance between pipes [mm]	57

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- Maximum load of 4.725 kg on block L
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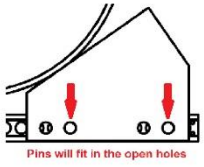

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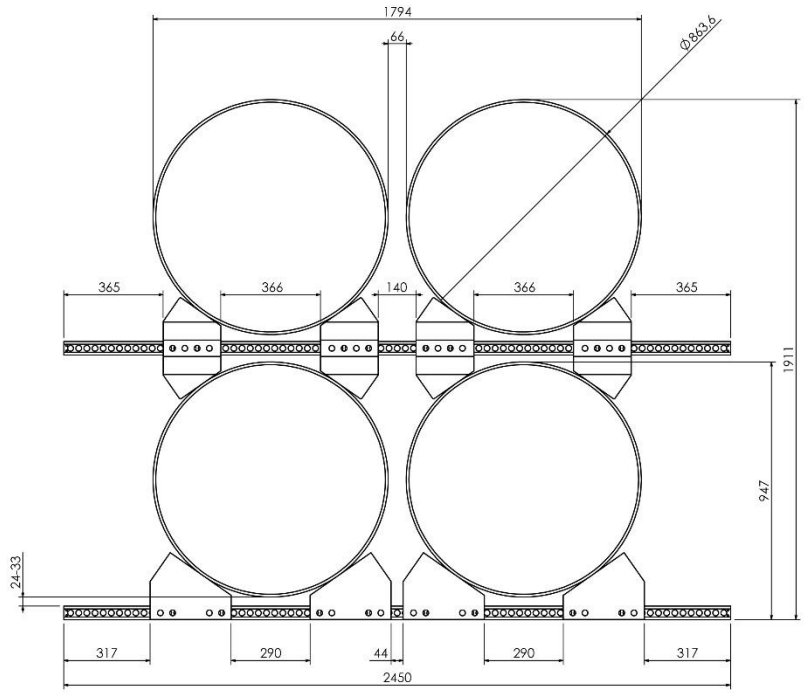
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-07



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 863,6
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	863,6
Outside diameter [inch]	34
Actual distance from pipe to profile [mm]	24 - 33
Actual distance between pipes [mm]	66

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- Maximum load of 4.725 kg on block L
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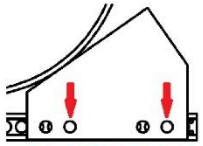

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SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
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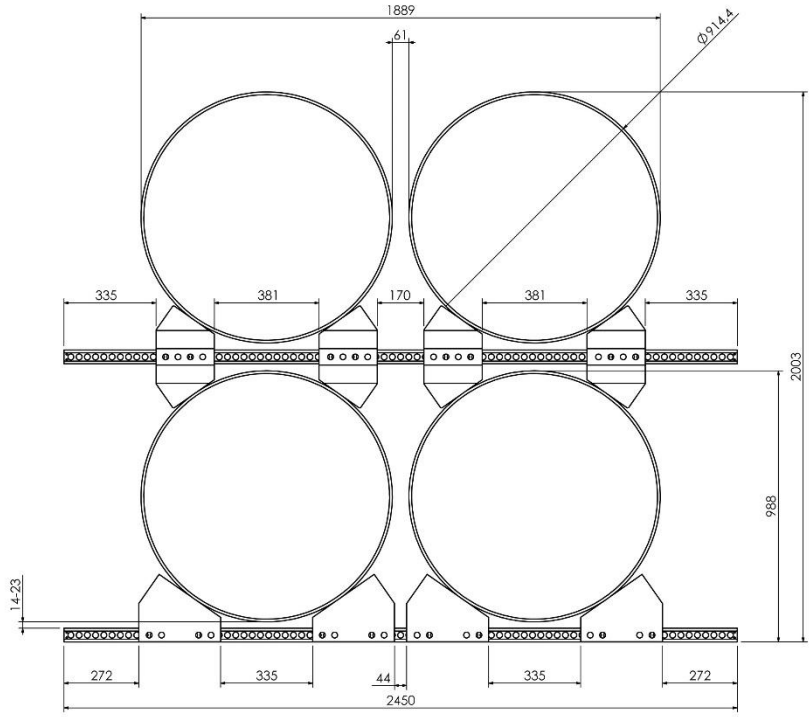
Page C-08



System88 - Truck	Ø 914,4
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	914,4
Outside diameter [inch]	36
Actual distance from pipe to profile [mm]	14 - 23
Actual distance between pipes [mm]	61

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- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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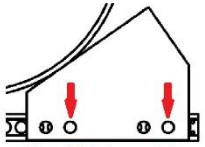

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Measures in [mm]
Drawing to scale

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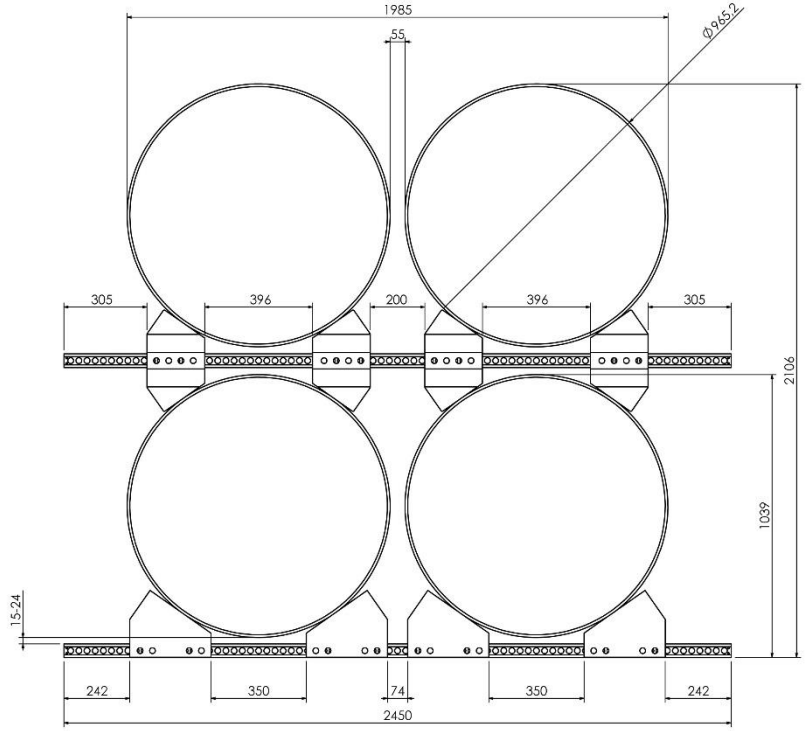
SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-09



System88 - Truck	Ø 965,2
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	965,2
Outside diameter [inch]	38
Actual distance from pipe to profile [mm]	15 - 24
Actual distance between pipes [mm]	55

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
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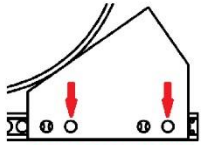

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Measures in [mm]
Drawing to scale

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TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
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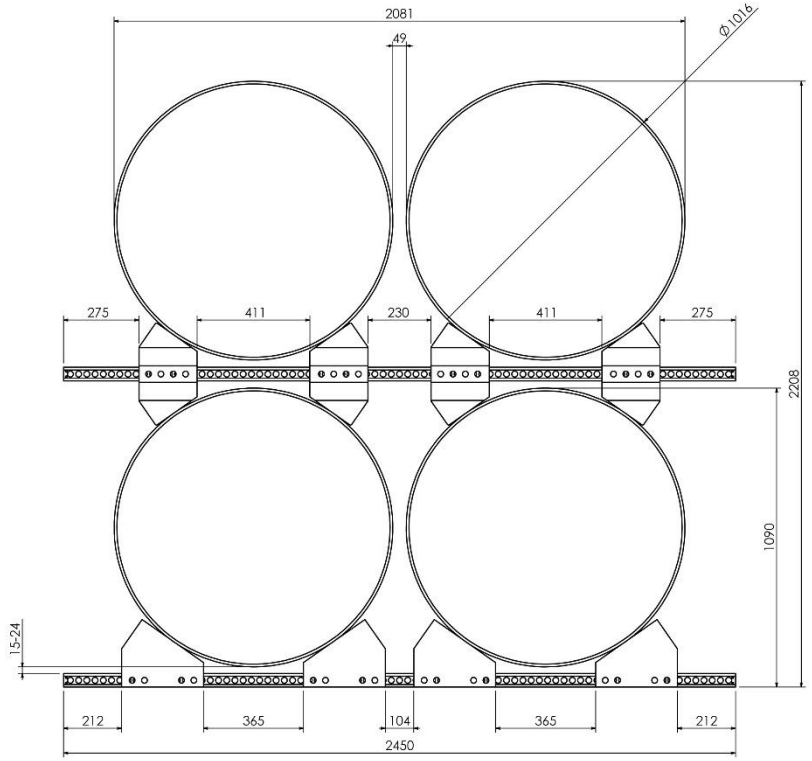
Page C-10



Measures in [mm]
Drawing to scale

System88 - Truck **Ø 1.016,0**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1.016,0
Outside diameter [inch]	40
Actual distance from pipe to profile [mm]	15 - 24
Actual distance between pipes [mm]	49

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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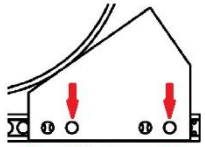
Pins will fit in the open holes

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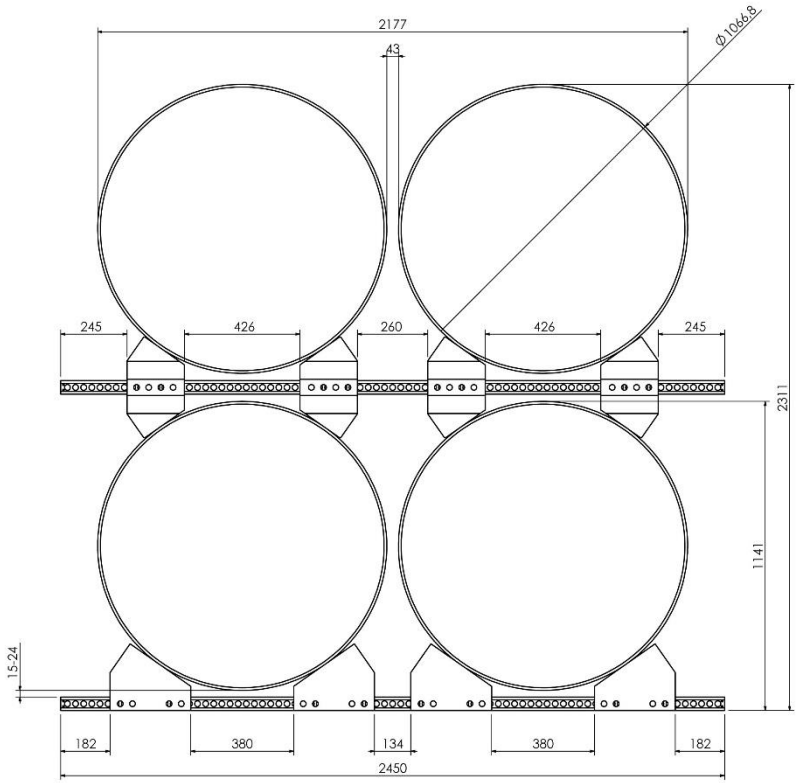
Page C-11



Measures in [mm]
Drawing to scale

System88 - Truck **Ø 1.066,8**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1.066,8
Outside diameter [inch]	42
Actual distance from pipe to profile [mm]	15 - 24
Actual distance between pipes [mm]	43

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
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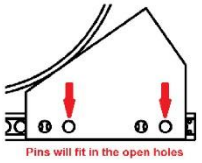

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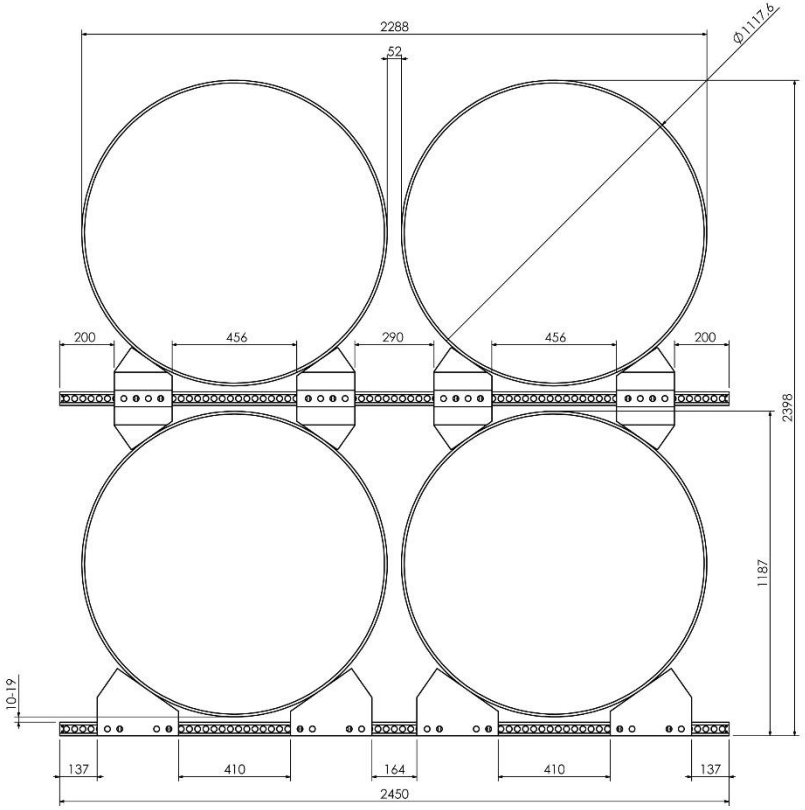
Page C-12



Measures in [mm]
Drawing to scale

System88 - Truck Ø 1.117,6

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1.117,6
Outside diameter [inch]	44
Actual distance from pipe to profile [mm]	10 - 19
Actual distance between pipes [mm]	52

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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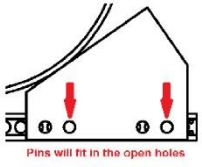

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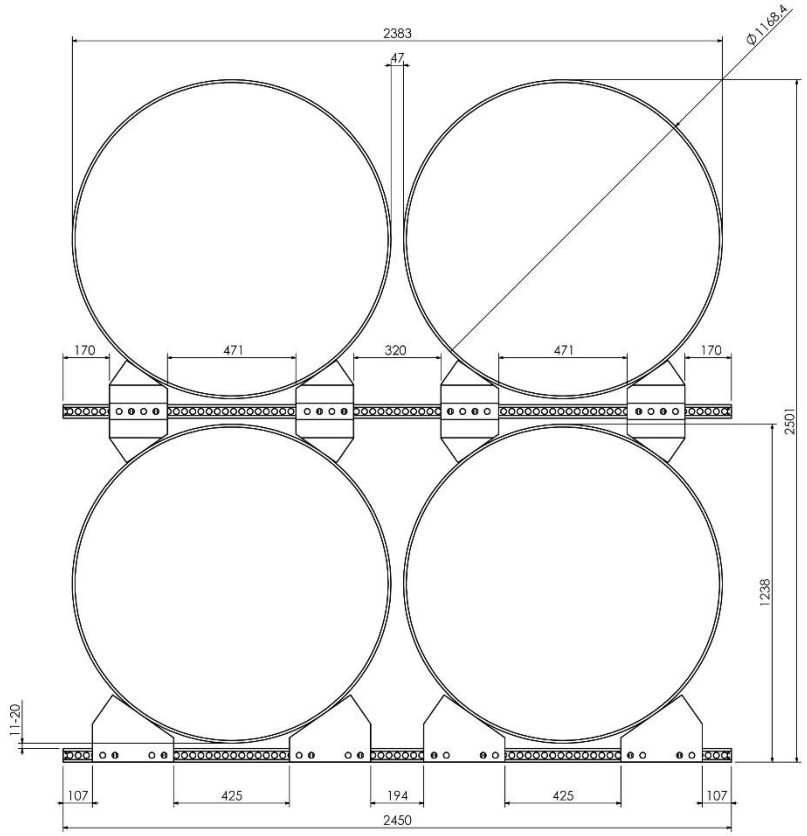

Measures in [mm]
Drawing to scale

System88 - Truck	Ø 1.168,4
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1.168,4
Outside diameter [inch]	46
Actual distance from pipe to profile [mm]	11 - 20
Actual distance between pipes [mm]	47

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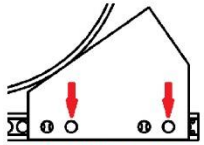
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Revision: 01

