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Handling Instruction

Use and Handling of the DN30-X Package

0045-HA-2021-001-Rev2

Prepared	Checked	Released
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Modifications

Revision	Date of revision	Modifications
0	28.06.2021	Original
1	15.03.2023	• Complete overall and editorial corrections • Removal of test instruction 0023-PA-2015-016 in list of further applicable documents because it has been incorporated in test instruction 0023-PA-2015-015. • Addition of the option to use M18 bolts for tie-down of DN30 PSPs on flatracks • Change of page layout for sections 6, 7, and 8.1
2	14.02.2025	• Implementation of necessary changes because of the removal of the housing of the DN30 PSP (removal of handling steps that are no longer required and exchange of figures showing the housing) • Additions and changes to ensure that the handling instructions for the DN30-X and DN30 package comply with each other • Added a note in section 4 that the valve protector of the 30B-X cylinder has to be removed before loading the cylinder into a DN30 PSP

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1 Objective and Scope

The following instruction regulates the handling of the DN30-X package and is intended for the operator. This instruction can further be used to train operators on using the DN30-X package. In this instruction, handling situations are described, and instructions are given to comply with the certificate of approval. For the sake of a correct and safe use of the DN30-X package, this instruction has to be completely read and understood by the operator prior to handling the DN30-X package.

2 Further Applicable Documents

The following documents are also valid:

Test instruction 0045-PA-2021-001	Periodical inspections of the 30B-X cylinder
Test instruction 0045-PA-2021-002	Contamination and dose rate measurement at the DN30-X package
Test instruction 0023-PA-2015-015	Periodical inspections of the DN30 PSP

3 Description of the DN30 PSP

The DN30 Protective Structural Packaging (PSP) is shown in Figure 1 to Figure 6. It consists of a bottom and a top half.

Lifting lugs at the feet as well as forklift pockets permit the safe handling of the DN30-X package. The tie-down interfaces allow for safe stowing of the DN30-X package and are compatible with existing PSP designs.

The bottom half includes a valve protecting device, a plug protecting device, two rotation preventing devices, the bottom half of the seal holder, as well as the bottom half of the closure system (composed of six closure devices). The valve protecting device is shaped like a U and encloses the valve of the 30B-X cylinder during transport. For loading a 30B-X cylinder into a DN30 PSP, it must be tilted by 90° via two hinges.

The top half with integrated handling attachment points suitable for lifting the top half only includes the top half of the seal holder and the top half of the closure system. The information that the lifting lugs at the top half are allowed to be used only for handling of the top half is printed on both front faces of the DN30 PSP as is shown in Figure 5. Additionally, the lifting lugs at the top half have to be rendered inoperable during transport to avoid incorrect use.

The bodies of the bottom and top half are made of an inner and outer shell of stainless steel, both in the form of a tub, which are connected by a flange, respectively. The cavity between the inner and outer shells and flanges is filled with foam of different densities as well as a thermal insulation layer between the inner shells and the foam. In the flange of the top half, there is an elastomeric gasket to prevent inleakage of water during routine conditions of transport. To prevent dangerous pressure build-up, nine thermal plugs (or eight thermal plugs and one thermal valve) are embedded into the outer shell of the bottom and top half, respectively.

All surfaces of the inner shells of the bottom and top half (except for the counterpart of the valve protecting device in the top half) are covered with a layer of intumescent material. In the bottom half, two silicon pads are located on top of the layer of intumescent material to reduce wearing.

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The top and bottom half of the DN30 PSP are connected by a closure system consisting of six robust mortise-and-tenon like devices. These closure devices have four teeth each with a hole in the center. When closed, the top and bottom half of the DN30 PSP are connected by a pin inserted into these holes. Each pin is attached to the corresponding closure device by a cable. After insertion, the pins are secured by a special M16 securing bolt and a Nord Lock washer.

The identification number of each DN30 PSP is engraved on the top and bottom part of two closure devices. That way the top half of each DN30 PSP is uniquely associated with the corresponding bottom half. Additionally, the identification number is printed onto both front faces of the bottom and top half of the DN30 PSP as well as on the nameplate. Each nameplate also contains a unique QR code of the identification number for scanning purposes.

It is not possible to close the DN30 PSP without turning the handle of both rotation preventing devices into their “closed” position. Labels with red backgrounds indicating either the CLOSED or OPEN position are glued next to the devices.

Note: The name plate (shown on the right in Figure 1) is always affixed to the front face on the plug side of a DN30 PSP. The valve and the plug side of the DN30 PSP are marked by red and blue arrows, respectively (see Figure 5). This way, the valve and plug side of a DN30 PSP can be identified without opening a DN30 PSP.

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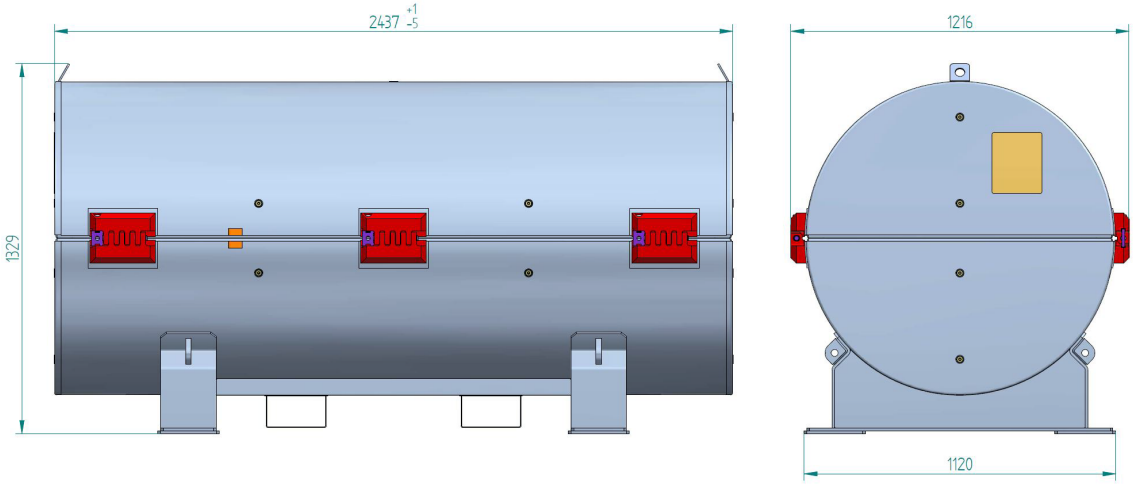

Figure 1: DN30 PSP

The main characteristics of the DN30 PSP design are summarized in Table 1.

Table 1: Main Characteristics of the DN30-X Package

Characteristic	Value
Masses[(a)]	
Empty DN30 PSP (nominal weight)	1100 kg
Maximum gross weight of package	4100 kg
Dimensions	
Length	2437 mm
Width	1216 mm
Height	1329 mm

[(a)]The actual weights of the units are stamped on the nameplate.

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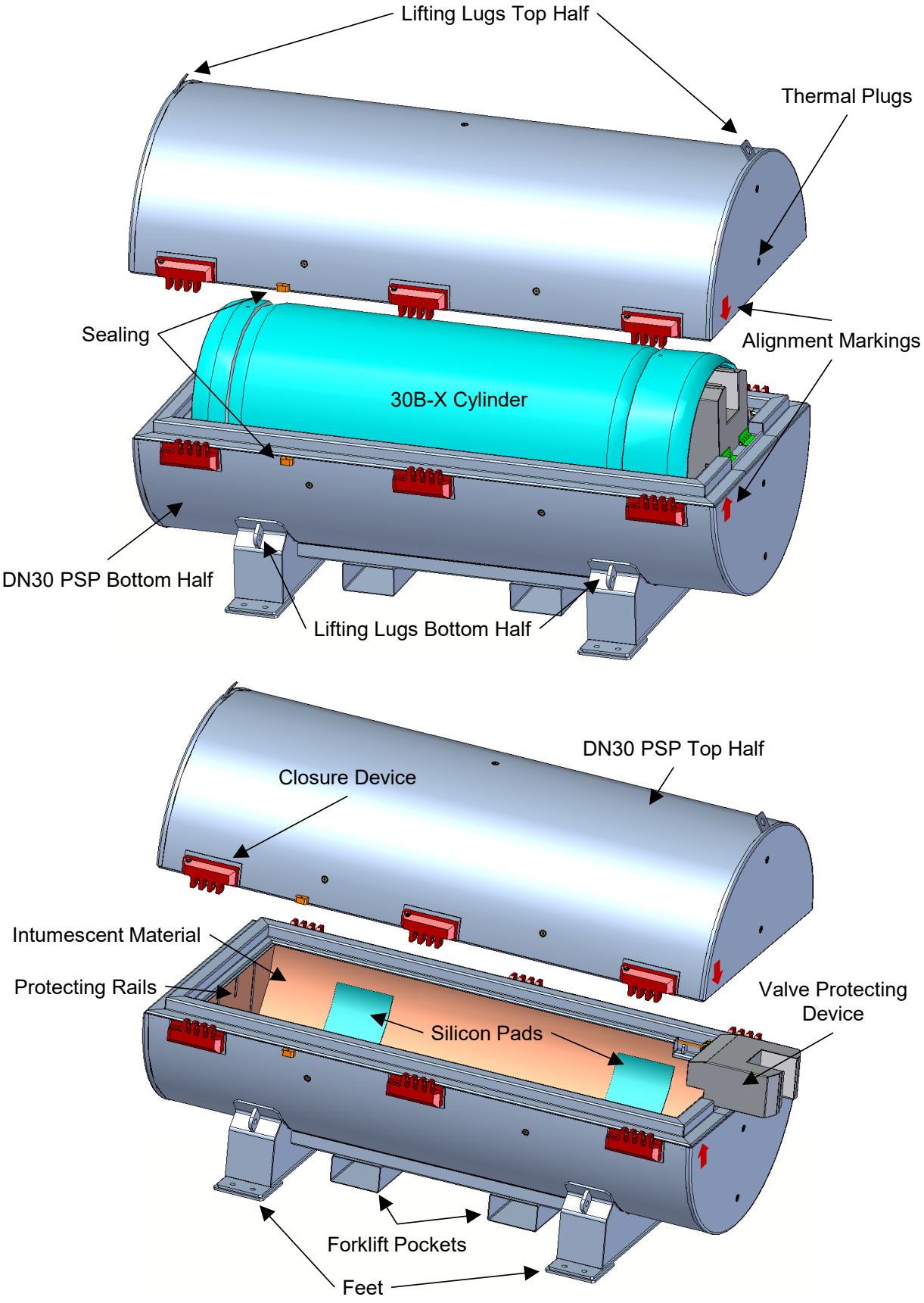

Figure 2: DN30 PSP and its main parts

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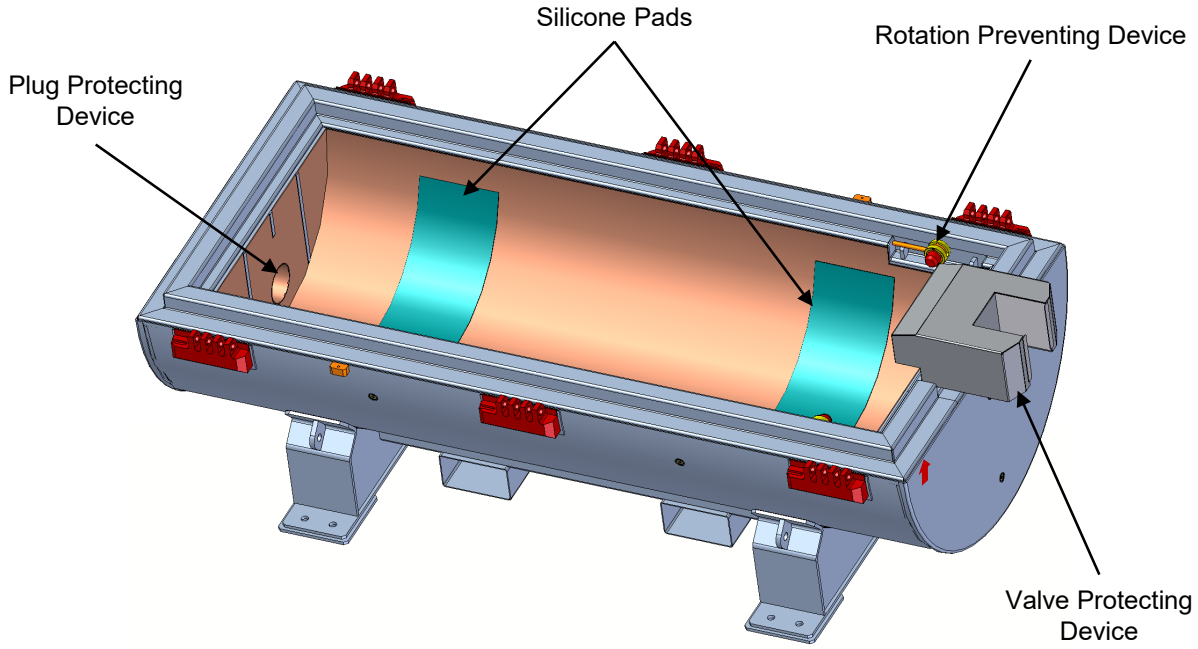

Figure 3: Details of the bottom half

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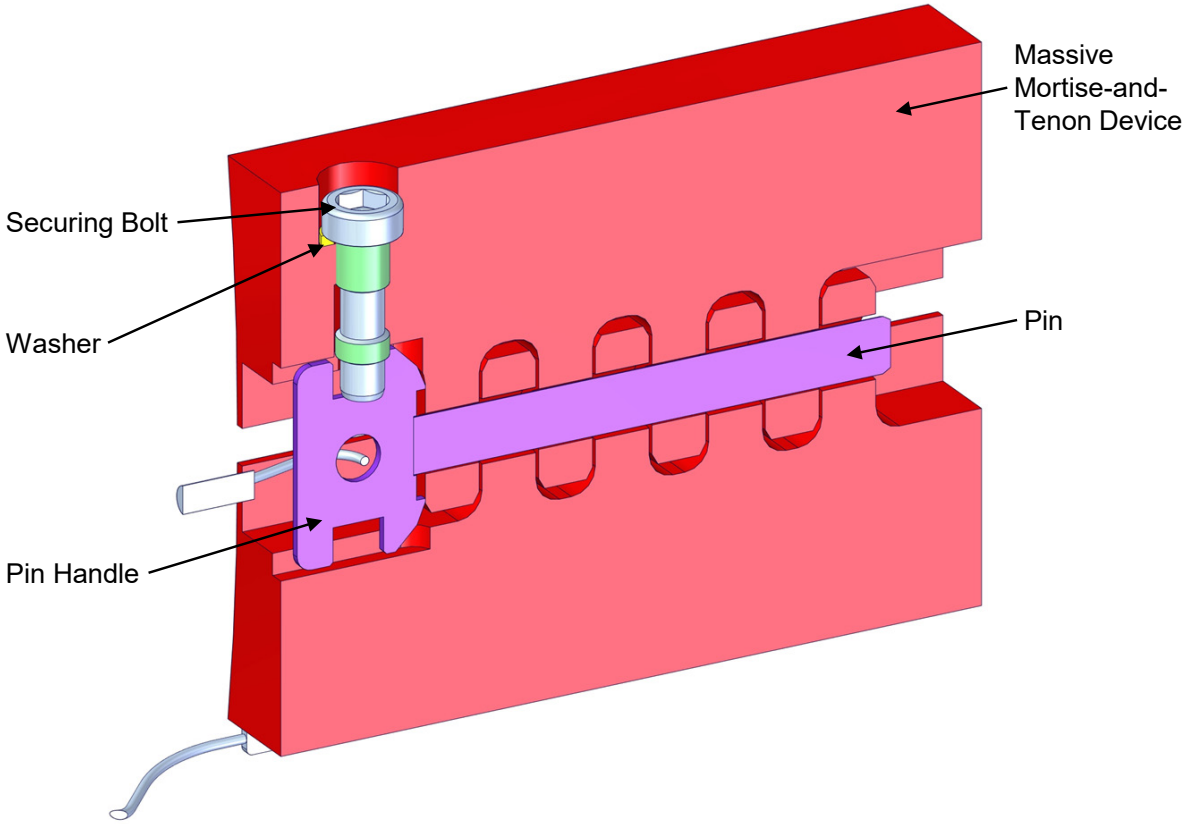

Figure 4: Detailed section view of the closure device

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Figure 5: View of the DN30 PSP (plug side)

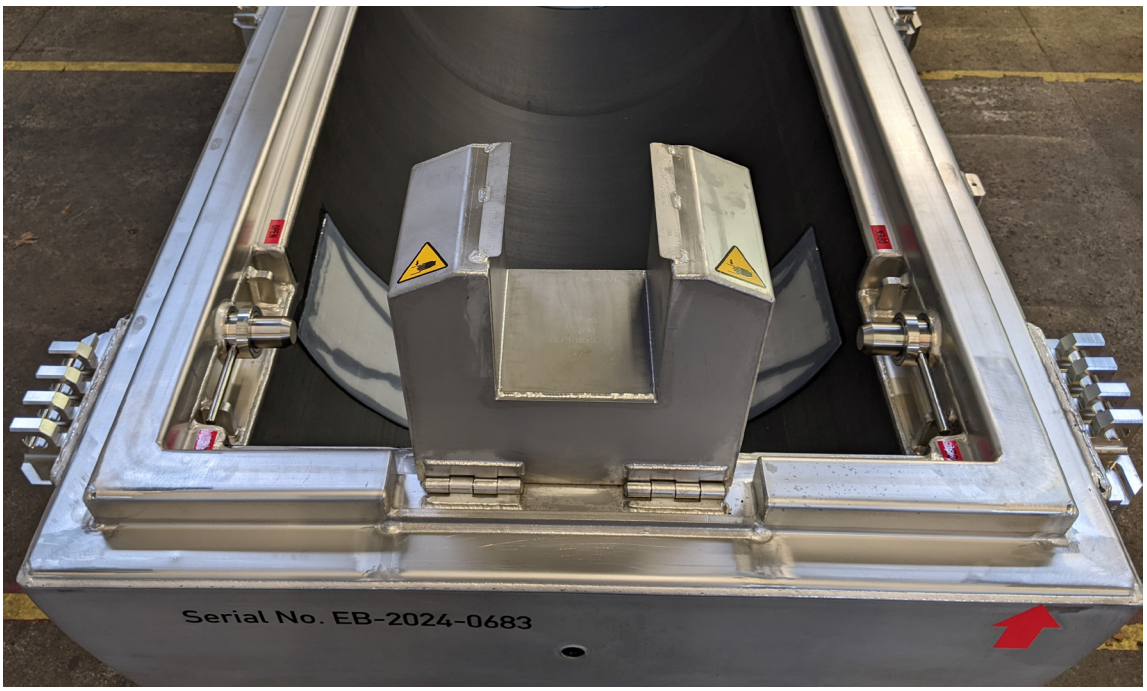

Figure 6: Labels on the inside of the DN30 PSP

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4 Requirements Towards the 30B-X cylinder

The DN30 PSP is intended for the transport of certified 30B-X cylinders complying with specification 0045-SPZ-2021-001. Therefore, the following requirements apply towards the 30B-X cylinder.