Document Ref: DHA415-APS-S88C

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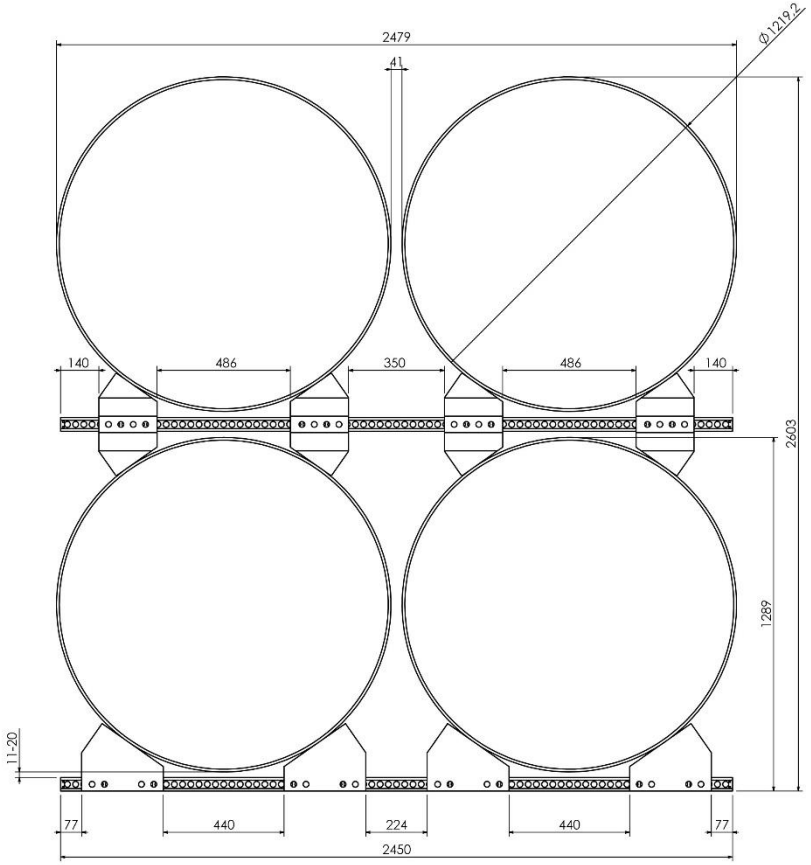
Page C-14



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 1.219,2
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1.219,2
Outside diameter [inch]	48
Actual distance from pipe to profile [mm]	11 - 20
Actual distance between pipes [mm]	41

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- Maximum load of 4.725 kg on block L
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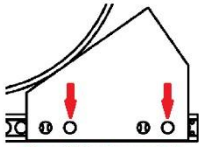

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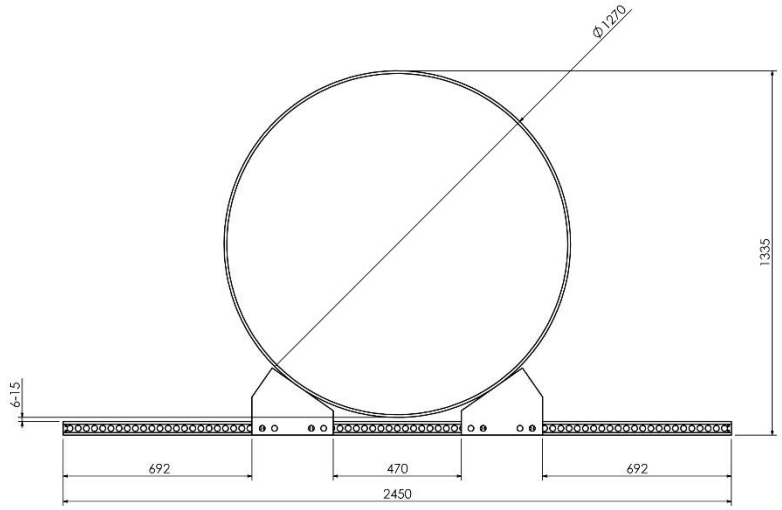
Page C-15



Measures in [mm]
Drawing to scale

System88 - Truck **Ø 1.270,0**

Block	Type C
Block in middle	-
Number of pipes	1
Outside diameter [mm]	1.270,0
Outside diameter [inch]	50
Actual distance from pipe to profile [mm]	6 - 15
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
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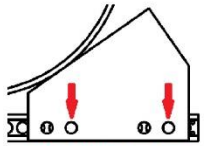
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



The sum of all tie-downs must be 5.560 daN for 25 ton load (check label on tie-down)
The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)

Revision date:
08-08-2012

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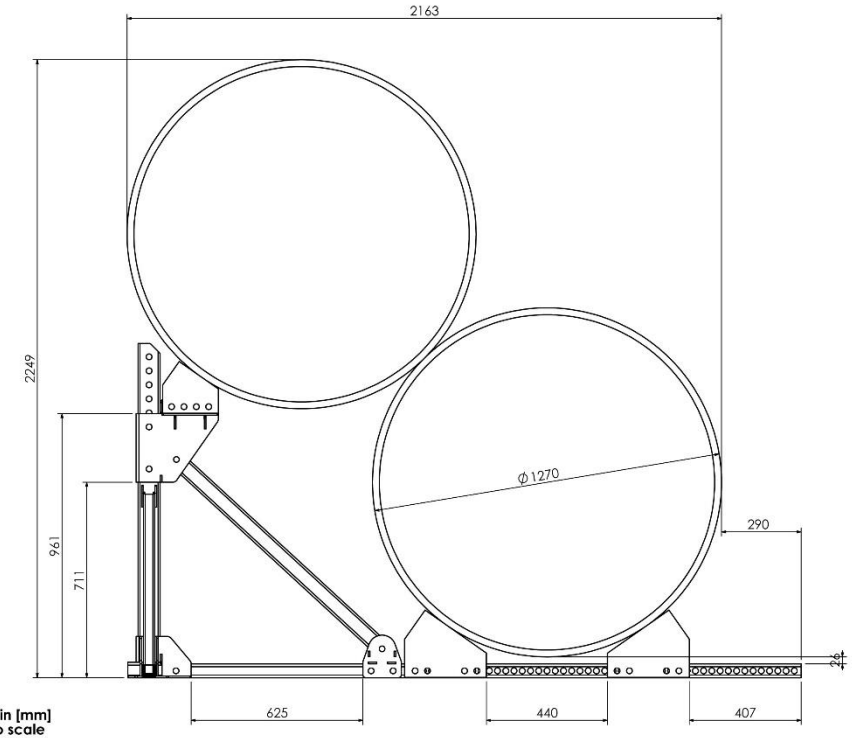
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-15-1



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 1.270,0
Block	Type C
Block in middle	Type B
Number of pipes	2
Outside diameter [mm]	1.270,0
Outside diameter [inch]	50
Actual distance from pipe to profile [mm]	17 - 26
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.500 kg per Pipe Raiser Unit
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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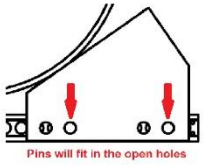

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TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC A SHAWCOR COMPANY

DHATEC A SHAWCOR COMPANY

System88 - Truck	Ø 1.320,8
Block	Type C
Block in middle	-
Number of pipes	1
Outside diameter [mm]	1.320,8
Outside diameter [inch]	52
Actual distance from pipe to profile [mm]	12 - 21
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
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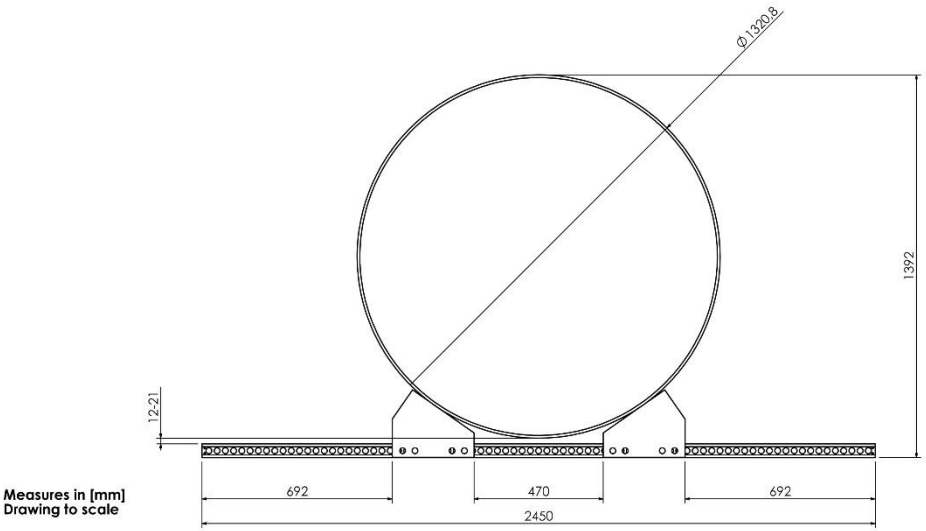

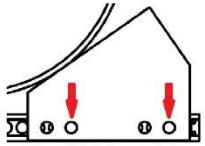

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The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)

Measures in [mm]
Drawing to scale

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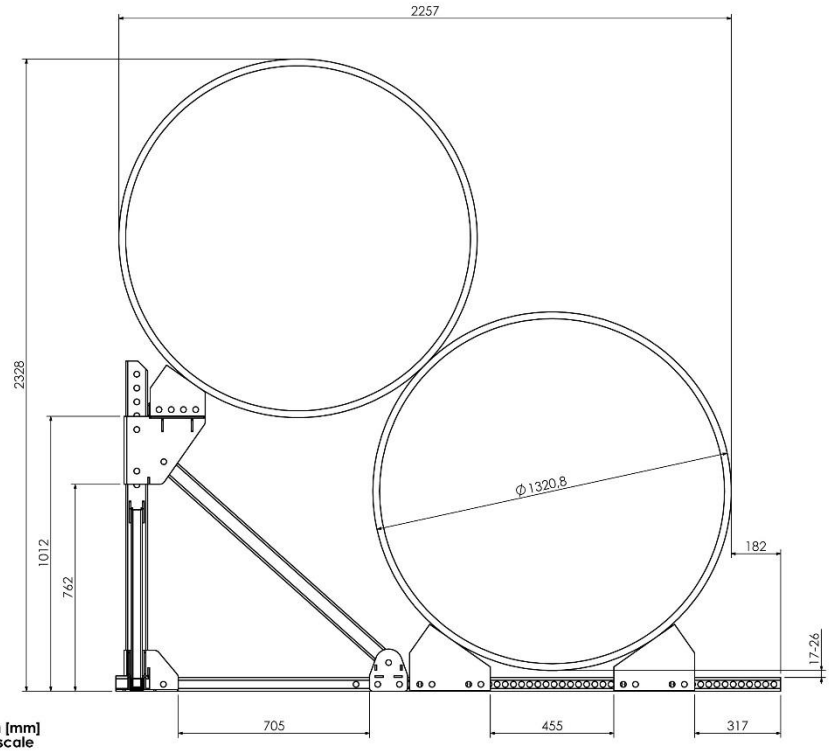
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-16-1



Measures in [mm]
Drawing to scale

System88 - Truck	Ø 1.320,8
Block	Type C
Block in middle	Type B
Number of pipes	2
Outside diameter [mm]	1.320,8
Outside diameter [inch]	52
Actual distance from pipe to profile [mm]	17 - 26
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.500 kg per Pipe Raiser Unit
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
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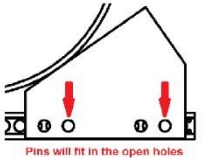
- Deviate from this advice only in consult with Dhatec



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TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

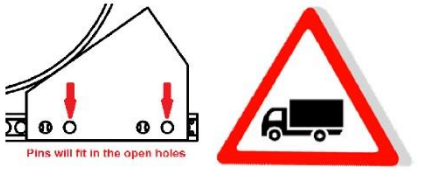
DHATEC
A SHAWCOR COMPANY

Page C-17

System88 - Truck Ø 1.371,6

Block	Type C
Block in middle	-
Number of pipes	1
Outside diameter [mm]	1.371,6
Outside diameter [inch]	54
Actual distance from pipe to profile [mm]	7 - 16
Actual distance between pipes [mm]	-

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
  (** due to relaxation tie-downs need retightening)
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



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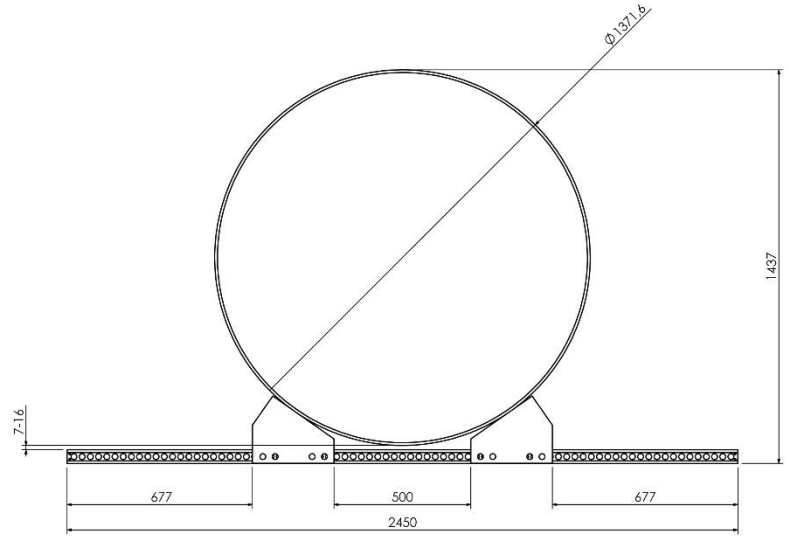
The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)



Measures in [mm]
Drawing to scale

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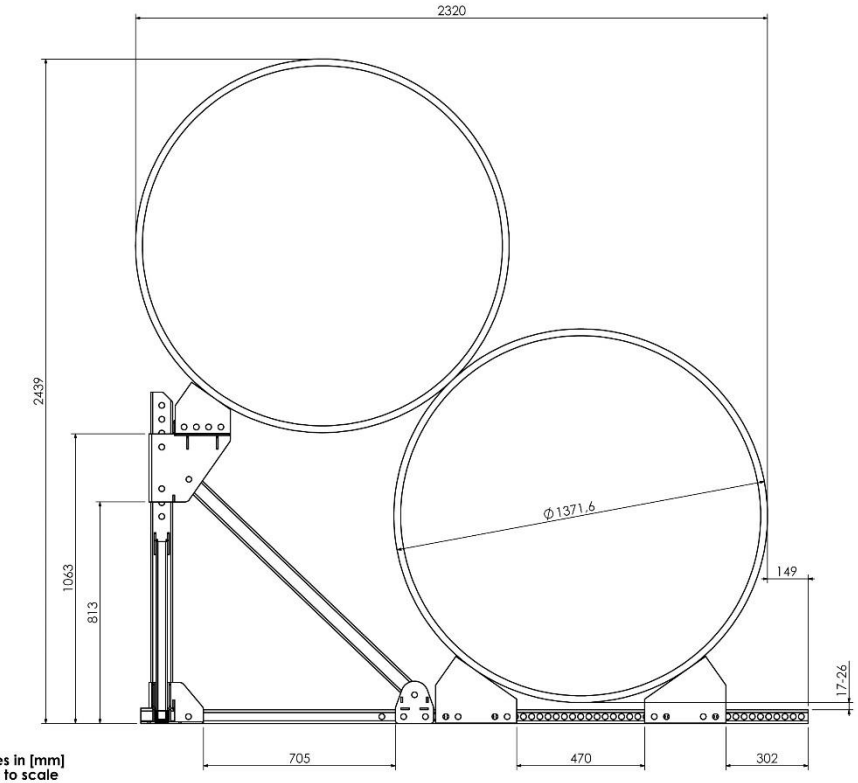
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-17-1



System88 - Truck **Ø 1.371,8**

Block	Type C
Block in middle	Type B
Number of pipes	2
Outside diameter [mm]	1.371,8
Outside diameter [inch]	54
Actual distance from pipe to profile [mm]	17 - 26
Actual distance between pipes [mm]	-

- Always check System88 instructions before use
- Maximum load of 7.500 kg per Pipe Raiser Unit
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
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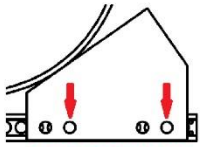
- Deviate from this advice only in consult with Dhatec



The sum of all tie-downs must be 5.560 daN for 25 ton load (check label on tie-down)
The sum of all tie-downs must be 6.670 daN for 30 ton load (check label on tie-down)

Measures in [mm]
Drawing to scale

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TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC
A SHAWCOR COMPANY

Page C-18

System88 - Truck **Ø 1.422,4**

Block	Type C
Block in middle	-
Number of pipes	1
Outside diameter [mm]	1.422,4
Outside diameter [inch]	56
Actual distance from pipe to profile [mm]	12 - 21
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
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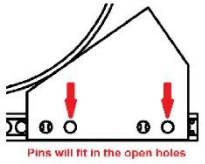
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