Before filling the 30B-X cylinder, inspections in accordance with [ANSI N14.1] or [ISO 7195] and at least as described in [USEC-651] (or in equivalent plant specific instructions) shall be carried out:

- The 30B-X cylinder shall be handled and filled in accordance with [ANSI N14.1] or [ISO 7195] and at least as described in[USEC-651].
- A valid maintenance certificate (valid date on the 30B-X cylinder's nameplate) exists.
- 30B-X cylinders that have not been inspected and tested within the required 5-year period shall not be refilled until they are properly reinspected and retested. Prior to shipment, 30B-X cylinders that have not been recertified within the 5-year requirement shall be visually inspected for degradation of the cylinder wall. Any questionable conditions should be investigated. Details on the visual inspection are provided in 0045-PA-2021-001.
- Any defective condition has to be corrected before filling according to the requirements of [ANSI N14.1] or [ISO 7195]:
    - The 30B-X cylinder shall be routinely examined as received and prior to sampling, withdrawal, filling, or shipping to ensure that it remains in a safe and usable condition.
    - Leakage, cracks, excessive distortion, bent or broken valves or plugs, broken or torn skirts, or other conditions that may affect the safe use of the cylinder shall warrant appropriate precautions, including removing the cylinder from service until the defective condition is satisfactorily corrected.
    - Questionable conditions should be referred to a qualified inspector for evaluation and for recommendations concerning use, repair, or condemnation of the cylinder in question.
    - Conditions of the 30B-X cylinder that might indicate excessive damage of the CCS, such as severe outer damages of the cylinder shell or skirts, should be referred to a qualified inspector. Reuse of such cylinders is only allowed after internal inspection of such cylinders and proof that the CCS is undamaged.
- Before filling, the cylinder is weighted to establish the net weight of the heels to ensure the fill limit will not be exceeded.
- To avoid overfilling, the 30B-X cylinder shall be weighted after being filled.

Before loading into the DN30 PSP, the inspection of the 30B-X cylinder should be carried out in accordance with[ANSI N14.1] or [ISO 7195], and at least as described in [USEC-651] (or in equivalent plant specific instructions):

- The content of the 30B-X cylinder has to comply with the certificate of approval of the DN30-X package.
- Before shipping, the 30B-X cylinder shall be inspected for leak-tightness, damage, as well as other unacceptable conditions.
- UF_6 shall be shipped only in its solid state and when the vapor pressure within the 30B-X cylinder is below atmospheric.
- The safe state of the 30B-X cylinder shall be recorded by the UF_6 supplier, and the record shall be provided to the shipper.

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Special care has to be taken to ensure that the cylinder fulfills the leak-tightness criteria of [ANSI N14.1] or [ISO 7195] and the following requirements:

- The leak-tightness of the valve seat of a filled cylinder shall be verified by leak-rate testing of the pigtail before disconnection and after closing the cylinder valve seat.
    - A leak-rate larger than 1×10^{-4} Pa.m^3/s SLR (Standardized Leakage Rate) shall not be permitted.
    - The leak-test method shall comply to the [ANSI N14.5] or [ISO 12807] standard.
    - If air is used for a pressure drop test, the air supply should be clean, dry and free from oil. If it is not, or if the quality of the air supply is uncertain, the test should be performed with nitrogen to ensure reliable results.
- Alternatively, a vacuum test may be performed by attaching a pigtail to the closed cylinder valve and drawing a vacuum.

Notes:

- The cylinder's outer surface shall be approximately at ambient temperature and its vapor pressure below atmospheric pressure.
- The cylinder's valve protector must be removed before loading the 30B-X cylinder into the DN30 PSP.

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5 General Handling Practices for the DN30-X Package

5.1 Handling

5.1.1 Handling of a Complete DN30 PSP or the Bottom Half of a DN30 PSP

5.1.1.1 Loaded DN30 PSP

For lifting a loaded DN30 PSP or the bottom half of a DN30 PSP, options 1 and 2 are available.

5.1.1.1.1 Option 1

Using the four lifting lugs at the feet and by means of a crane or a forklift with slings.

- A shackle has to be attached to each of the four lifting lugs.
- Lifting capacity of each sling has to be at least 2500 kg.
- Lifting capacity of each shackle has to be at least 2500 kg.
- When using a traverse (a), the angle between the slings has to be 60° ± 10°. This corresponds to a sling length of 1.65 m ± 0.15 m.
- When using a spreader (b), the lateral angle of the slings to the vertical has to lie within ±10°. The optimal distance of the spreader in vertical direction is 1.1 m.
- In the longitudinal direction, the shackles and the crane shall be vertically connected by the slings. A deviation of ±10° is acceptable. The optimal distance of the spreader in longitudinal direction is 1.5 m.

Notes:

- Lifting chains are not allowed.
- The center of gravity of a DN30 PSP is slightly shifted towards its valve side.

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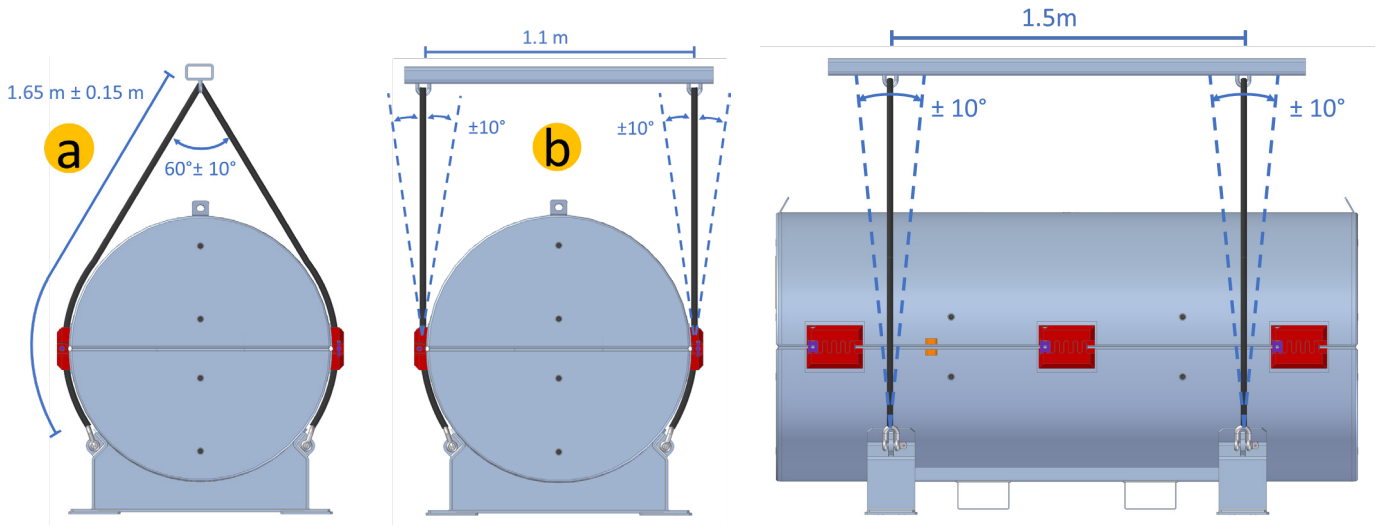

Figure 7: Lifting of an empty or loaded DN30 PSP by using the four lifting lugs

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5.1.1.1.2 Option 2

Using a forklift, the forks are inserted into the forklift pockets.

For lifting the loaded DN30 PSP with a forklift, the distance of the forks needs to be adjustable to fit into the forklift pockets of the DN30 PSP.

Load capacity of the forklift has to be at least 5000 kg.

Notes:

- It is recommended to place a spacer of 40 cm onto the forklift such that the closure devices will not get in contact with the forklift.

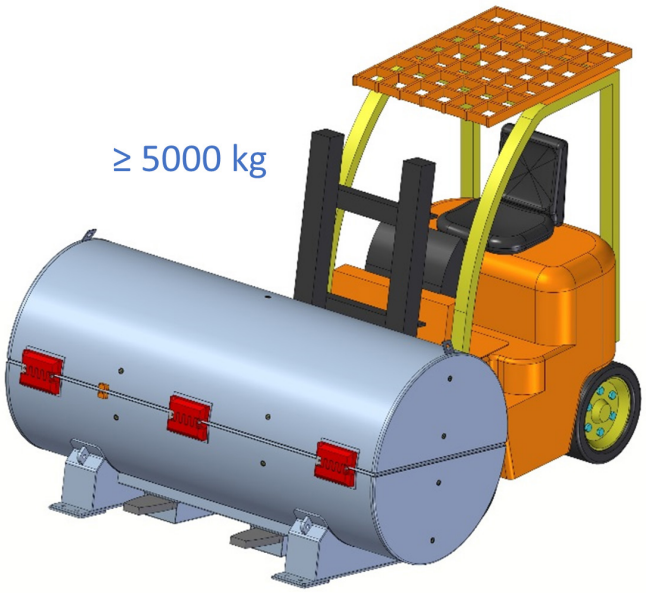

Figure 8: Lifting of a DN30 PSP by using the forklift pockets

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5.1.1.2 Empty DN30 PSP

For lifting an empty DN30 PSP, options 1 and 2 (above), and option 3 (below) are available. Option 3 can also be used for loaded DN30 PSPs if the package is only lifted on-site and not in public areas.

5.1.1.2.1 Option 3

Using appropriate slings and by means of a crane or a forklift:

- The slings have to be winded around the DN30 PSP, outside the base feet and behind the closure devices.
- Lifting capacity of each sling has to be at least 2500 kg.
- Lifting capacity of the shackle has to be at least 5000 kg.
- Angle between the slings has to be 45° ± 10°. This corresponds to a sling length of 5.5 m ± 0.2 m.

Notes:

- Lifting chains are not allowed.
- The center of gravity of a DN30 PSP is slightly shifted towards its valve side.

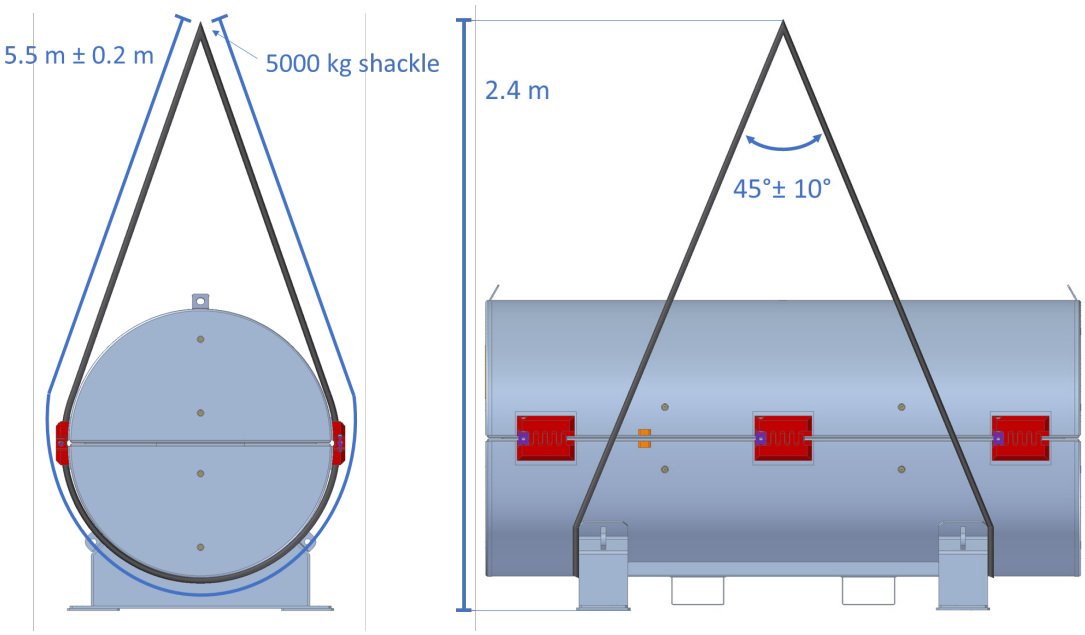

Figure 9: Lifting of an empty DN30 PSP by means of slings

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5.1.2 Handling of the Top Half

For lifting the top half of a DN30 PSP, shackles (or other adequate lifting means) have to be attached to the two lifting lugs of the top half. Only a crane or forklift with appropriate lifting slings can be used to lift the top half. Both slings need to have a lifting capacity of at least 500 kg.

Before lifting the top half, the operator has to make sure that all six pins of the closure devices have been removed. Additionally, any means (e.g., bolts or clamps) that were used to render the lifting lugs at the top half inoperable during transport have to be removed.

Notes:

- The angle between the slings has to be 60° ± 10°. This corresponds to a sling length of 2.3 m ± 0.3 m. It is recommended to use a sling approximately 7 cm shorter for the lifting lug on the valve side (red arrows and no nameplate) to compensate for the shifted center of gravity of the top half.
- The top half has to be handled slowly and carefully.
- Never use the forks of a forklift to lift the top half.
- The two lifting lugs are designed for lifting the top half only. Never use them for lifting the loaded or empty DN30 PSP.

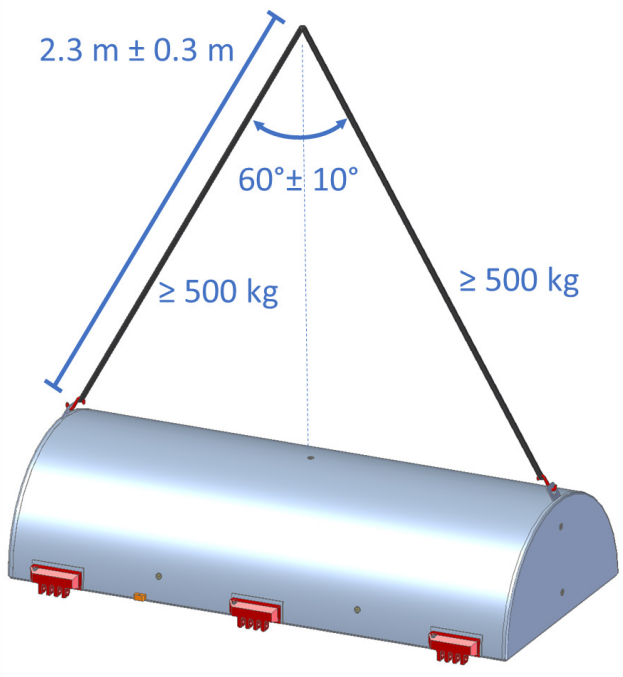

Figure 10: Lifting of the top half

5.2 Storage

The DN30 PSP might be stored indoors or outdoors.

Note: The DN30 PSP has to be closed during storage.

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5.3 Visual Inspection

The DN30 PSP shall be inspected prior to loading and the following observations shall be a cause for further investigation, replacement of parts, or rejection of the DN30 PSP as specified in detail in test instruction 0023-PA-2015-015:

- Structural changes of exterior or interior shells, like excessive deformations, cracks, holes, etc.
- Excessive damage of flange areas
- Missing or damaged markings of the DN30 PSP
- Missing or damaged thermal plugs/valves
- Missing or damaged gasket
- Damage of the mortise-and-tenon closure system
- Missing or damaged seals
- Damage of the valve protecting device as well as functional issues
- Damage of the rotation preventing device as well as functional issues
- Excessive wear and tear of the intumescent material
- Damage to any welding seams like cracks, holes, excessive corrosion
- Excessive damage of the handling devices
- Excessive damage of the silicon pads

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5.4 Functional Tests

Before using the DN30 PSP for the transport of a 30B-X cylinder, the following functional tests have to be carried out to ensure proper functionality of all movable parts:

- The pin of the closure device can be inserted and extracted by hand
- The securing bolt of each closure device can be turned by hand
- Turning the handle of the rotation preventing devices traverses the pin
- The valve protecting device can easily be rotated around the hinges

5.5 Deviations

Test instruction 0023-PA-2015-015 contains in detail the criteria and measures in case of deviations during the visual inspections and functional tests. Measures could comprise cleaning, replacement of parts, minor repairs (on site) and major repairs (to be carried out by the license holder or an authorized repair shop qualified for such repairs).

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6 Handling Procedure: Loading of a 30B-X Cylinder

For loading the DN30 PSP with a 30B-X cylinder, the following handling steps have to be strictly complied with.