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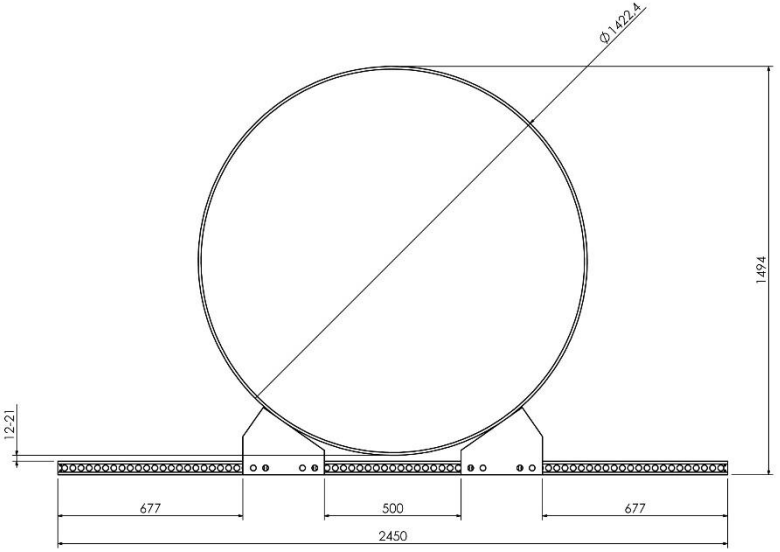

Measures in [mm]
Drawing to scale

Revision date:
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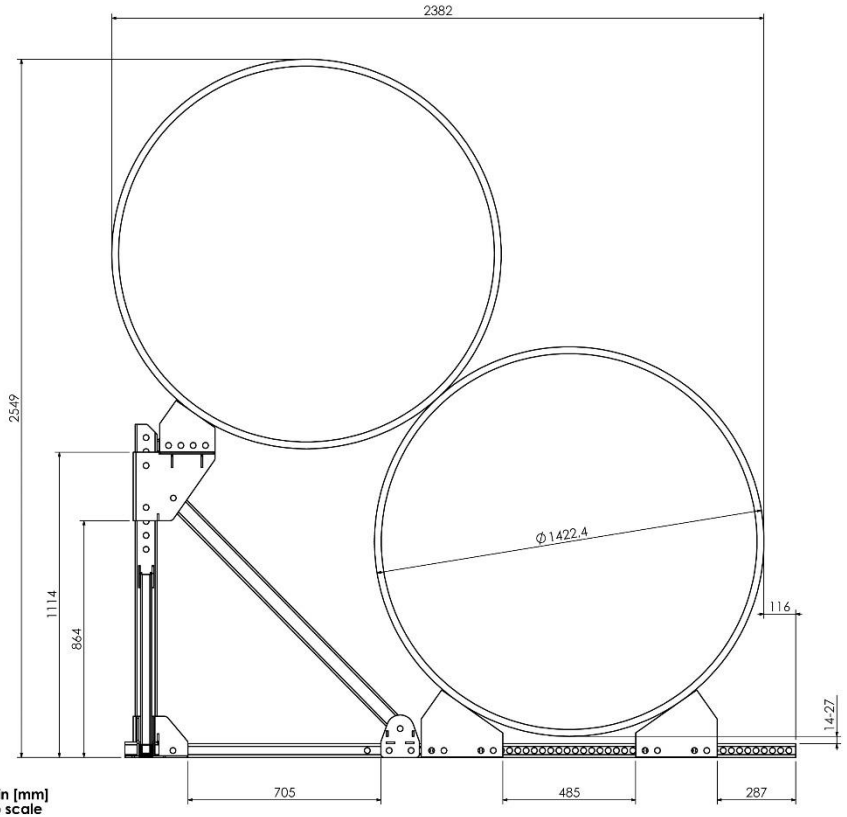
TÜV NORD

SYSTEM 88

STANDARD TRUCK CONFIGURATIONS

DHATEC A SHAWCOR COMPANY

Page C-18-1

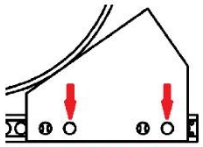


Measures in [mm]
Drawing to scale

System88 - Truck **Ø 1.422,4**

Block	Type C
Block in middle	Type B
Number of pipes	2
Outside diameter [mm]	1.422,4
Outside diameter [inch]	56
Actual distance from pipe to profile [mm]	18 - 27
Actual distance between pipes [mm]	-

- Always check System88 Instructions before use
- Maximum load of 7.500 kg per Pipe Raiser Unit
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- The blocks can be provided with rubber layer* on request
  (* always use ratchet tie-downs in combination with rubber layer)
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes**
  (** due to relaxation tie-downs need retightening)
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- Deviate from this advice only in consult with Dhatec



The sum of all tie-downs must be 5.560 daN for 25 ton load (check label on tie-down)
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Revision date:
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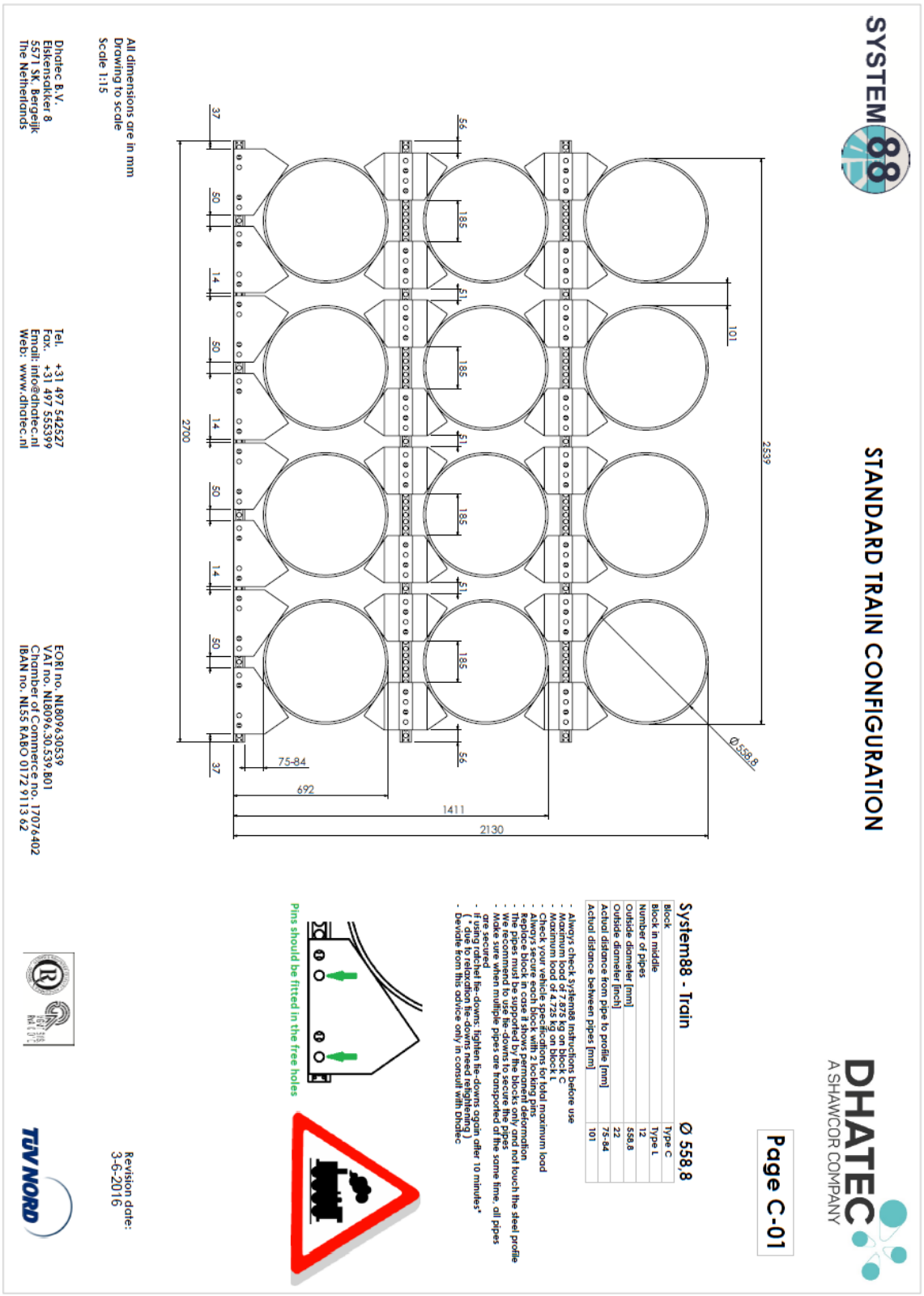
TÜV NORD

Appendix A Standard Configurations Train block C

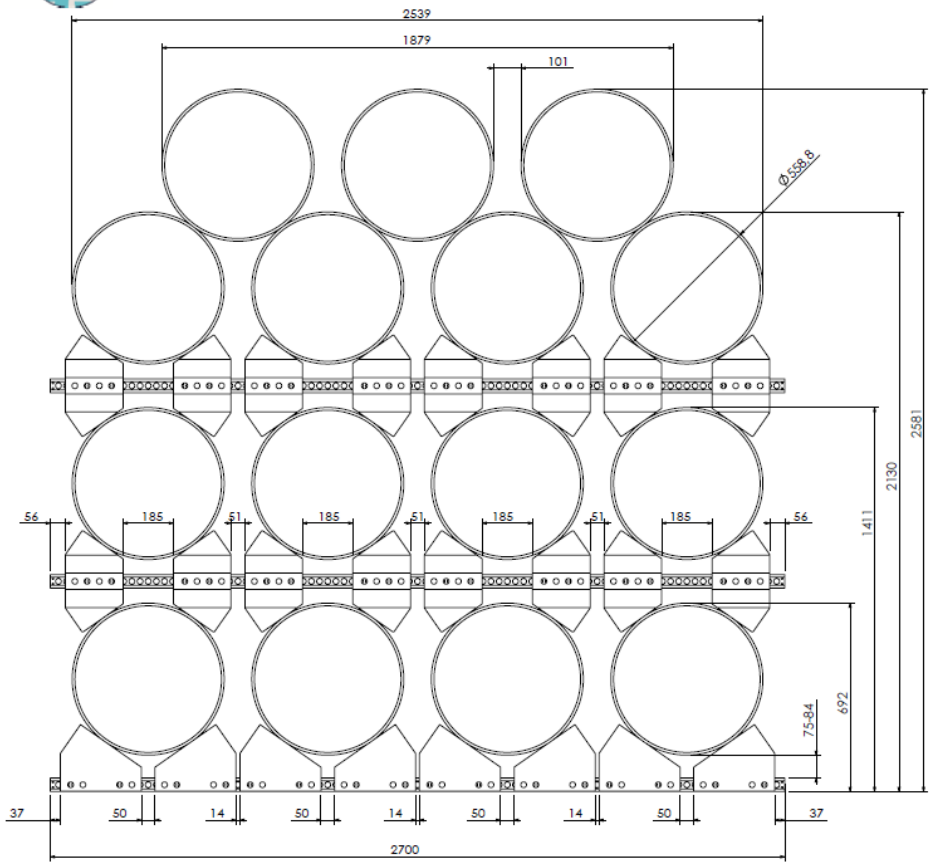


SYSTEM 88

STANDARD TRAIN CONFIGURATION

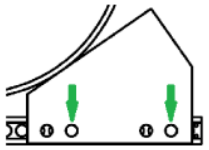
DHATEC
A SHAWCOR COMPANY

Page C-01-1



System88 - Train	Ø 558,8
Block	Type C
Block in middle	Type L
Number of pipes	15
Outside diameter [mm]	558,8
Outside diameter [inch]	22
Actual distance from pipe to profile [mm]	75-84
Actual distance between pipes [mm]	101

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes* (* due to relaxation tie-downs need retightening)
- Deviate from this advice only in consult with Dhatec



Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:15

Revision date:
3-6-2016

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TÜV NORD

DHATEC

Revision: 01

Document Ref: DHA415-APS-S88C

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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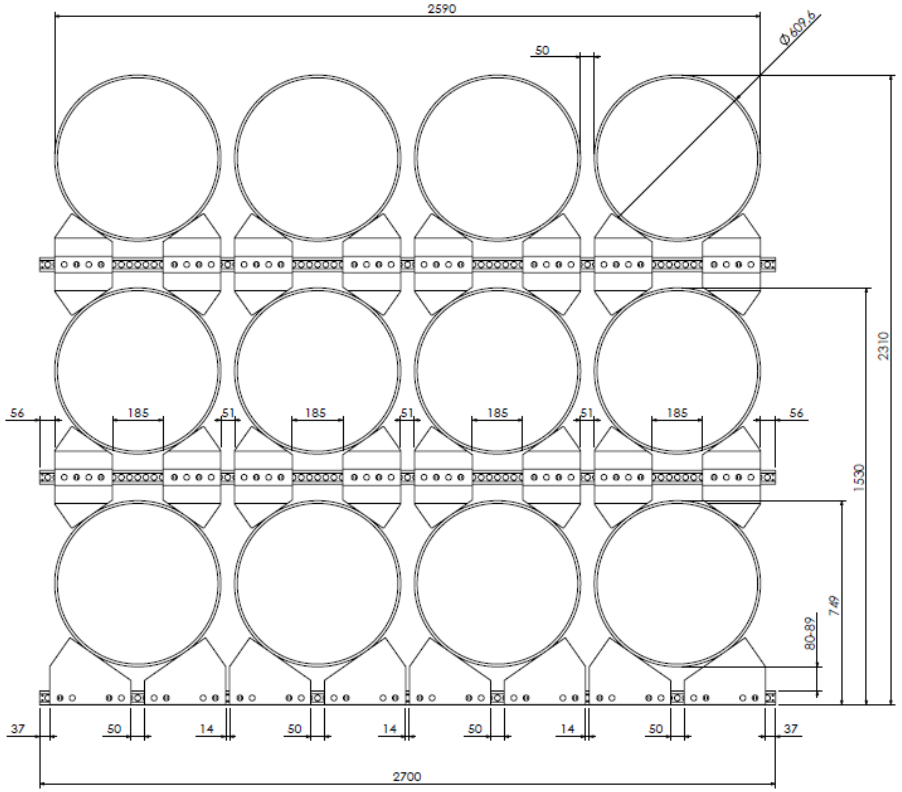
Page C-02



System88 - Train	Ø 609,6
Block	Type C
Block in middle	Type L
Number of pipes	12
Outside diameter [mm]	609,6
Outside diameter [inch]	24
Actual distance from pipe to profile [mm]	80-89
Actual distance between pipes [mm]	50

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
- Make sure when multiple pipes are transported at the same time, all pipes are secured
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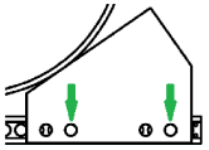

Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:15

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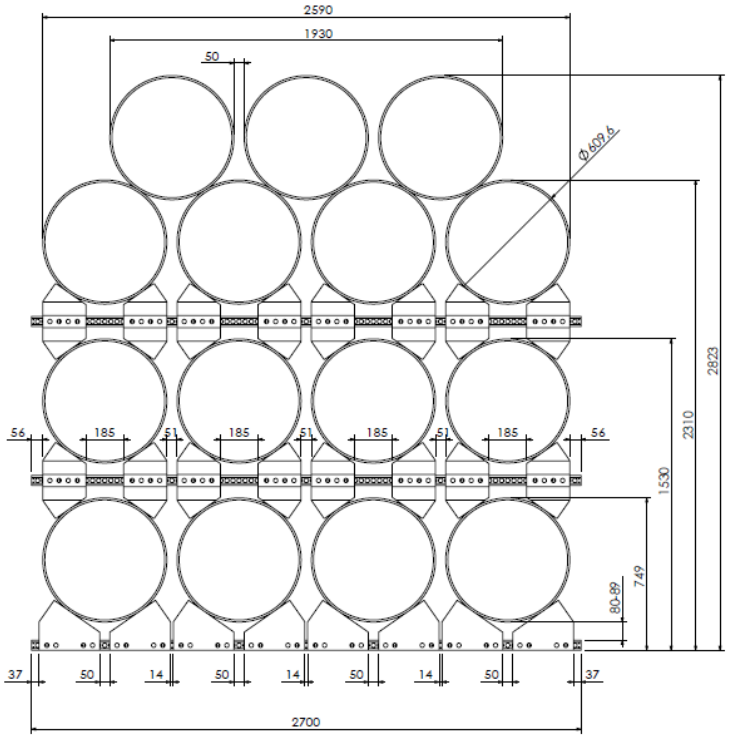
TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
A SHAWCOR COMPANY

Page C-02-1



System88 - Train	Ø 609,6
Block	Type C
Block in middle	Type L
Number of pipes	15
Outside diameter [mm]	609,6
Outside diameter [inch]	24
Actual distance from pipe to profile [mm]	80-89
Actual distance between pipes [mm]	50

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
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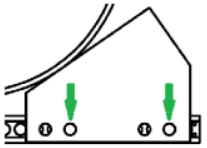

Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:20

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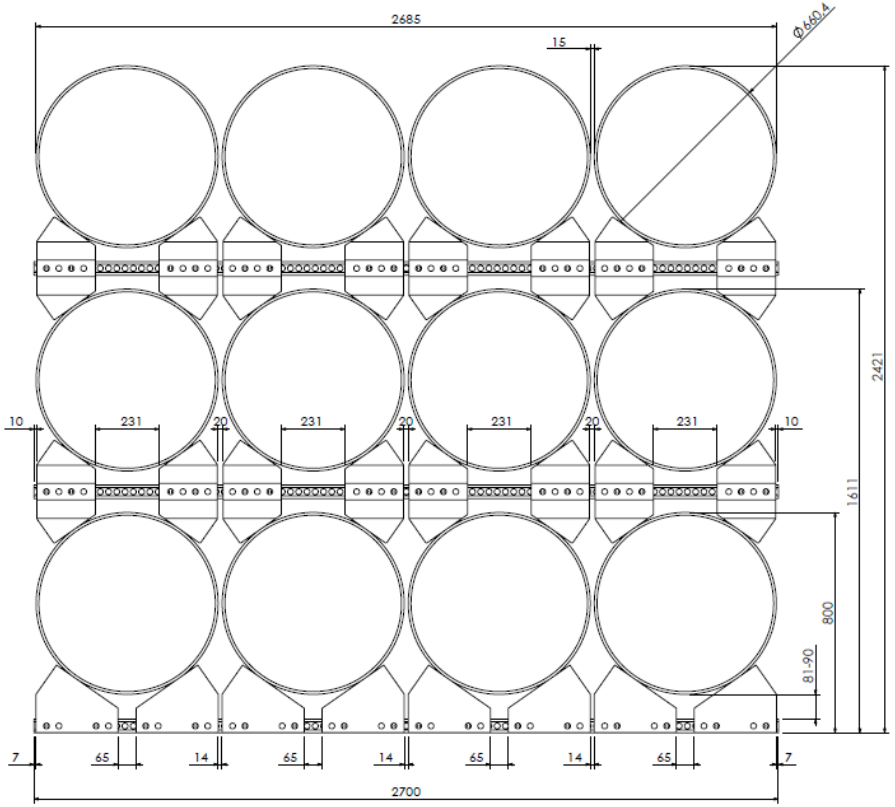
TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

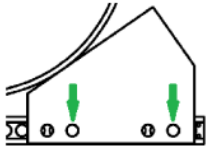
DHATEC
A SHAWCOR COMPANY

Page C-03



System88 - Train	Ø 660,4
Block	Type C
Block in middle	Type L
Number of pipes	12
Outside diameter [mm]	660,4
Outside diameter [inch]	26
Actual distance from pipe to profile [mm]	81-90
Actual distance between pipes [mm]	15

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes* (* due to relaxation tie-downs need retightening)
- Deviate from this advice only in consult with Dhatec



Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:15

Revision date:
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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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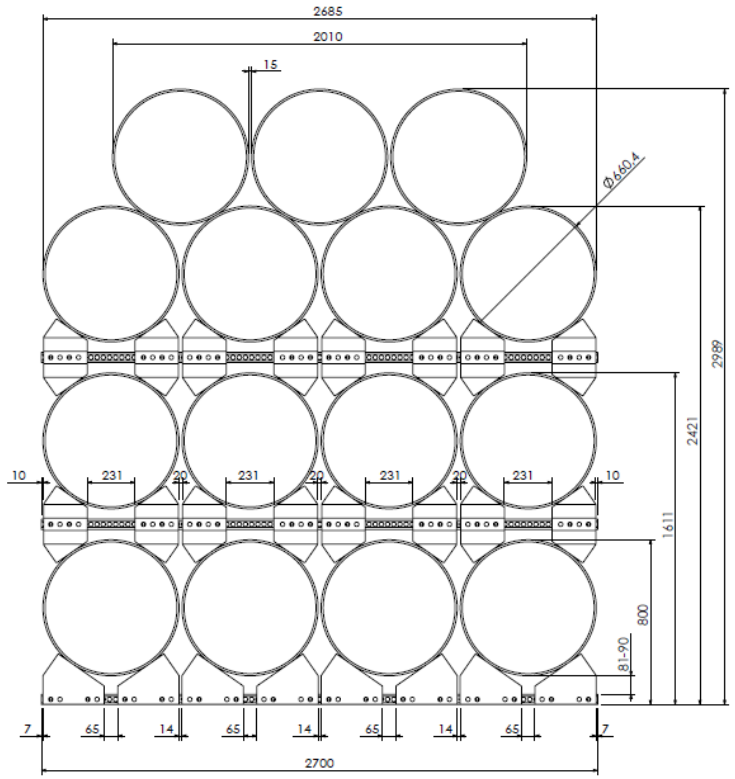
Page C-03-1



System88 - Train	Ø 660,4
Block	Type C
Block in middle	Type L
Number of pipes	15
Outside diameter [mm]	660,4
Outside diameter [inch]	26
Actual distance from pipe to profile [mm]	81-90
Actual distance between pipes [mm]	15

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
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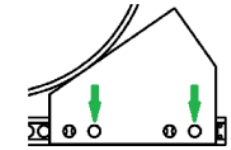

Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:20

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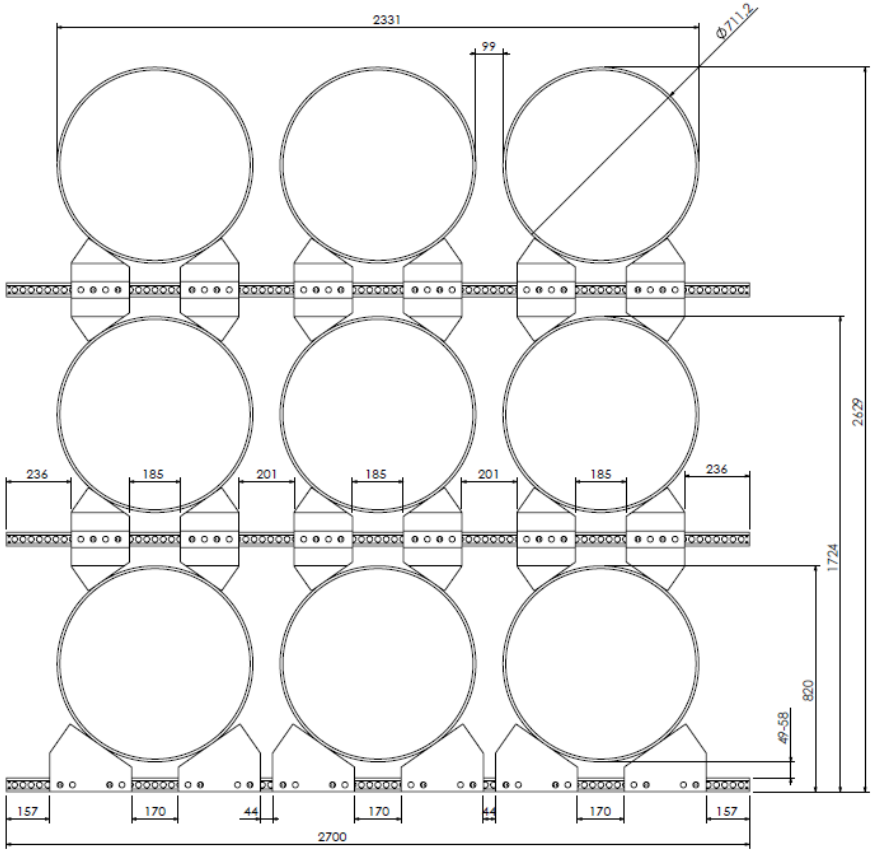
TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
A SHAWCOR COMPANY

Page C-04



All dimensions are in mm
Drawing to scale
Scale 1:15

System88 - Train	Ø 711,2
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	711,2
Outside diameter [inch]	28
Actual distance from pipe to profile [mm]	49-58
Actual distance between pipes [mm]	99

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
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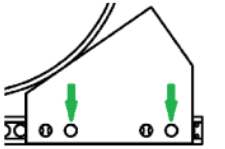

Pins should be fitted in the free holes

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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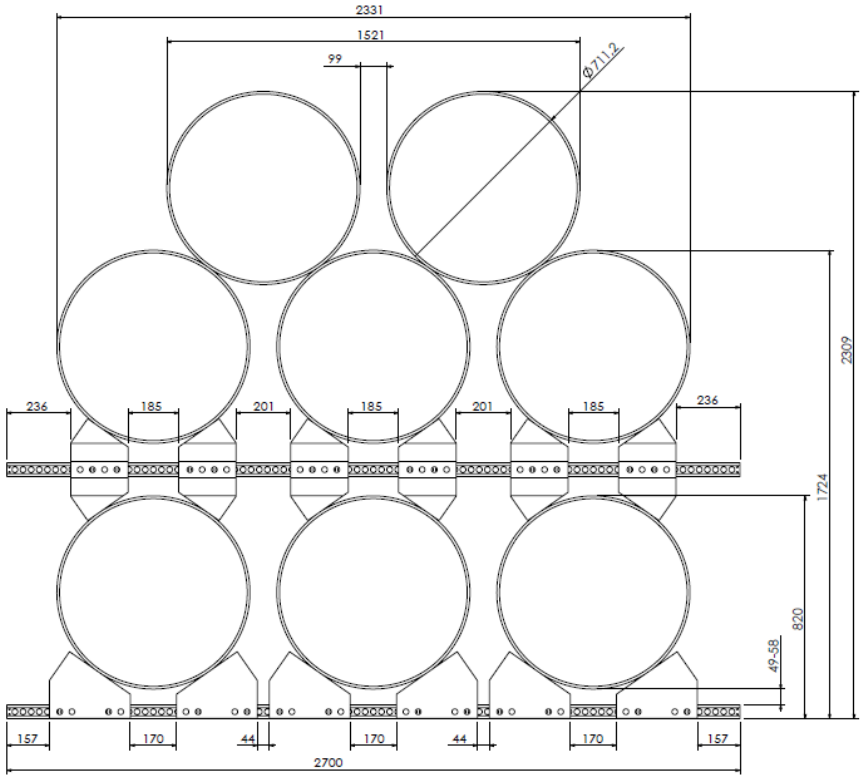
Page C-04-1



System88 - Train **Ø 711,2**

Block	Type C
Block in middle	Type L
Number of pipes	8
Outside diameter [mm]	711,2
Outside diameter [inch]	28
Actual distance from pipe to profile [mm]	49-58
Actual distance between pipes [mm]	99

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
- Make sure when multiple pipes are transported at the same time, all pipes are secured
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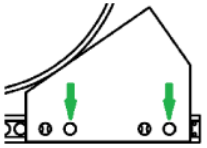

Pins should be fitted in the free holes

All dimensions are in mm
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Scale 1:15

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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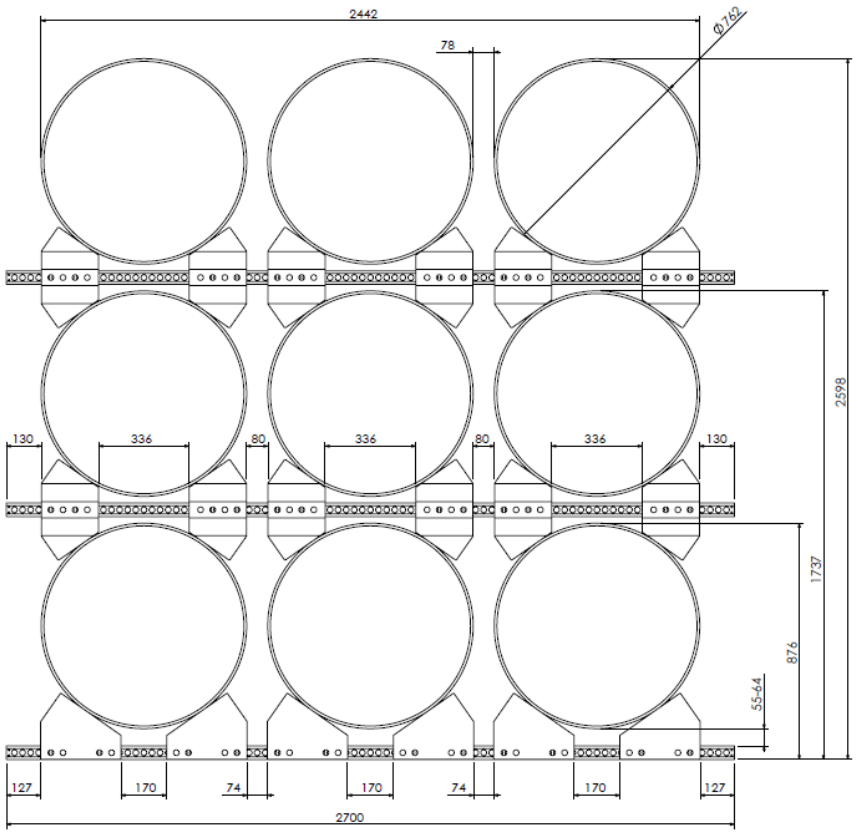
Page C-05



System88 - Train	Ø 762
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	762
Outside diameter [inch]	30
Actual distance from pipe to profile [mm]	55-64
Actual distance between pipes [mm]	78

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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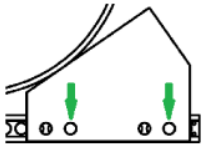

Pins should be fitted in the free holes

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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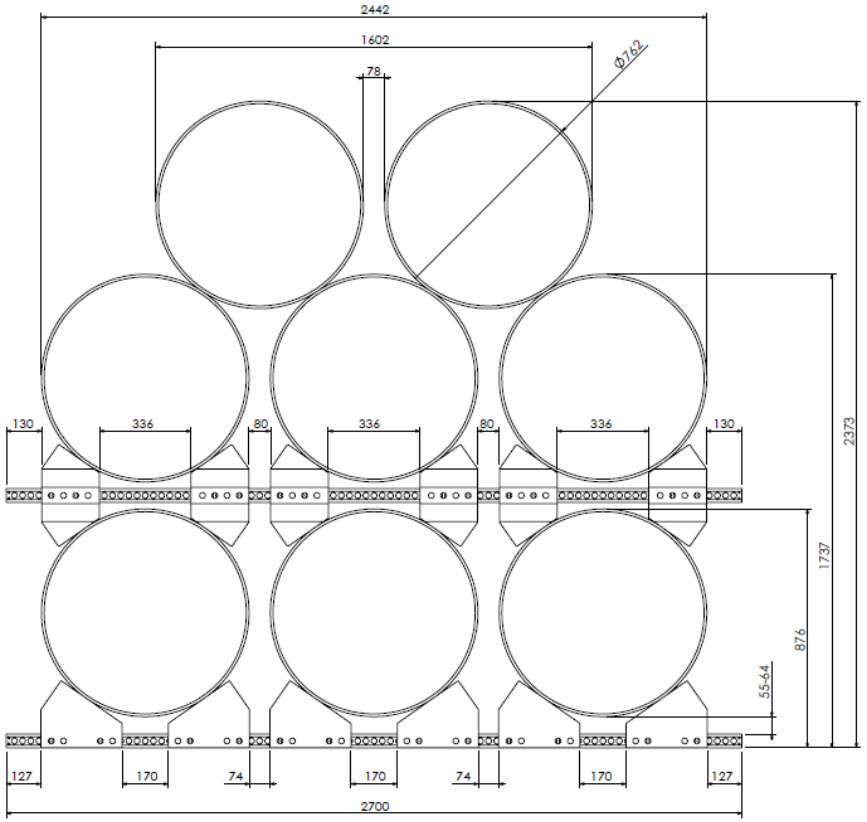
Page C-05-1



System88 - Train	Ø 762
Block	Type C
Block in middle	Type L
Number of pipes	8
Outside diameter [mm]	762
Outside diameter [inch]	30
Actual distance from pipe to profile [mm]	55-64
Actual distance between pipes [mm]	78

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
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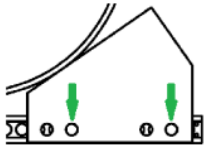

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Document Ref: DHA415-APS-S88C

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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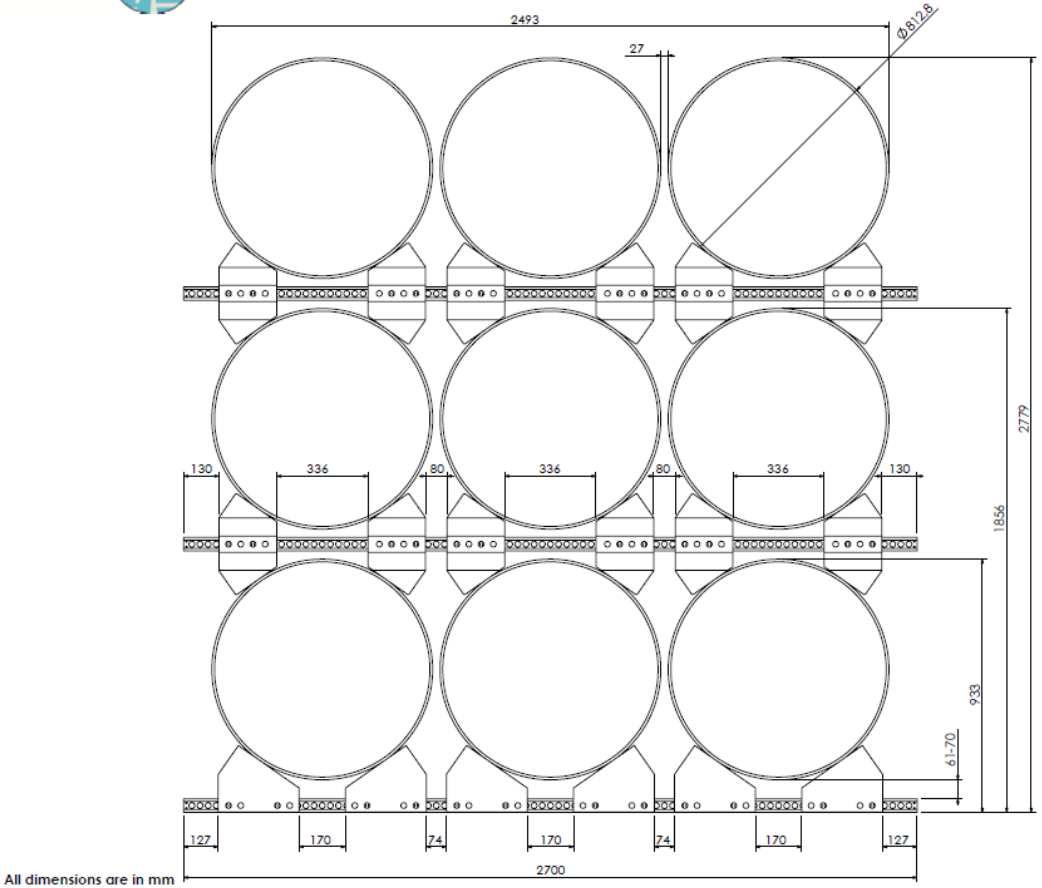
Page C-06



System88 - Train	Ø 812,8
Block	Type C
Block in middle	Type L
Number of pipes	9
Outside diameter [mm]	812,8
Outside diameter [inch]	32
Actual distance from pipe to profile [mm]	61-70
Actual distance between pipes [mm]	27

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
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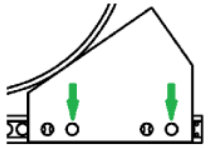

Pins should be fitted in the free holes

All dimensions are in mm
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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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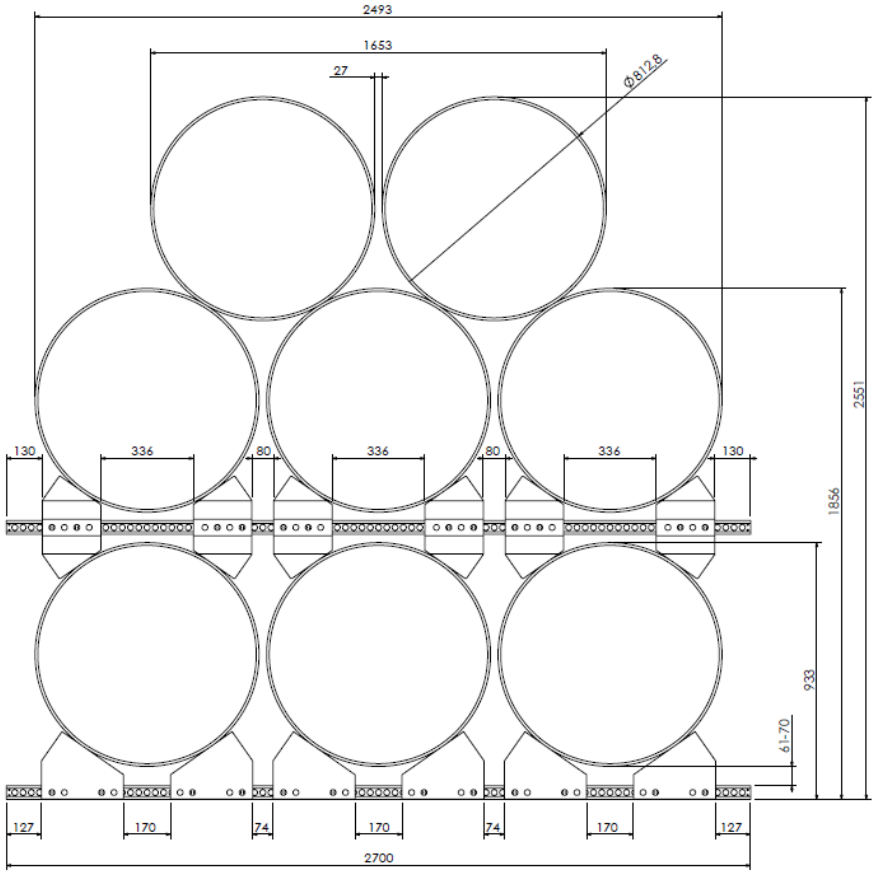
Page C-06-1



System88 - Train	Ø 812,8
Block	Type C
Block in middle	Type L
Number of pipes	8
Outside diameter [mm]	812,8
Outside diameter [inch]	32
Actual distance from pipe to profile [mm]	61-70
Actual distance between pipes [mm]	27

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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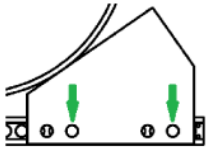

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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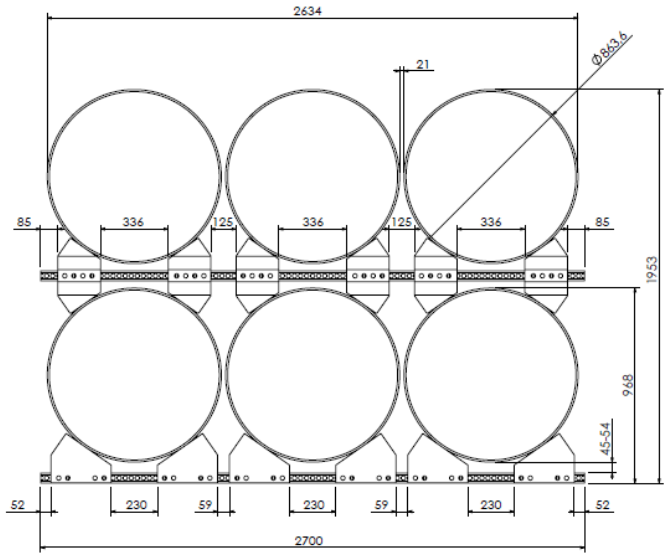
Page C-07



System88 - Train	Ø 863,6
Block	Type C
Block in middle	Type L
Number of pipes	6
Outside diameter [mm]	863,6
Outside diameter [inch]	34
Actual distance from pipe to profile [mm]	45-54
Actual distance between pipes [mm]	21

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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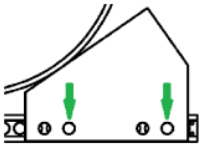

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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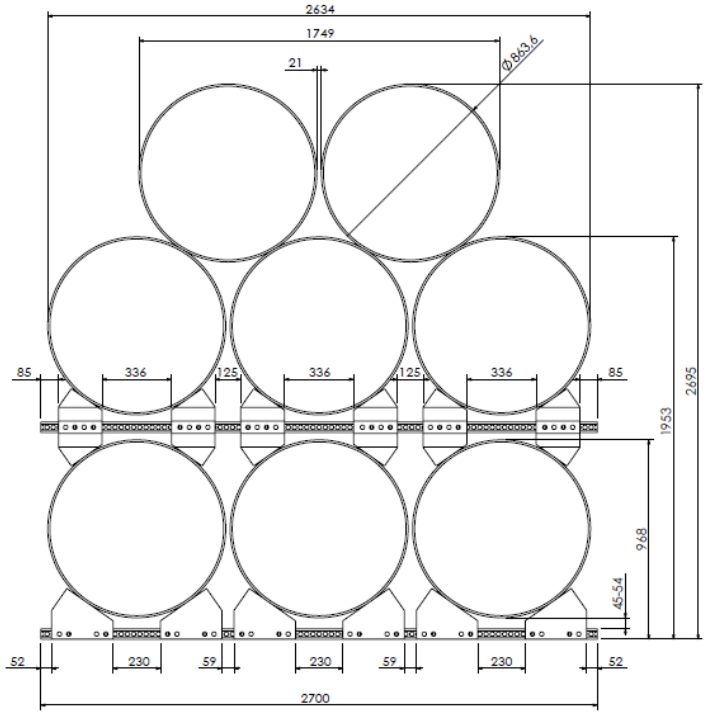
Page C-07-1



System88 - Train **Ø 863,6**

Block	Type C
Block in middle	Type L
Number of pipes	8
Outside diameter [mm]	863,6
Outside diameter [inch]	34
Actual distance from pipe to profile [mm]	45-54
Actual distance between pipes [mm]	21

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
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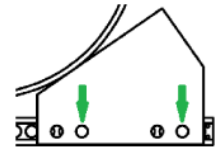

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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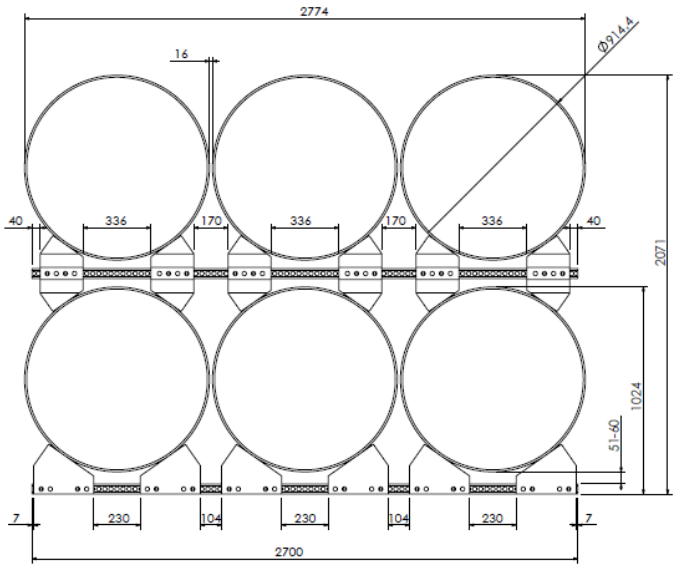
Page C-08



System88 - Train	Ø 914,4
Block	Type C
Block in middle	Type L
Number of pipes	6
Outside diameter [mm]	914,4
Outside diameter [inch]	36
Actual distance from pipe to profile [mm]	51-60
Actual distance between pipes [mm]	16

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
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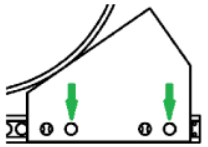

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SYSTEM 88

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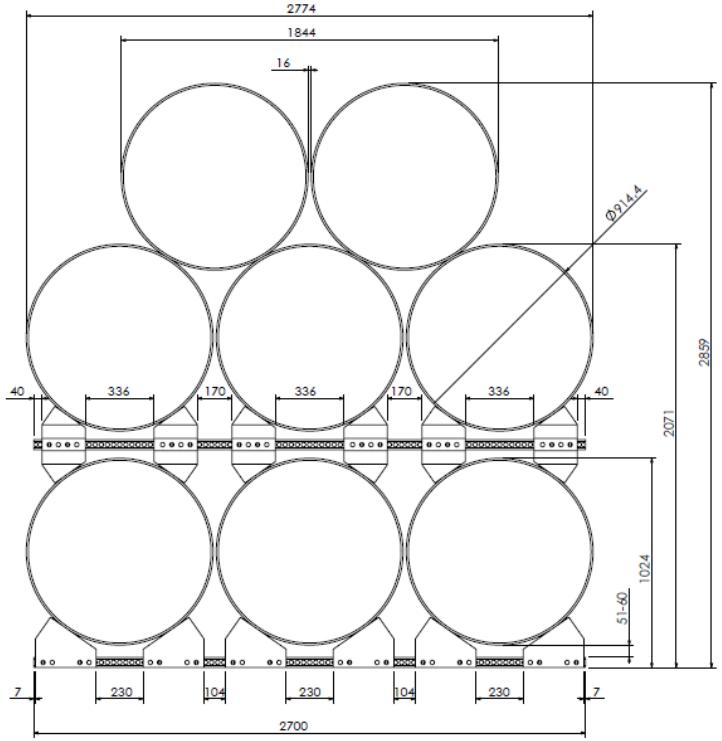
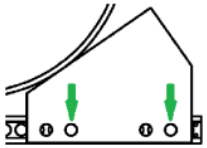
Page C-08-1



System88 - Train	Ø 914,4
Block	Type C
Block in middle	Type L
Number of pipes	8
Outside diameter [mm]	914,4
Outside diameter [inch]	36
Actual distance from pipe to profile [mm]	51-60
Actual distance between pipes [mm]	16

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
- Make sure when multiple pipes are transported at the same time, all pipes are secured
- If using ratchet tie-downs: tighten tie-downs again after 10 minutes* (* due to relaxation tie-downs need retightening)
- Deviate from this advice only in consult with Dhatec



Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:20

Revision date:
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SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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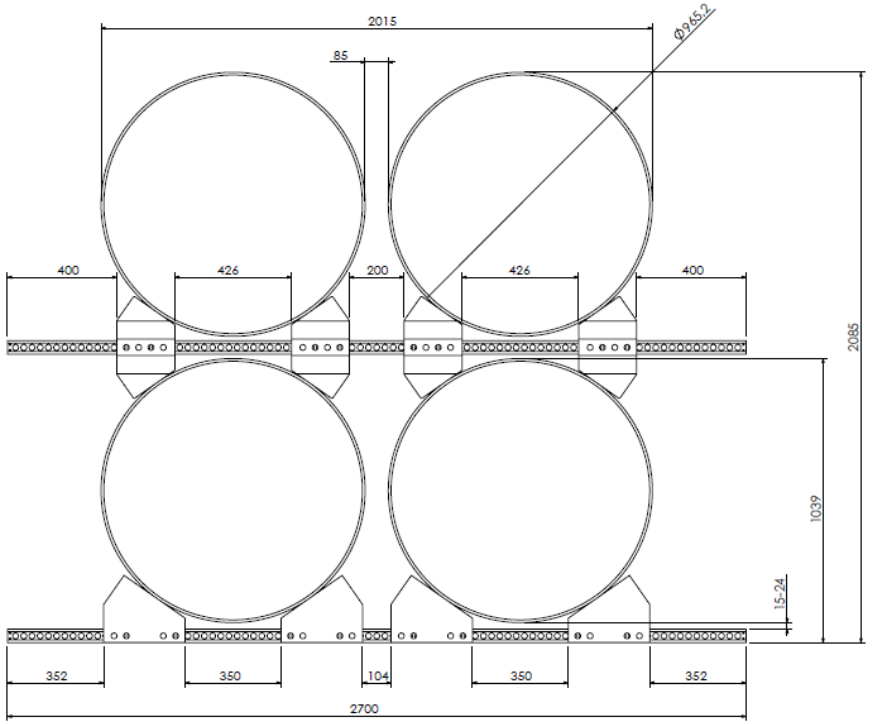
Page C-09



System88 - Train	Ø 965,2
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	965,2
Outside diameter [inch]	38
Actual distance from pipe to profile [mm]	15-24
Actual distance between pipes [mm]	85

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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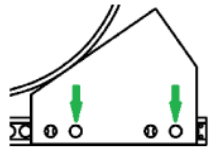

Pins should be fitted in the free holes

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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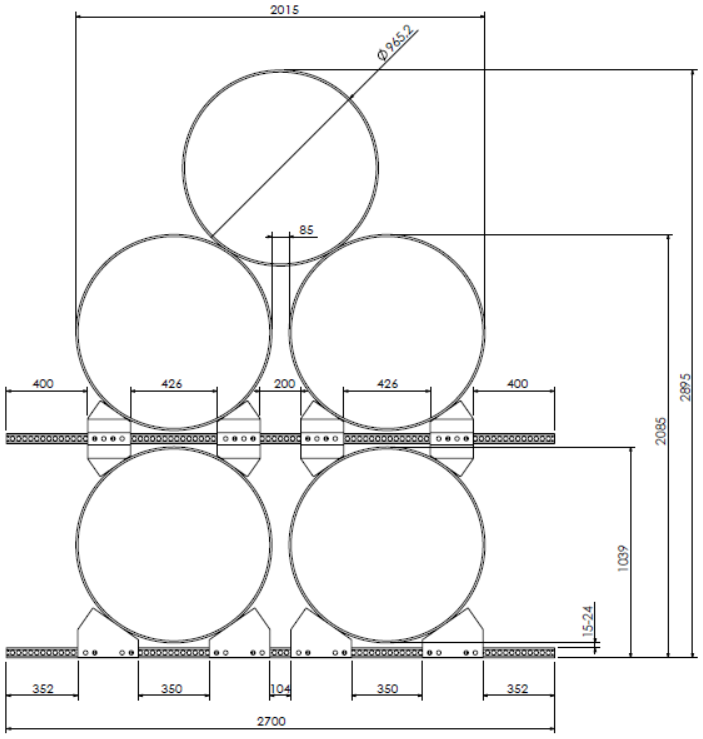
Page C-09-1