Step	Explanation	Illustration
L.1	The DN30 PSP is locked and empty.	
L.2	Visual inspections	• At the reception of the DN30 PSP: check the general conditions (damaging, soiling, dirt, …) • Check the presence of the 6 pins locking the corresponding closure devices • Check the presence of the seals (2 in total) • Check the liftings lugs (2 at the top half, 4 at the bottom half): no deformation that can interfere with the handling • Check the markings of the DN30 PSP (inspection date, …)

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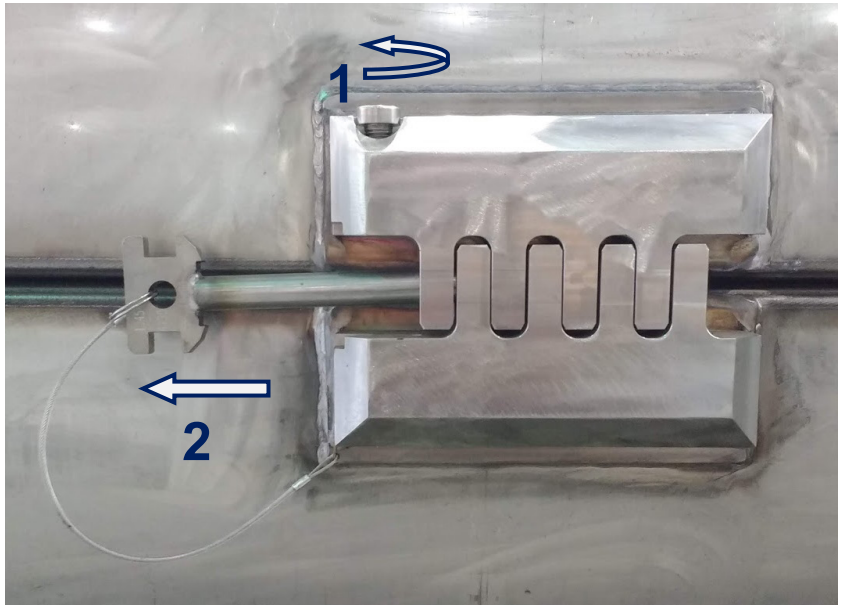
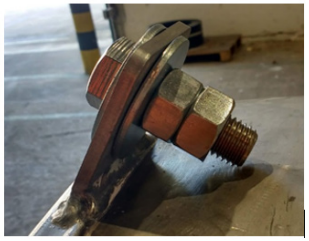
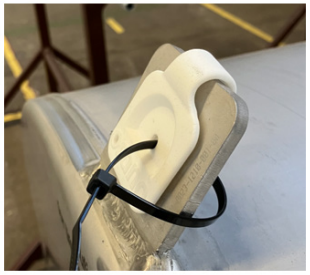
Step	Explanation	Illustration
L.3	For each closure device (6 in total): 1. Unlock the securing bolt, using a calibrated torque wrench for hexagon socket screws with center per [DIN 6911] (the securing bolt cannot be completely removed) 2. Withdraw the pin Remove the seals (if any).	
L.4	Remove the blocking piece(s) from the holes in the two top half lifting lugs, which were intended to render the lifting lugs incapable of being used during transport.	 Example with a bolt including two nuts  Example with a clamp and cable binder

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Step	Explanation	Illustration
L.5	Attach shackles (or other adequate lifting means) to each of the two lifting lugs at the top half of the DN30 PSP. The lifting capacity of the slings and shackles has to be at least 500 kg each. The angle between the slings has to be 60° ± 10° (see also section 5.1.2). <u>Note:</u> The shorter sling should be attached to the lifting lug on the valve side (red arrows and no nameplate).	
L.6	Check that all 6 pins have been removed. Slowly and carefully lift (take off) the top half. Special care has to be taken to prevent swinging of the top half that could cause damage to the DN30 PSP.	

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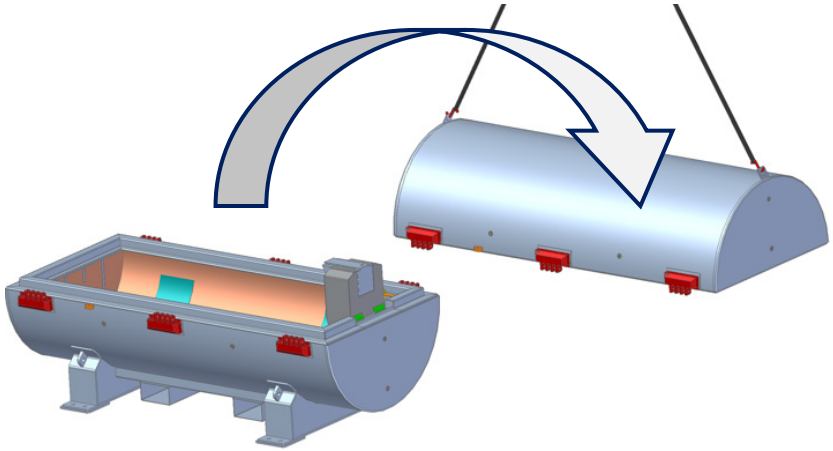
Step	Explanation	Illustration
L.7	Temporarily, put down the top half next to the bottom half.	
L.8	Visual inspections and functional tests <u>Caution: Do not work under suspended load.</u> To check the gasket and the intumescent material inside the top half, the top half may be placed on a rack or may be turned upside-down.	• Ensure that there is no free water inside the cavity • Check the presence and proper functioning of the rotation preventing devices (see also L.9) • Check the presence and proper functioning of the valve protecting device (see also L.10) • Check the state and presence of the silicon pads (2 in total) in the bottom half • Check the state and presence of the gasket in the top half • Check the state and presence of the intumescent material and its proper attachment (bottom and top half) • Check the state and presence of all thermal plugs/valves except the bottom one (17 in total)

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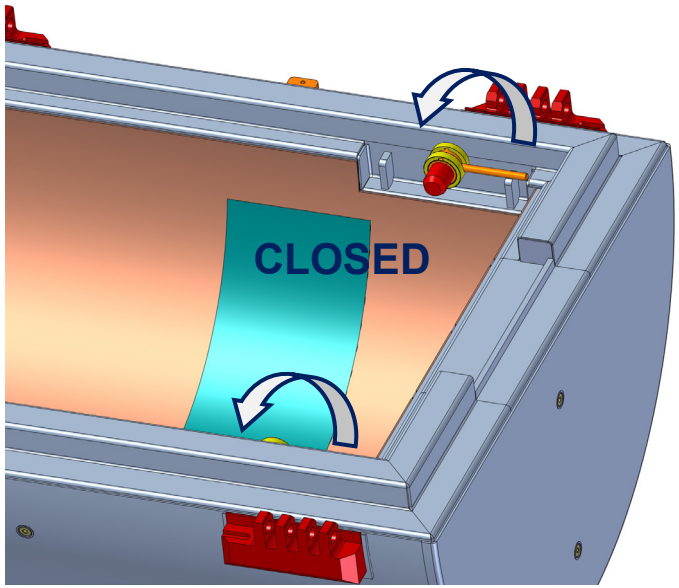
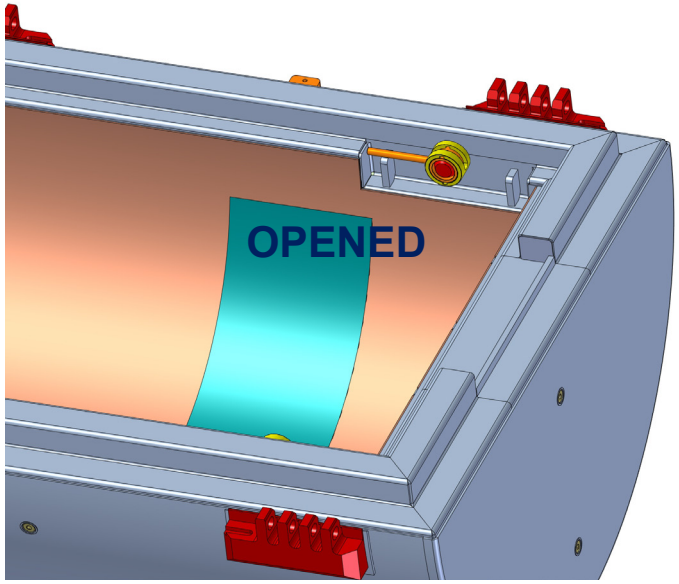
L.9	Turn the handles of the rotation preventing devices (2 in total) into their opened position. <u>Note:</u> The pins of the rotation preventing devices should not be sticking out of the DN30 PSP bottom half.	 

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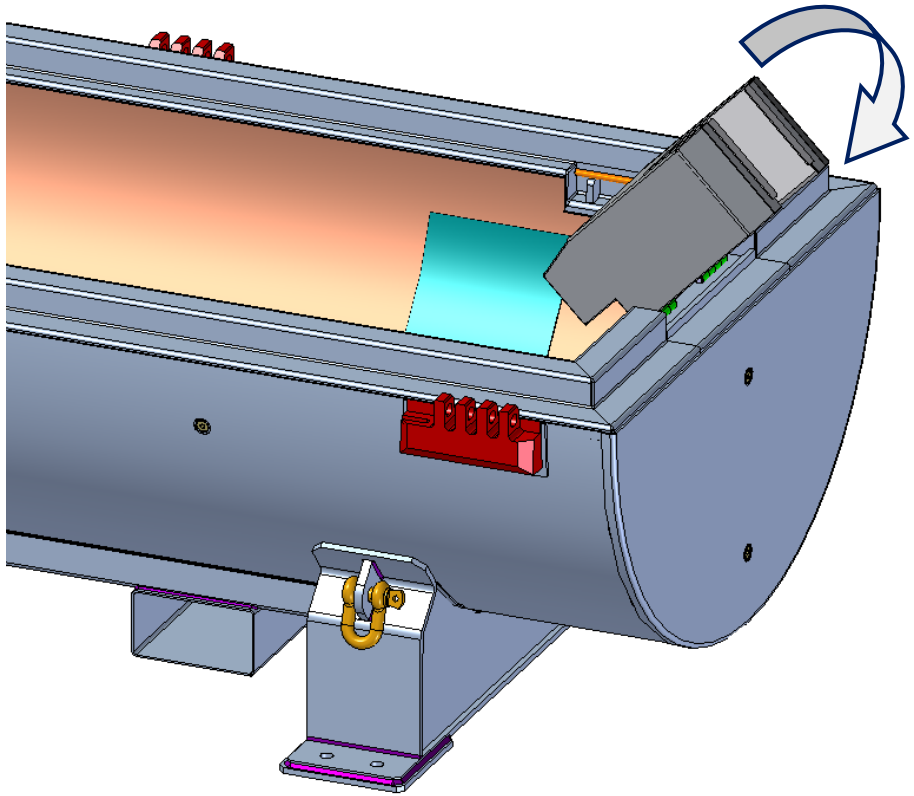
Step	Explanation	Illustration
L.10	Tilt back the valve protecting device to its horizontal position.	