System88 - Train	Ø 965,2
Block	Type C
Block in middle	Type L
Number of pipes	5
Outside diameter [mm]	965,2
Outside diameter [inch]	38
Actual distance from pipe to profile [mm]	15-24
Actual distance between pipes [mm]	85

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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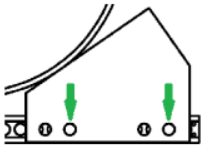

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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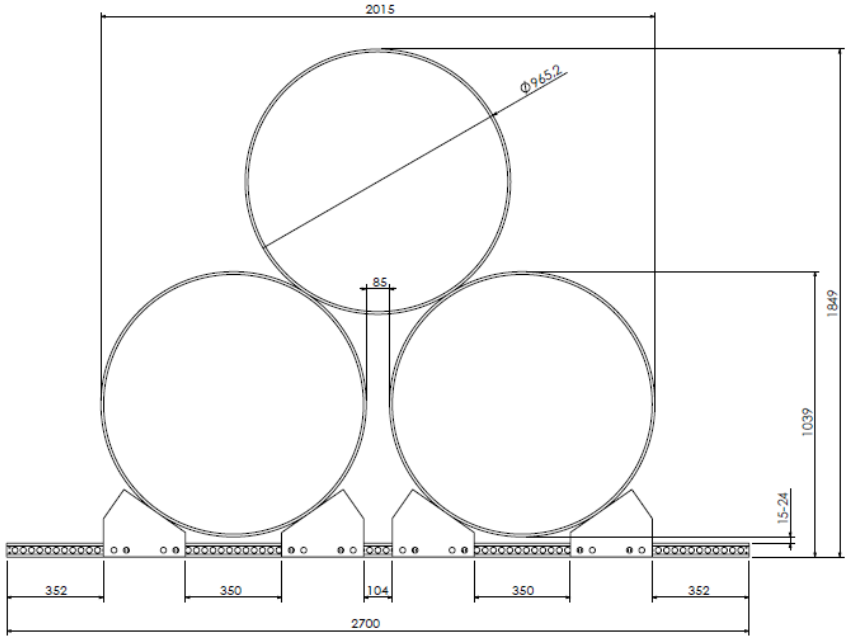
Page C-09-2



System88 - Train **Ø 965,2**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	965,2
Outside diameter [inch]	38
Actual distance from pipe to profile [mm]	15-24
Actual distance between pipes [mm]	85

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
- We recommend to use tie-downs to secure the pipes
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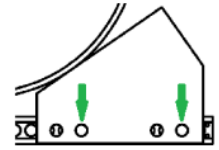

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

DHATEC
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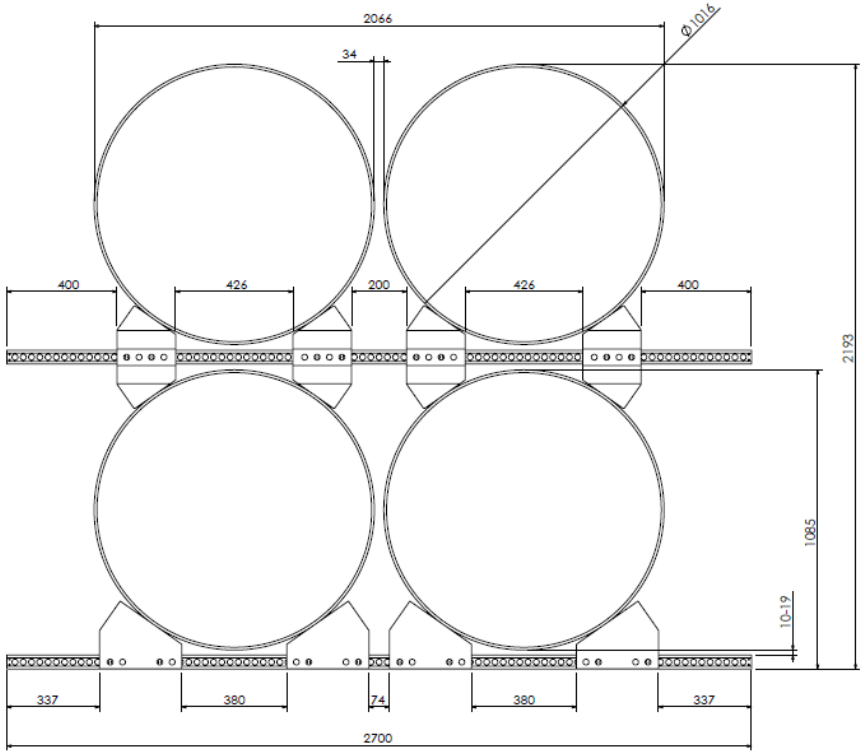
Page C-10



System88 - Train	Ø 1016
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1016
Outside diameter [inch]	40
Actual distance from pipe to profile [mm]	10-19
Actual distance between pipes [mm]	34

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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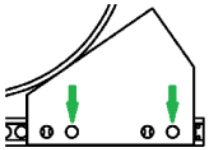

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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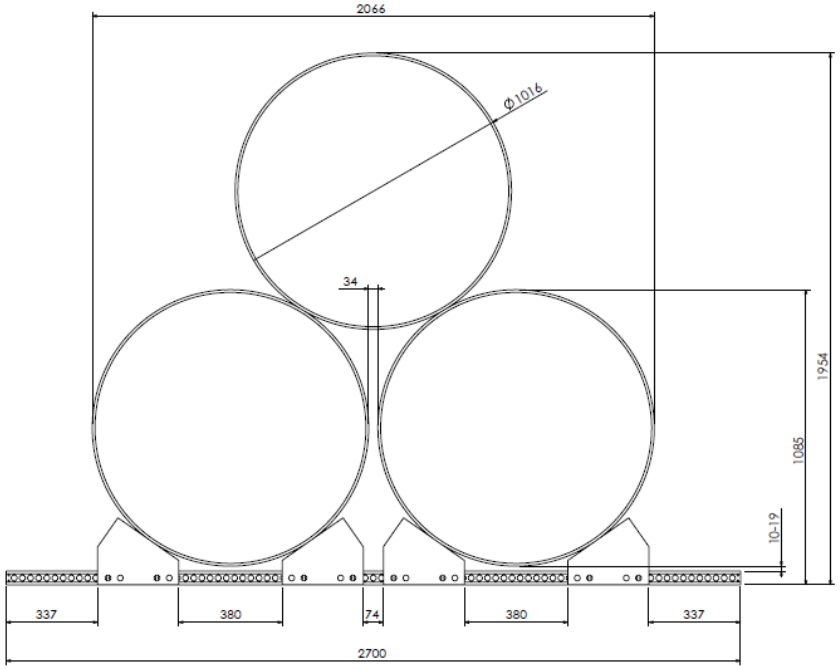
Page C-10-1



System88 - Train **Ø 1016**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	1016
Outside diameter [inch]	40
Actual distance from pipe to profile [mm]	10-19
Actual distance between pipes [mm]	34

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
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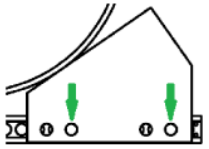

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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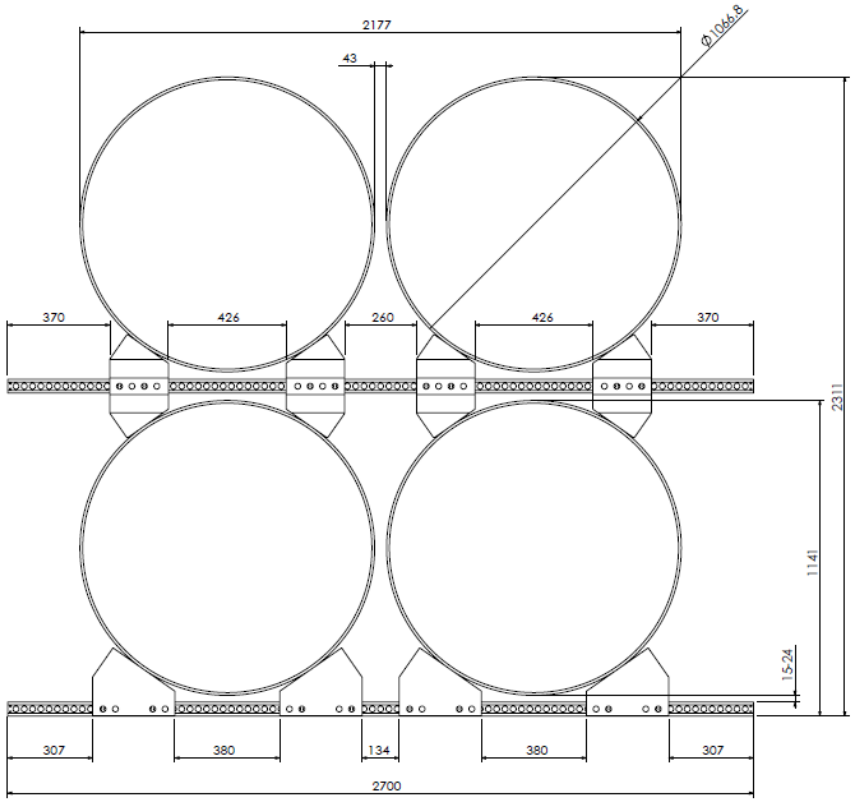
Page C-11



System88 - Train **Ø 1066,8**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1066,8
Outside diameter [inch]	42
Actual distance from pipe to profile [mm]	15-24
Actual distance between pipes [mm]	43

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
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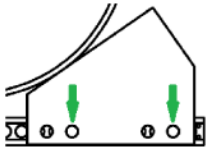

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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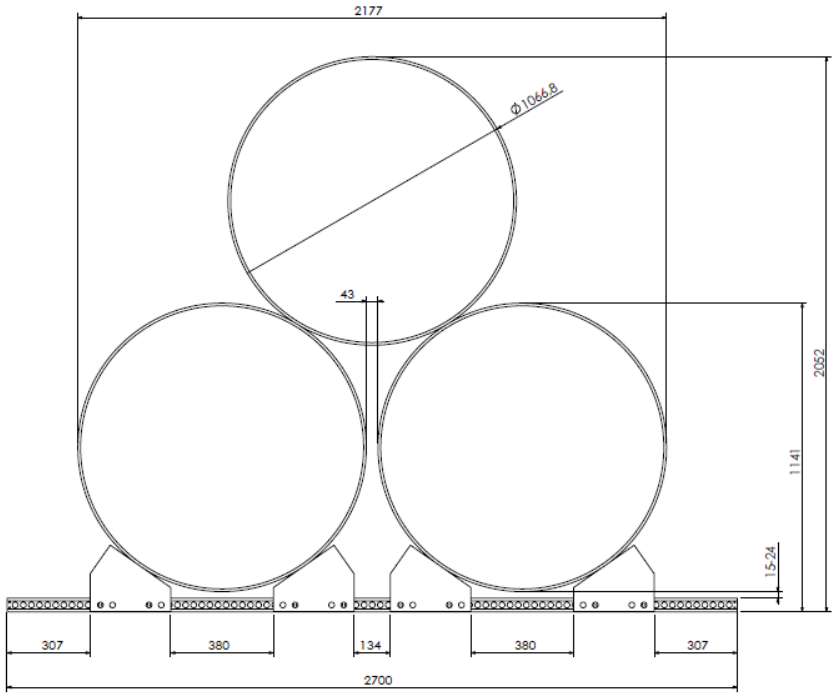
Page C-11-1



System88 - Train **Ø 1066,8**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	1066,8
Outside diameter [inch]	42
Actual distance from pipe to profile [mm]	15-24
Actual distance between pipes [mm]	43

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
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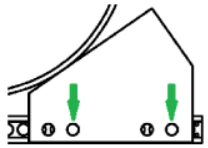

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SYSTEM 88

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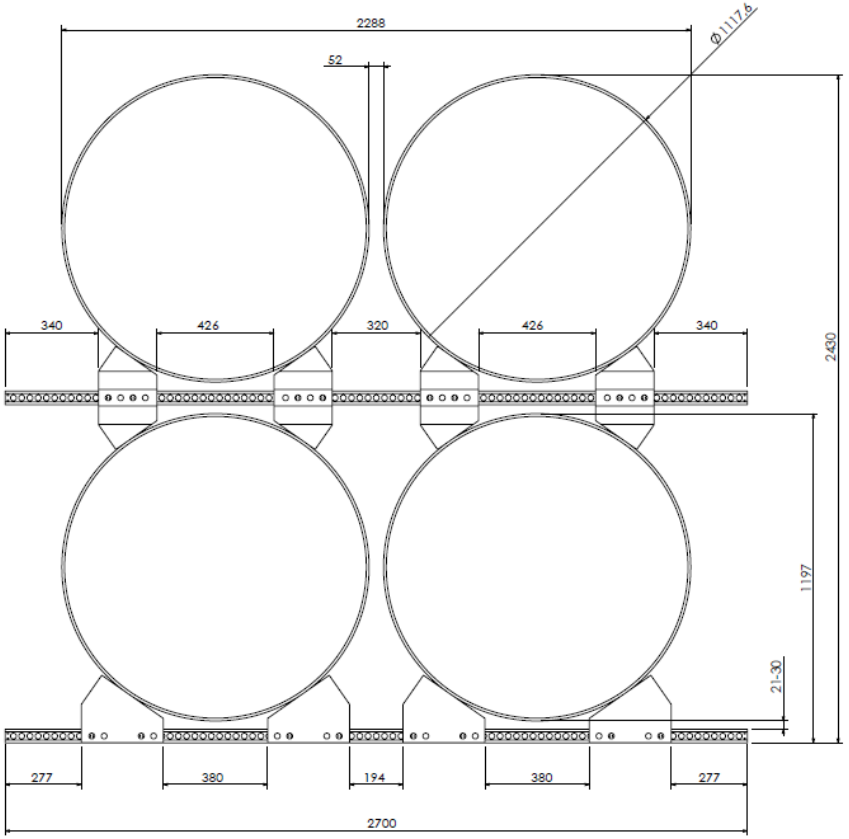
Page C-12



System88 - Train **Ø 1117,6**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1117,6
Outside diameter [inch]	44
Actual distance from pipe to profile [mm]	21-30
Actual distance between pipes [mm]	52

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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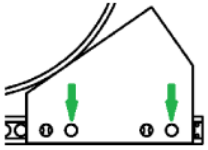

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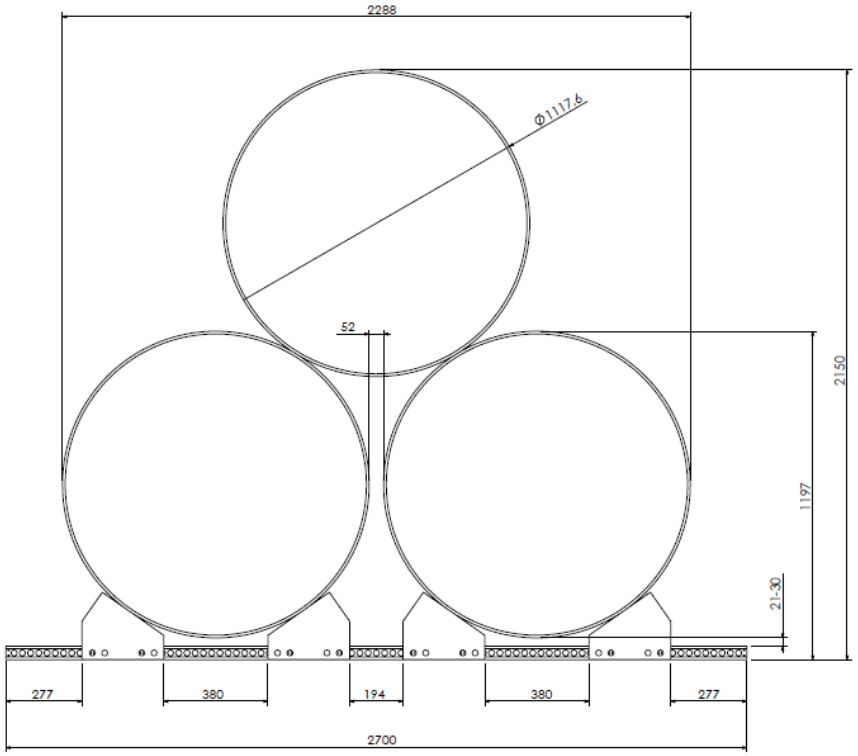
Page C-12-1



System88 - Train **Ø 1117,6**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	1117,6
Outside diameter [inch]	44
Actual distance from pipe to profile [mm]	21-30
Actual distance between pipes [mm]	52

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
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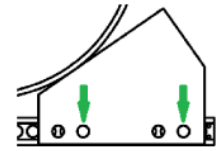