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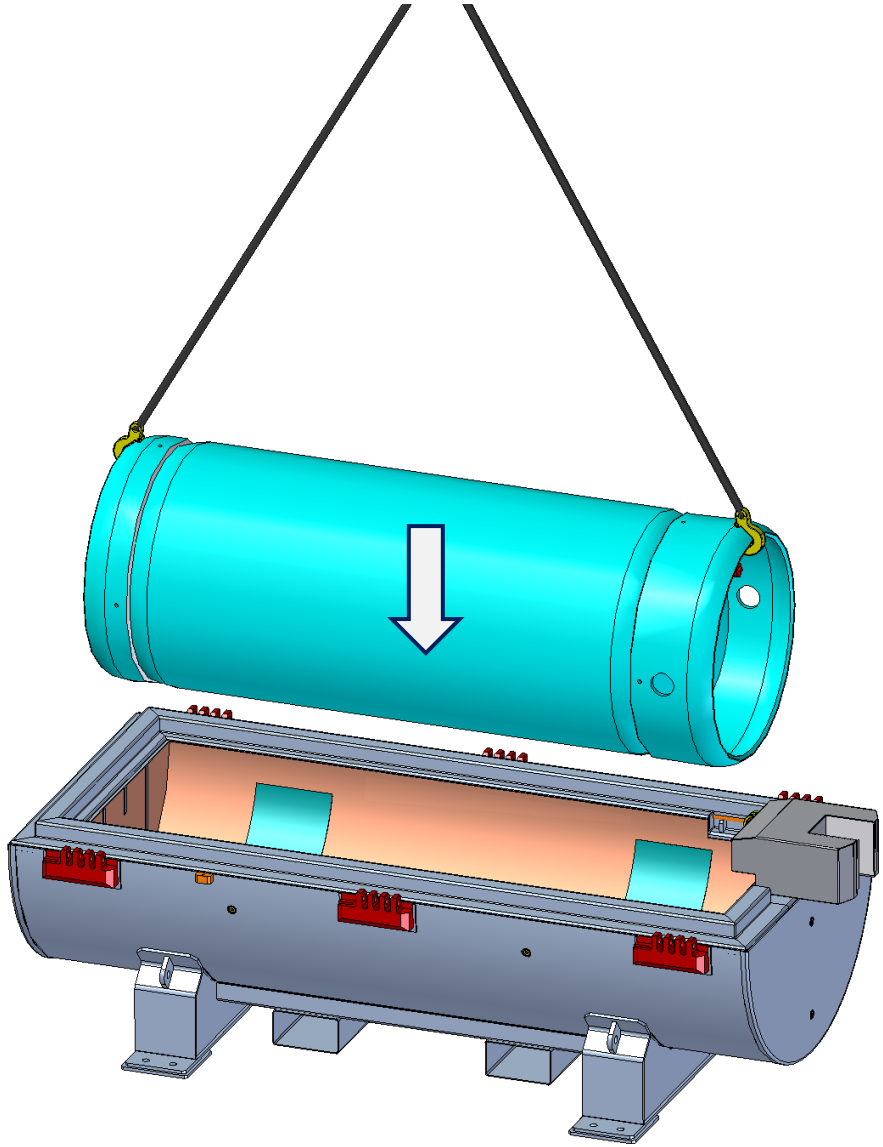
Step	Explanation	Illustration
L.11*	Carefully lower the 30B-X cylinder (in a horizontal position) towards the DN30 PSP. Pay attention to the orientation of the 30B-X cylinder: • The valve of the 30B-X cylinder coincides with the valve protecting device of the DN30 PSP. • The 30B-X cylinder has to be loaded with its valve in 12 o'clock position. Otherwise, the rotation preventing devices will not fit into the corresponding holes in the 30B-X cylinder skirt.	

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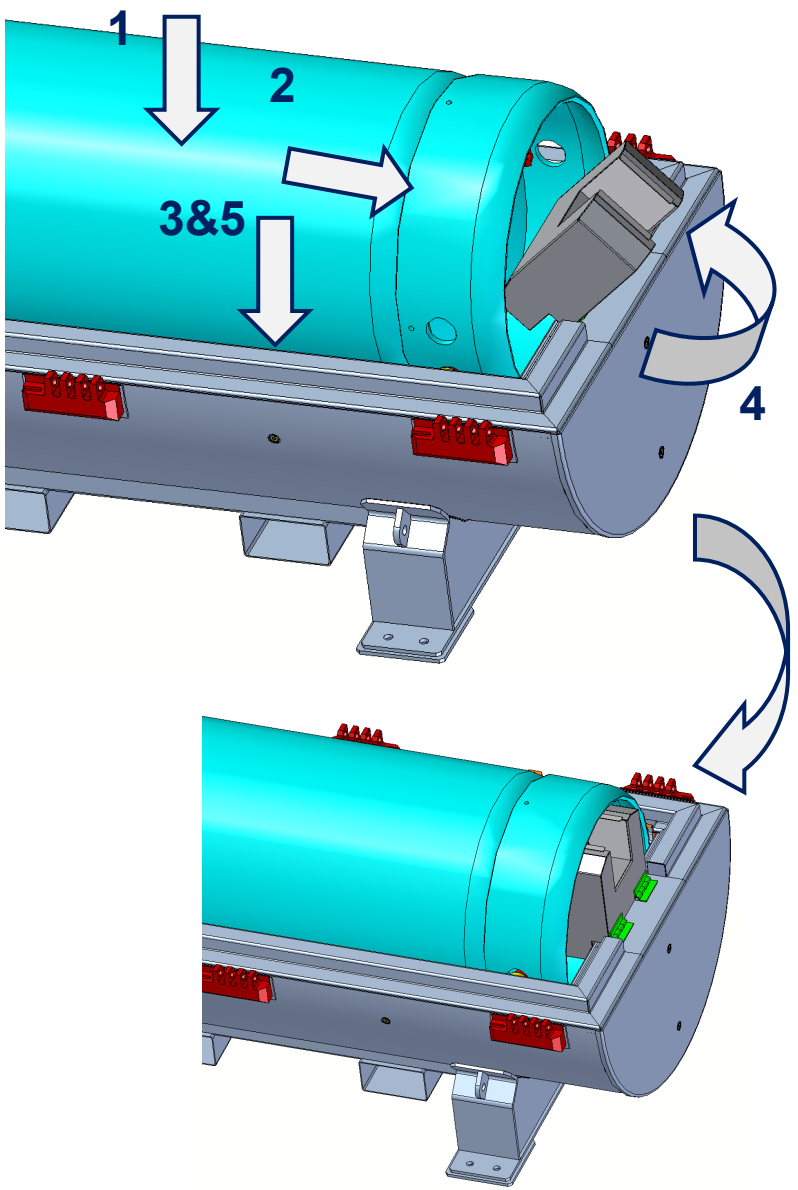
L.12*	When the 30B-X cylinder is near the bottom half of the DN30 PSP, the following points must be observed to avoid a collision: • Lower the 30B-X cylinder carefully into the bottom half until the bottom line of the 30B-X cylinder is just below the valve protecting device (1). • Move the 30B-X cylinder approximately 2 cm in the axial direction towards the valve side (2) to fit inside the bottom half of the DN30 PSP. • Continue lowering the 30B-X cylinder carefully inside the bottom half (3). • When the 30B-X cylinder is located in the middle of the bottom half, tilt back the valve protecting device by 90° (4). • Continue lowering the 30B-X cylinder until it reaches the bottom of the bottom half (5). Note: Avoid any contact between the valve protecting device and the valve of the 30B-X cylinder.	

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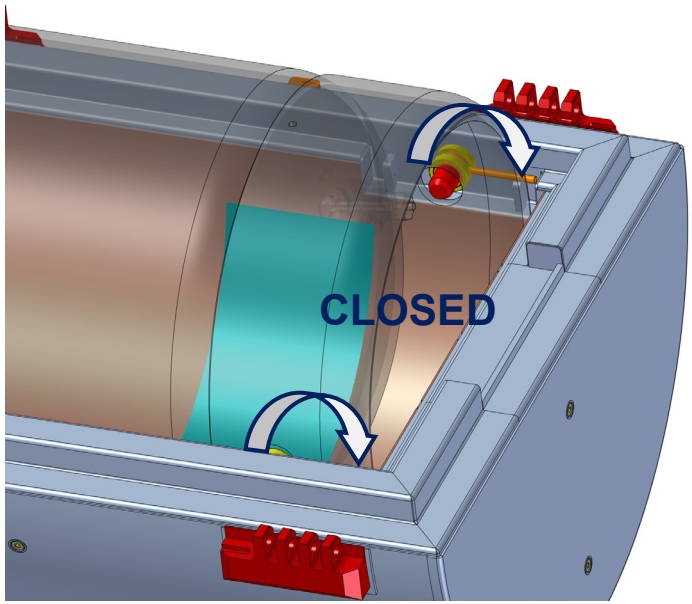
Step	Explanation	Illustration
L.13	Turn the handles of the rotation preventing devices (2 in total) into their closed position. The pins of the rotation preventing devices have to be inserted into the corresponding holes in the 30B-X cylinder skirt. Afterwards, the handles have to be in horizontal position towards the valve side.	