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SYSTEM 88

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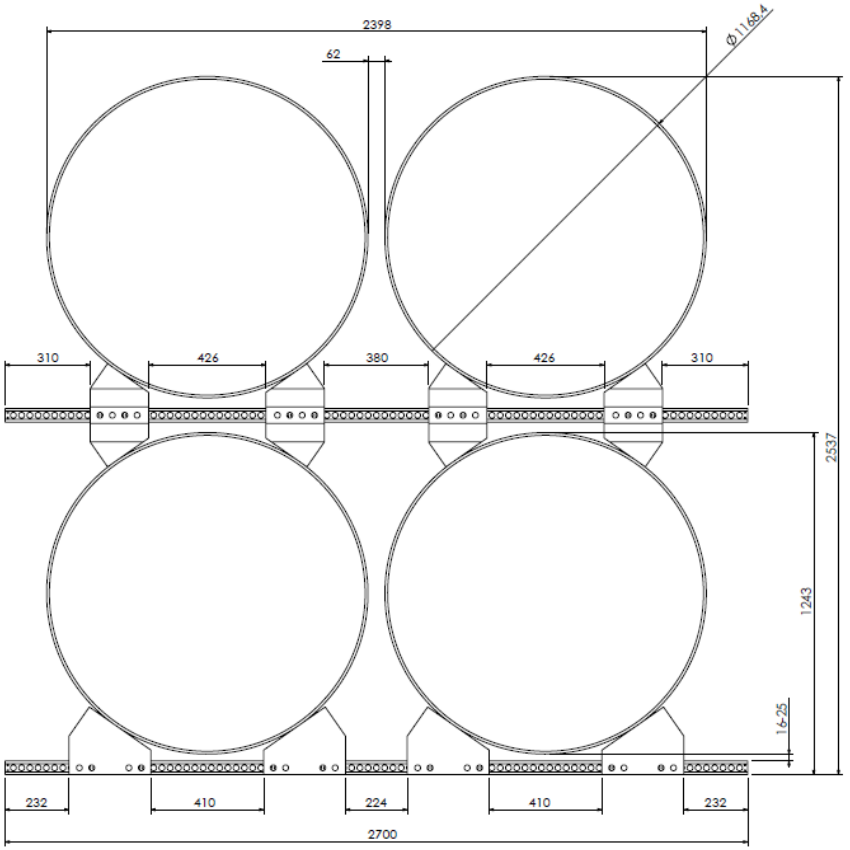
Page C-13



All dimensions are in mm
Drawing to scale
Scale 1:15

System88 - Train **Ø 1168,4**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1168,4
Outside diameter [inch]	46
Actual distance from pipe to profile [mm]	16-25
Actual distance between pipes [mm]	62

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
- The pipes must be supported by the blocks only and not touch the steel profile
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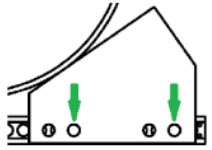

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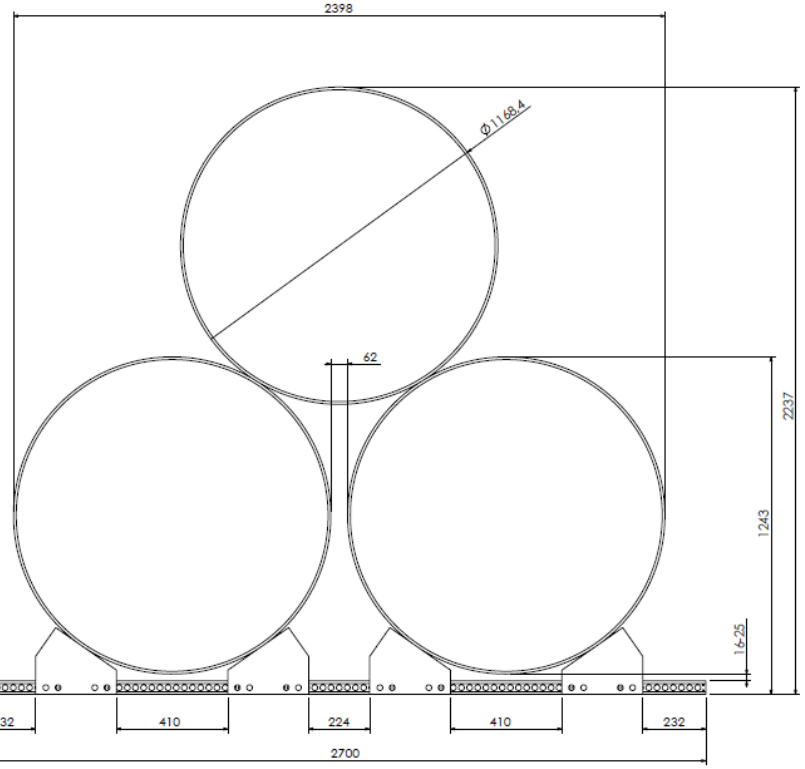

System88 - Train **Ø 1168,4**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	1168,4
Outside diameter [inch]	46
Actual distance from pipe to profile [mm]	16-25
Actual distance between pipes [mm]	62

- Always check System88 Instructions before use
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- Maximum load of 4.725 kg on block L
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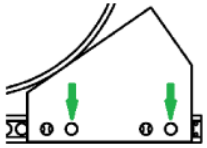

Pins should be fitted in the free holes

All dimensions are in mm
Drawing to scale
Scale 1:15

Revision date:
3-6-2016

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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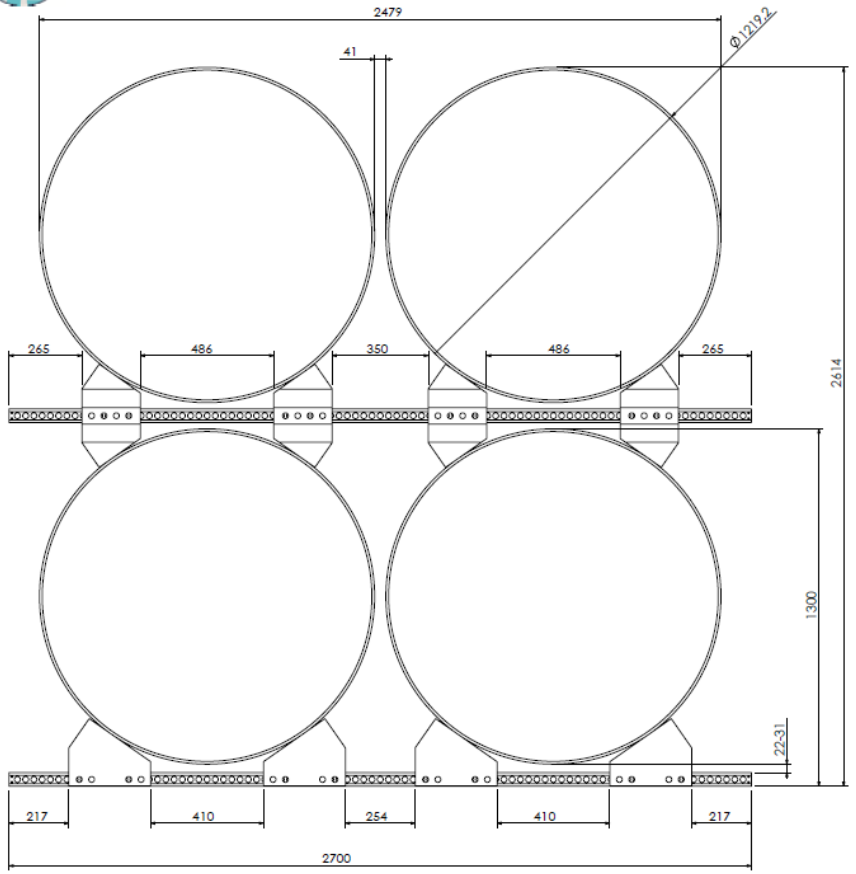
Page C-14



System88 - Train **Ø 1219,2**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1219,2
Outside diameter [inch]	48
Actual distance from pipe to profile [mm]	22-31
Actual distance between pipes [mm]	41

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
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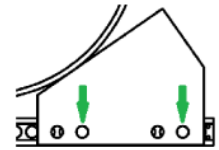

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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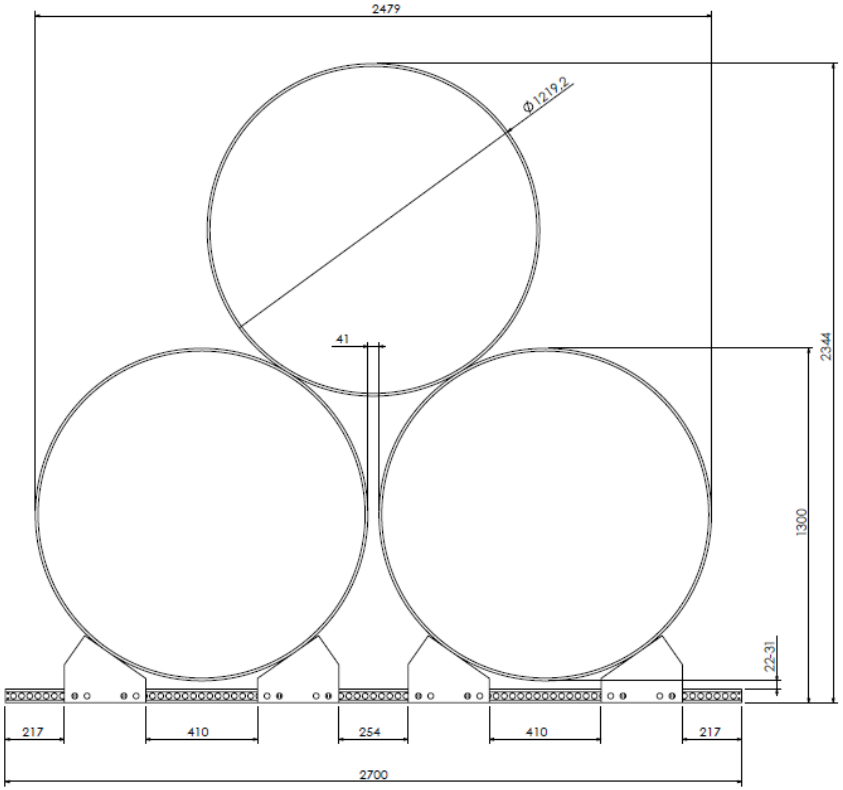
Page C-14-1



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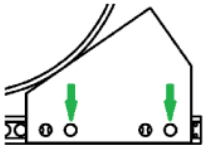

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SYSTEM 88

STANDARD TRAIN CONFIGURATION

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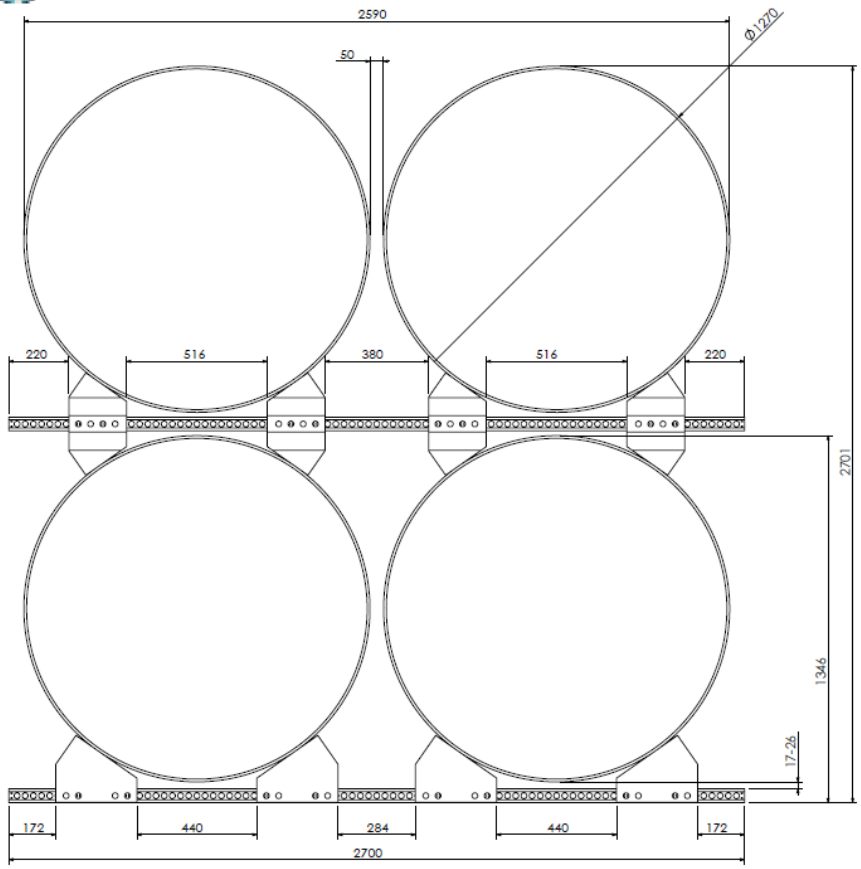
Page C-15



All dimensions are in mm
Drawing to scale
Scale 1:15

System88 - Train	Ø 1270
Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1270
Outside diameter [inch]	50
Actual distance from pipe to profile [mm]	17-26
Actual distance between pipes [mm]	50

- Always check System88 Instructions before use
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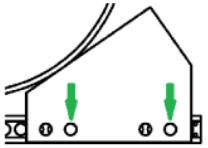

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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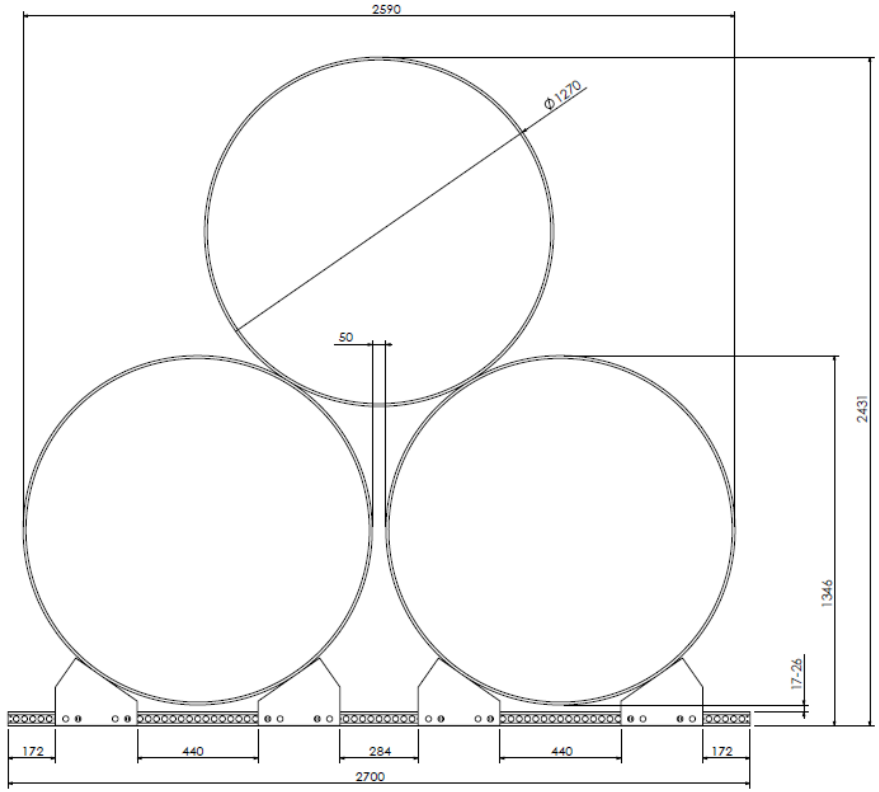
Page C-15-1



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System88 - Train	Ø 1270
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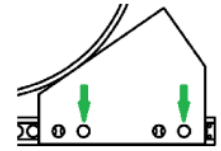

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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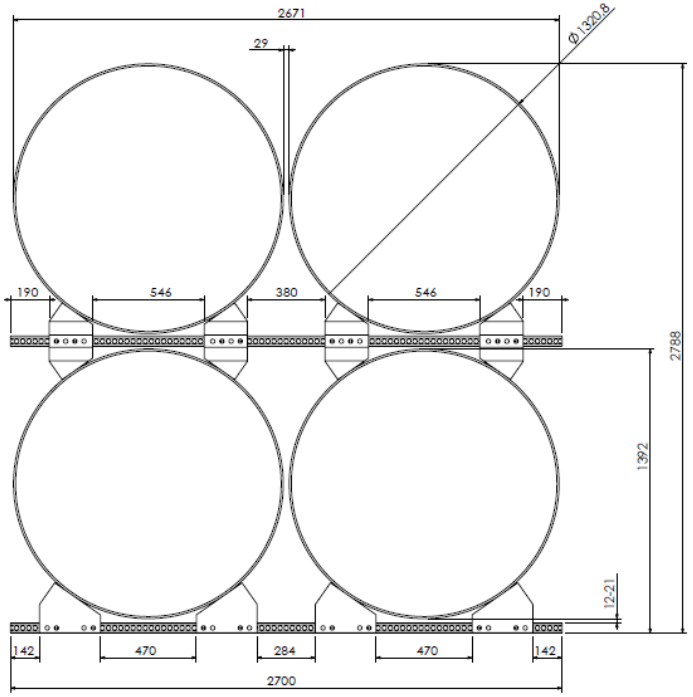
Page C-16



System88 - Train **Ø 1320,8**

Block	Type C
Block in middle	Type L
Number of pipes	4
Outside diameter [mm]	1320,8
Outside diameter [inch]	52
Actual distance from pipe to profile [mm]	12-21
Actual distance between pipes [mm]	29

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
- Check your vehicle specifications for total maximum load
- Always secure each block with 2 locking pins
- Replace block in case it shows permanent deformation
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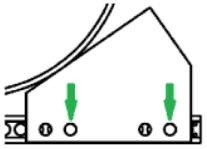

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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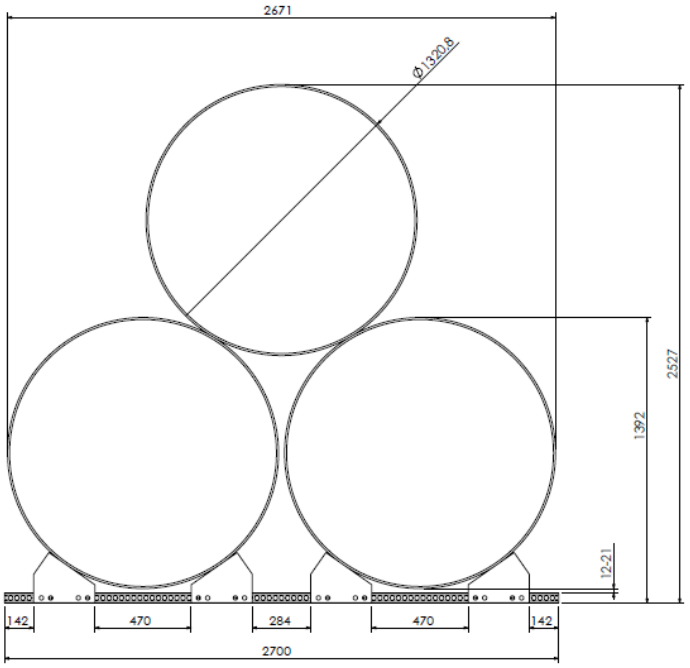
Page C-16-1



System88 - Train **Ø 1320,8**

Block	Type C
Block in middle	Type L
Number of pipes	3
Outside diameter [mm]	1320,8
Outside diameter [inch]	52
Actual distance from pipe to profile [mm]	12-21
Actual distance between pipes [mm]	29

- Always check System88 Instructions before use
- Maximum load of 7.875 kg on block C
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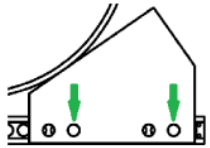

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TÜV NORD

SYSTEM 88

STANDARD TRAIN CONFIGURATION

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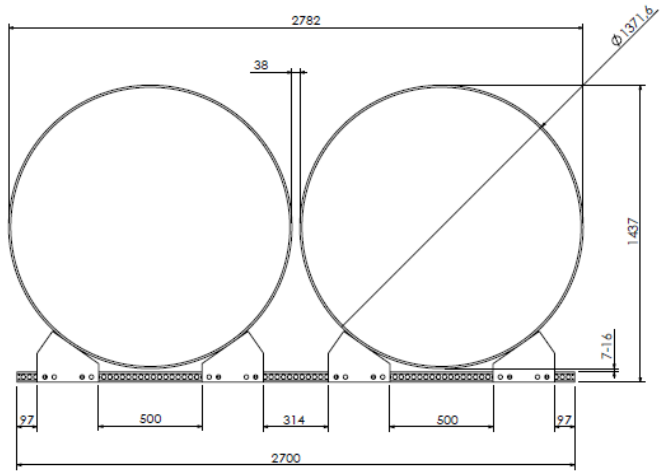
Page C-17



System88 - Train **Ø 1371,6**

Block	Type C
Block in middle	Type L
Number of pipes	2
Outside diameter [mm]	1371,6
Outside diameter [inch]	54
Actual distance from pipe to profile [mm]	7-16
Actual distance between pipes [mm]	38

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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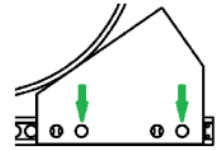

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SYSTEM 88

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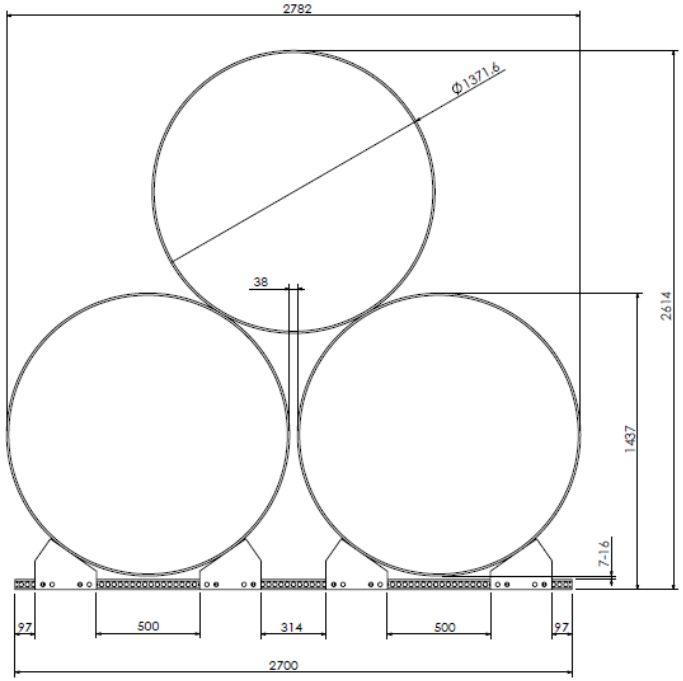
Page C-17-1



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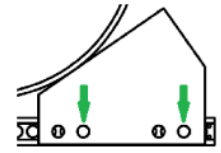

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STANDARD TRAIN CONFIGURATION

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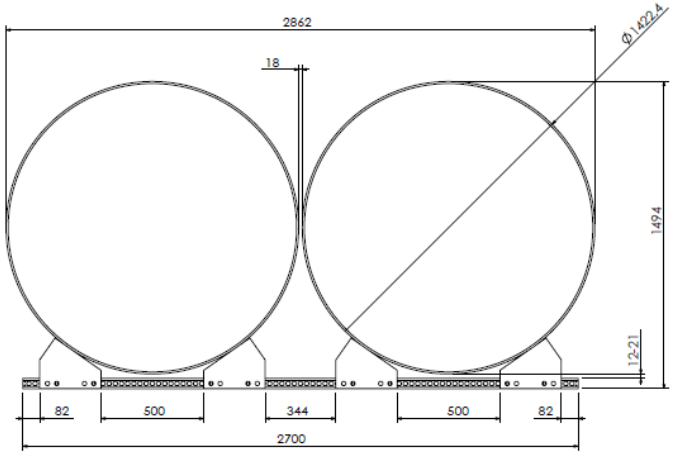
Page C-18



System88 - Train **Ø 1422,4**

Block	Type C
Block in middle	Type L
Number of pipes	2
Outside diameter [mm]	1422,4
Outside diameter [inch]	56
Actual distance from pipe to profile [mm]	12-21
Actual distance between pipes [mm]	18

- Always check System88 instructions before use
- Maximum load of 7.875 kg on block C
- Maximum load of 4.725 kg on block L
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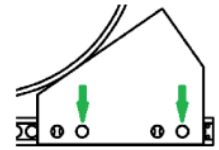

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SYSTEM 88

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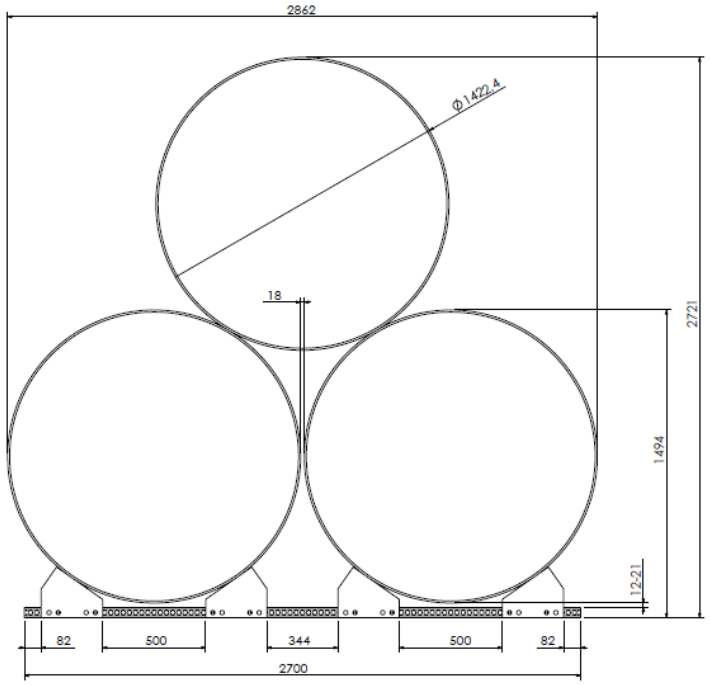
Page C-18-1



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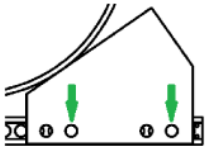

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Appendix C Calculation for securing pipe loads

1. Calculation for securing pipe loads (March 2th 2011)
Securing the load of pipes, total 27.000 kg (ref. [1],[2],[3],[4])
See figure 2 for maximum inertial forces of the load to be considered
Load of pipes on trailer 27.000 kg (F_g)

1.1. Calculation of needed tie-downs <u>WITH</u> the use of (Dhatec) Anti-skid layers between trailer and System88 and between System88 and pipes with μ = 0,6

1.1.1. Load securing in driving direction
Inertial forces in driving direction, conform VDI 2700*[4]p.9*
In forward direction ***<u>for trucks</u>***: 0.8G
Fm vorwärts = 0,8 x Fg = 0,8 x 27.000 = 21.600 kg

Friction force with friction coefficient between pipes and PE-Blocks with the use of anti-skid layers μ = 0,60*[4]VDI p.10*
F_w = μ x F_g = 0,60 x 27.000 = 16.200 kg

Load securing force needed*[1]TLN p.149*
$F_z = F_{m\ vorwärts} - F_w$ = 21.600 – 16.200 = 5.400 kg = 5.400 daN

The standard tension force (S_{TF}) is mentioned on the label of each tie-down and depends on the model of the ratchet. For the calculation, we assume that Dhatec ratchets are used with a S_{TF} of 750 daN. This information can be found on the label of the tie-down. When the load is lashed the tension in the belt is according to *DIN EN 12195 – 1[3]* 1,5 times the S_{TF} that is mentioned on the label. For this example, the needed tie-downs to secure the load is:

5.400 daN / (0,6 x 1,5 x 750 daN) = ***8 Dhatec tie-downs***.

1.1.2. Load securing rectangular on driving direction
Inertial forces rectangular on driving direction, conform VDI 2700*[4]*
F_m sidewards = 0,5 x Fg = 0,5 x 27.000 = 13.500 kg

Friction coefficient between pipes and PE-Blocks
with the use of anti-skid layers: μ = 0,60*[4]VDI p.10*
Fw = μ x Fg = 0,60 x 27.000 = 16.200 kg

Load securing force needed*[1]*
$F_z = F_{m\ vorwärts} - F_w$ = 13.500 – 16.200 < 0 kg

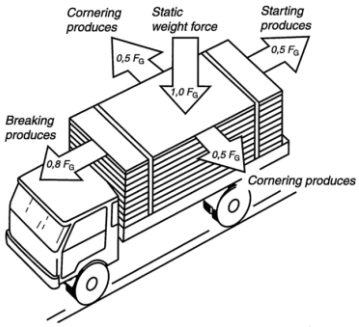

Fig. 26: Maximum inertial forces of the load to be considered for load safety (from VDI2700[4])

For securing the load rectangular to the driving direction no additional tie-downs are needed.

1.1.3. Load securing contrary to driving direction
For securing the load against forces contrary to the driving direction no tie-downs are needed while the inertial forces for securing the load against moving backwards relative to the trailer are the same as the inertial forces during cornering. The calculation would therefore be the same as 1.1.2.

Conclusion: ***For securing a pipe load with a total weight of 27.000 kg, when using System88 for transport WITH antiskid layers with a friction coefficient of >0,6 between all contact surfaces, 8 tie-downs with a S_{TF} (standard tensioning force) of 750 daN are needed.***

References:

[1] Smit, A., Lampen, A., Ladingzekering, Handboek van Transport en Logistiek Nederland voor het goed vastzetten van Lading, ISBN 90-75363-35-4, Februari 2003.
[2] Kugele, M., Lampen, A., Sander, R., Dekra Praxisratgeber Ladungssicherung, Dekra Fachbuchreihe Fuhrpark, ISBN 978-3-938255-34-6, Juni 2007.
[3] Ladungssicherung auf Straßenfahrzeugen - Aufbauten an Nutzfahrzeugen - Mindestanforderungen; Deutsche Fassung EN 12642, Januar 2006.
[4] Verein Deutscher Ingenieure, VDI 2700 Ladungssicherung auf Straßenfahrzeugen, Berlin Beuth Verlag, November 2004.

2. Calculation for securing pipe loads (March 2th 2011)

Securing the load of pipes, total 27.000 kg (ref. [1],[2],[3],[4])
See figure 2 for maximum inertial forces of the load to be considered
Load of pipes on trailer 27.000 kg (F_g)

2.1. Calculation of needed tie-downs WITHOUT the use of (Dhatec) Anti-skid layers the friction between pipes and blocks is μ = 0,3

2.1.1. Load securing in driving direction

Inertial forces in driving direction, conform VDI 2700*[4]p.9*
Fm vorwärts = 0,8 x Fg = 0,8 x 27.000 = 21.600 kg

Friction force with friction coefficient between pipes and PE-Blocks without the use of anti-skid layers with μ = 0,3
F_w = μ x F_g = 0,30 x 27.000 = 8.100 kg

Load securing force needed*[1]TLN p.149*
$F_z = F_{m\ vorwärts} - F_w$ = 21.600 – 8.100 = 13.500 kg = 13.500 daN

The standard tension force (S_{TF}) is mentioned on the label of each tie-down and depends on the model of the ratchet. For the calculation, we assume that ratchets are used with a S_{TF} of 750 daN. This information can be found on the label of the tie-down. When the load is lashed the tension in the belt is according to *DIN EN 12195 – 1[3]* 1,5 times the S_{TF} that is mentioned on the label. For this example, the needed tie-downs to secure the load is:

13.500 daN / (0,3 x 1,5 x 750 daN) = ***40 Dhatec tie-downs***.

2.1.2. Load securing rectangular on driving direction

Inertial forces rectangular on driving direction, conform VDI 2700*[4]*
F_m sidewards = 0,5 x Fg = 0,5 x 27.000 = 13.500 kg

Friction coefficient between pipes and PE-Blocks is 0,3:
Fw = μ x Fg = 0,30 x 27.000 = 8.100 kg

Load securing force needed*[1]*
$F_z = F_{m\ vorwärts} - F_w$ = 13.500 – 8.100 = 5.400 kg

The needed securing force is already covered by the tie down that are mentioned under 2.1.1. For securing the load rectangular to the driving direction no additional tie-downs are needed.

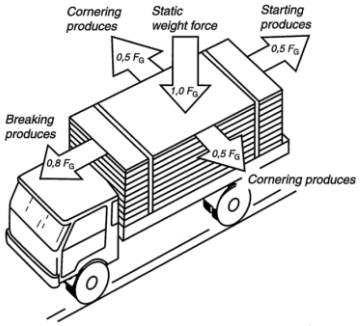

Fig. 27: Maximum inertial forces of the load to be considered for load safety (from VDI2700[4])

2.1.3. Load securing contrary to driving direction

For securing the load against forces contrary to the driving direction no additional tie-downs are needed while the inertial forces for securing the load against moving backwards relative to the trailer are the same as the inertial forces during cornering. The calculation would therefore be the same as 2.1.2.

Conclusion: ***For securing a pipe load with a total weight of 27.000 kg for transport WITHOUT using antiskid mats, 40 tie-downs with a S_{TF} (standard tensioning force) of 750 daN are needed.***

References:

[1] Smit, A., Lampen, A., Ladingzekering, Handboek van Transport en Logistiek Nederland voor het goed vastzetten van Lading, ISBN 90-75363-35-4, Februari 2003.
[2] Kugele, M., Lampen, A., Sander, R., Dekra Praxisratgeber Ladungssicherung, Dekra Fachbuchreihe Fuhrpark, ISBN 978-3-938255-34-6, Juni 2007.
[3] Ladungssicherung auf Straßenfahrzeugen - Aufbauten an Nutzfahrzeugen - Mindestanforderungen; Deutsche Fassung EN 12642, Januar 2006.
[4] Verein Deutscher Ingenieure, VDI 2700 Ladungssicherung auf Straßenfahrzeugen, Berlin Beuth Verlag, November 2004.