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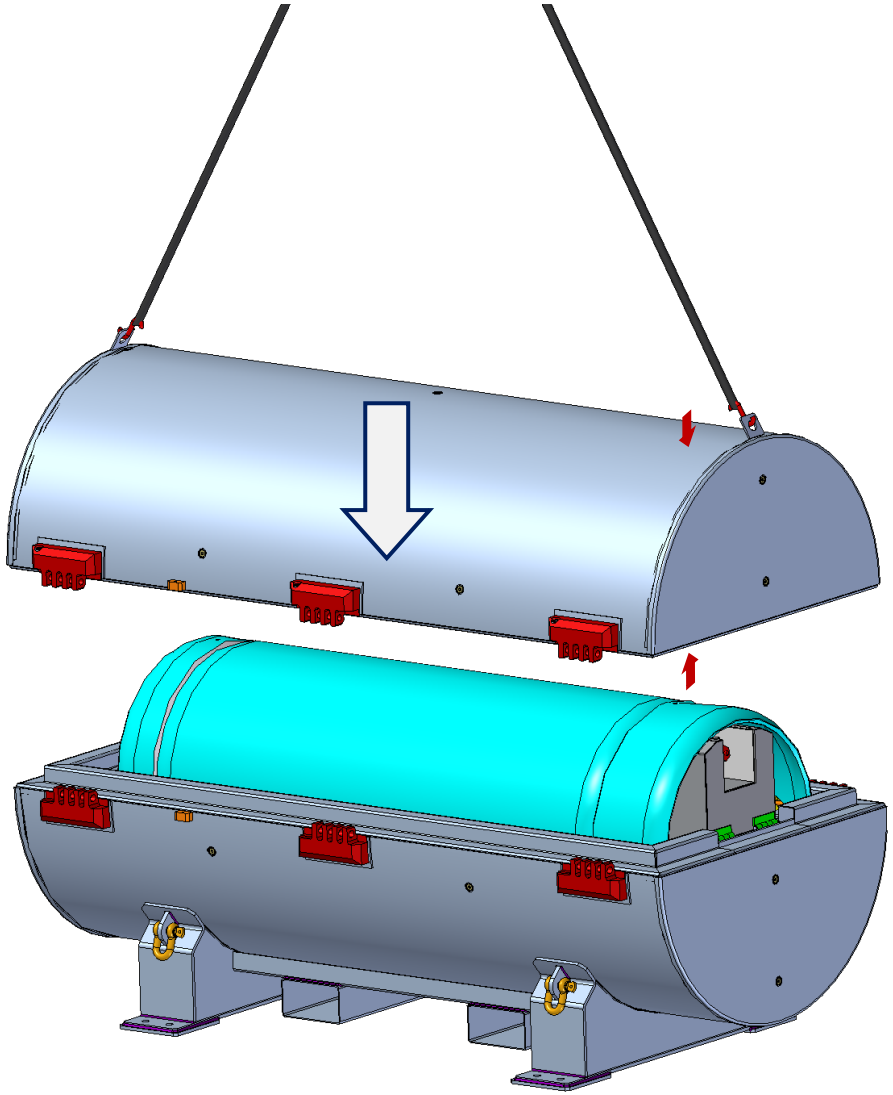
Step	Explanation	Illustration
L.14	Attach shackles (or other adequate lifting means) to each of the two lifting lugs of the top half of the DN30 PSP. <u>Note:</u> Ensure that the identification numbers on the bottom and top half of the DN30 PSP match. The lifting capacity of the slings and shackles has to be at least 500 kg each. The angle between the slings has to be 60° ± 10° (see also section 5.1.2). Lift the top half onto the bottom half. The markings (▲▼) on the top and bottom half have to be aligned and of the same color.	

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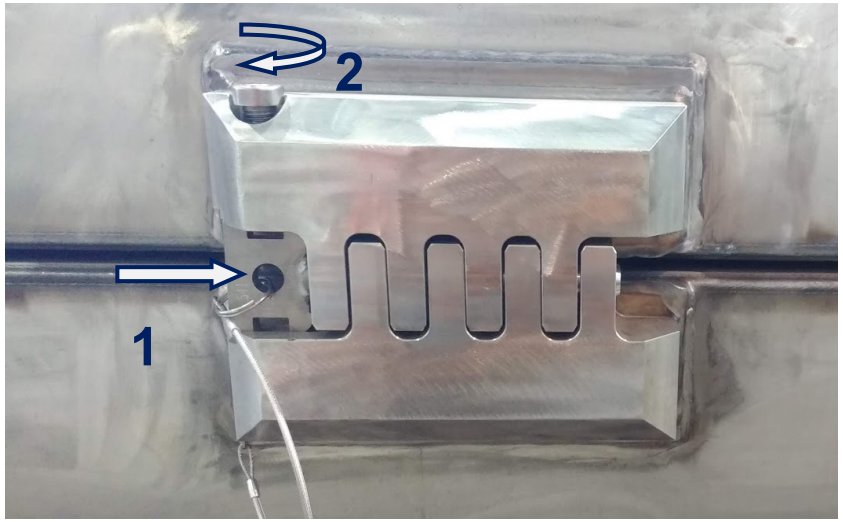
Step	Explanation	Illustration
L.15	Insert the six pins (1) into the corresponding closure devices. Secure the six pins with the corresponding securing bolts (2): • Use a calibrated torque wrench for hexagon socket screws with center per [DIN 6911]. • Apply a tightening torque of 150 Nm to each securing bolt. • Retighten each securing bolt with 150 Nm.	
L.16	Attach the two seals on both sides of the top and bottom half of the DN30 PSP.	

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Step	Explanation	Illustration
L.17	Return the blocking piece(s) onto the holes of the two top half lifting lugs to render them incapable of being used during transport.	 Example with a bolt including two nuts  Example with a clamp and cable binder
L.18	Final checks	• Check the presence of the 6 pins that lock the corresponding closure devices • Ensure that the securing bolts are locked with the intended tightening torque (e.g., by applying the torque retightening test method) • Check the presence of the 2 seals • Check that the markings of the DN30 PSP correspond to the transport documents
L.19	Contamination and dose rate measurement	• Prior to transport, carry out the measurements prescribed in test instruction 0045-PA-2021-002
L.20	Determination of Transport Index (TI)	• From the maximal dose rate in 1 m distance from the package measured in L.19, determine the TI.

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* To facilitate loading in one vertical loading step it is recommended to use the loading-aid shown in Figure 11 for steps L.11 and L.12 in the following manner:

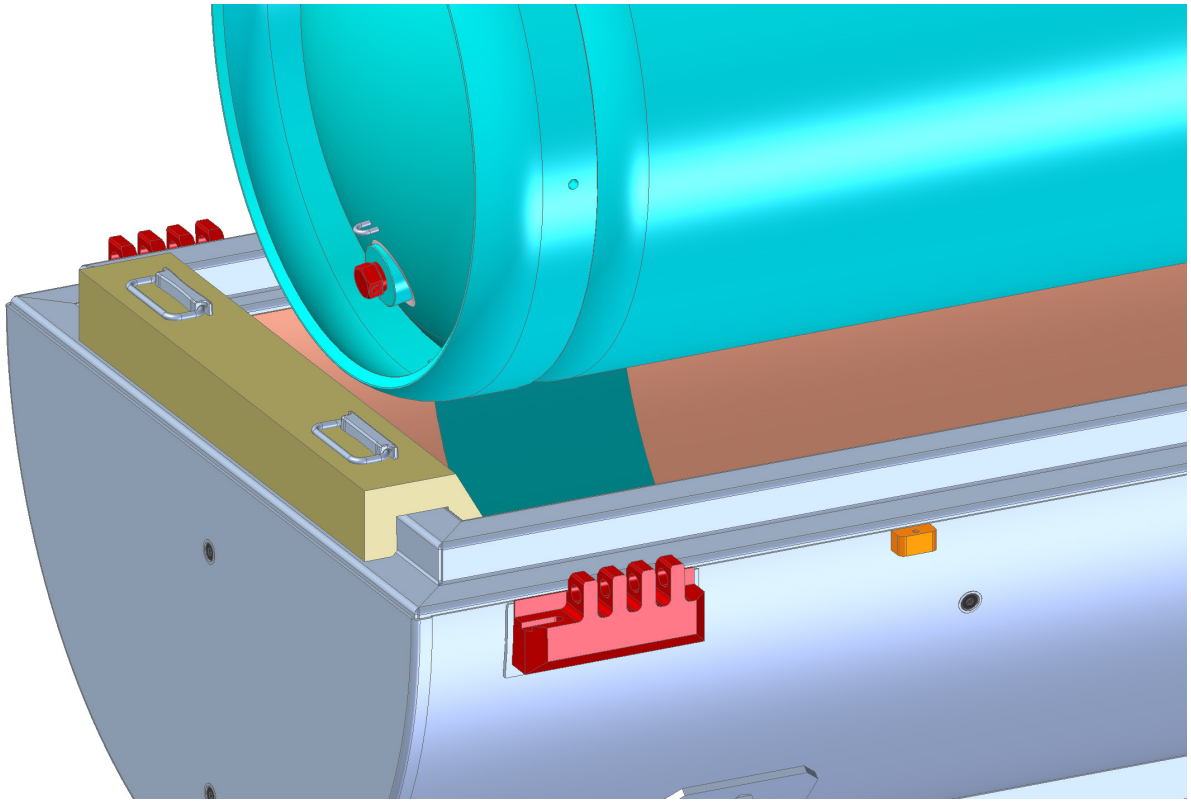

Figure 11: Use of the loading-aid

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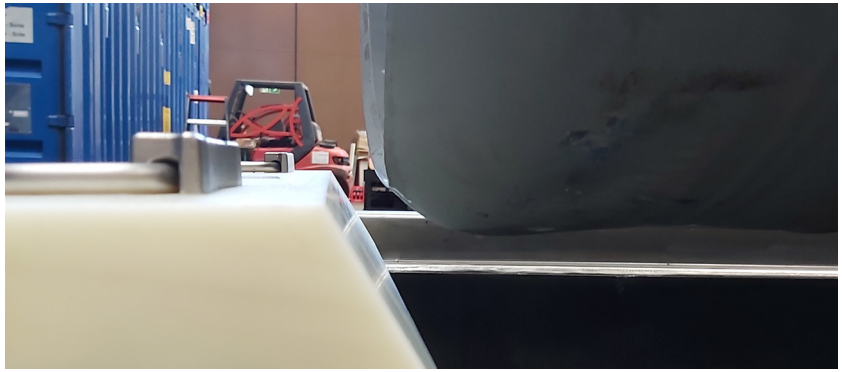
Position the loading-aid on the profile on the plug side of the bottom half of the DN30 PSP, with the inclined side facing inwards.	
Align the end of the 30B-X cylinder skirt with the top of the loading-aid.	
Slowly lower the 30B-X cylinder inside the bottom half of the DN30 PSP. The cylinder will automatically move towards the valve side after passing the valve protecting device.	

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Continue lowering the 30B-X cylinder until it is completely inside the bottom half of the DN30 PSP (don’t forget to tilt back the valve protecting device as usual).	
Remove the loading-aid.	

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7 Handling Procedure: Unloading of a 30B-X Cylinder

For unloading a 30B-X cylinder from a DN30 PSP, the following handling steps have to be strictly complied with.

Step	Explanation	Illustration
U.1	The DN30 PSP is locked and loaded.	
U.2	Check of general condition	• At the reception of the DN30 PSP: check the general conditions (damaging, soiling, dirt, …) • Check the presence of the 6 pins locking the corresponding closure devices • Check the presence and condition of the seals (2 in total) • Check the liftings lugs (2 at the top half, 4 at the bottom half): no deformation that can interfere with the handling • Check the marking of the DN30 PSP (inspection date, …)

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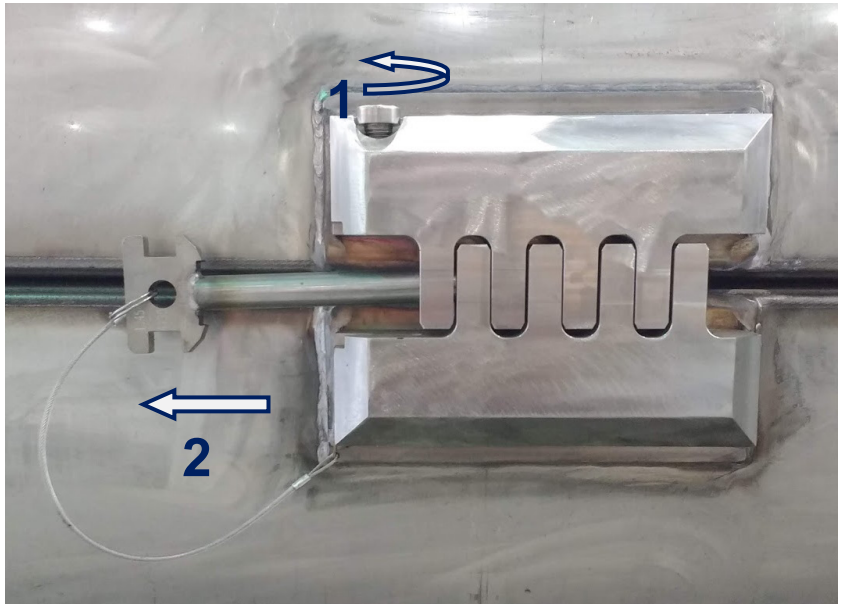
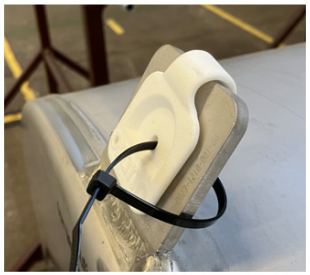
Step	Explanation	Illustration
U.3	For each closure device (6 in total): 1. Unlock the securing bolt, using a calibrated torque wrench for hexagon socket screws with center per [DIN 6911] (the securing bolt cannot be completely removed) 2. Withdraw the pin Remove the seals (if any).	
U.4	Remove the blocking piece(s) from the holes in the two top half lifting lugs, which were intended to render the lifting lugs incapable of being used during transport.	 Example with a bolt including two nuts  Example with a clamp and cable binder

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Step	Explanation	Illustration
U.5	Attach shackles (or other adequate lifting means) to each of the two lifting lugs at the top half of the DN30 PSP. The lifting capacity of the slings and shackles has to be at least 500 kg each. The angle between the slings has to be 60° ± 10° (see also section 5.1.2). <u>Note:</u> The shorter sling should be attached to the lifting lug on the valve side (red arrows and no nameplate).	
U.6	Check that all 6 pins have been removed. Slowly and carefully lift (take off) the top half. Special care has to be taken to prevent swinging of the top half that could cause damage to the DN30 PSP.	

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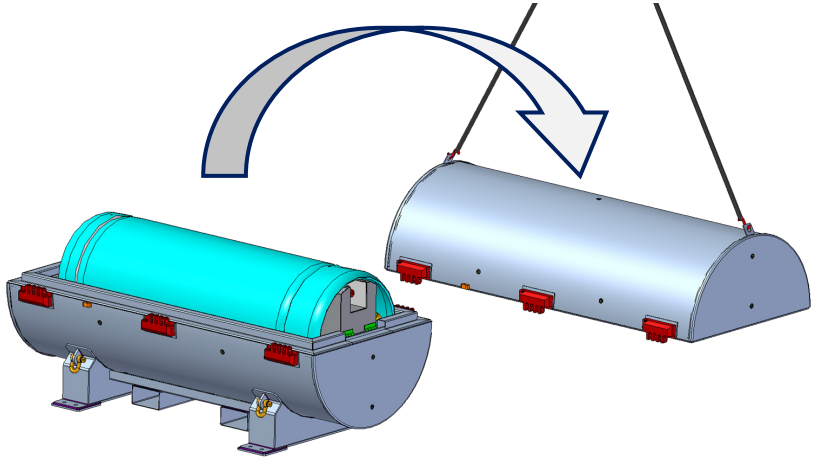
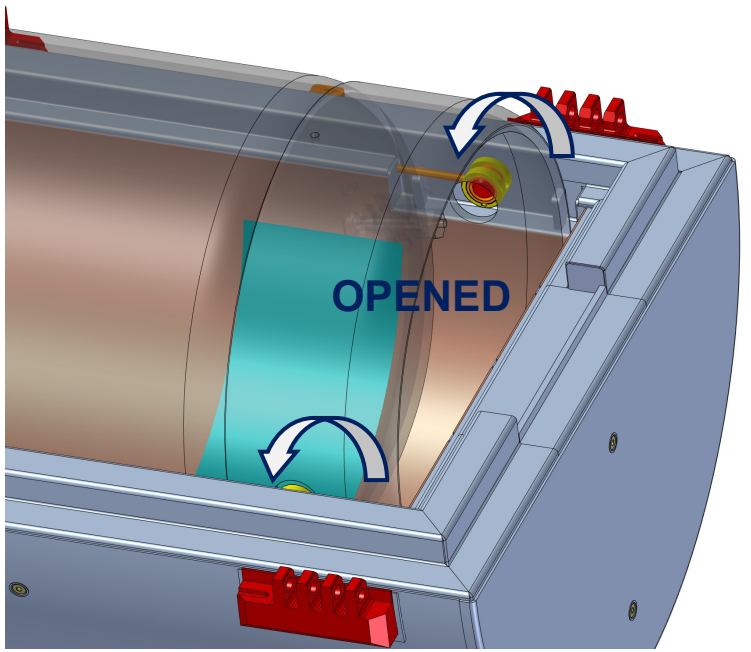
Step	Explanation	Illustration
U.7	Temporarily, put down the top half next to the bottom half.	
U.8	Turn the handles of the rotation preventing devices (2 in total) into their opened position. <u>Note:</u> The pins of the rotation preventing devices should not be sticking out of the DN30 PSP bottom half.	

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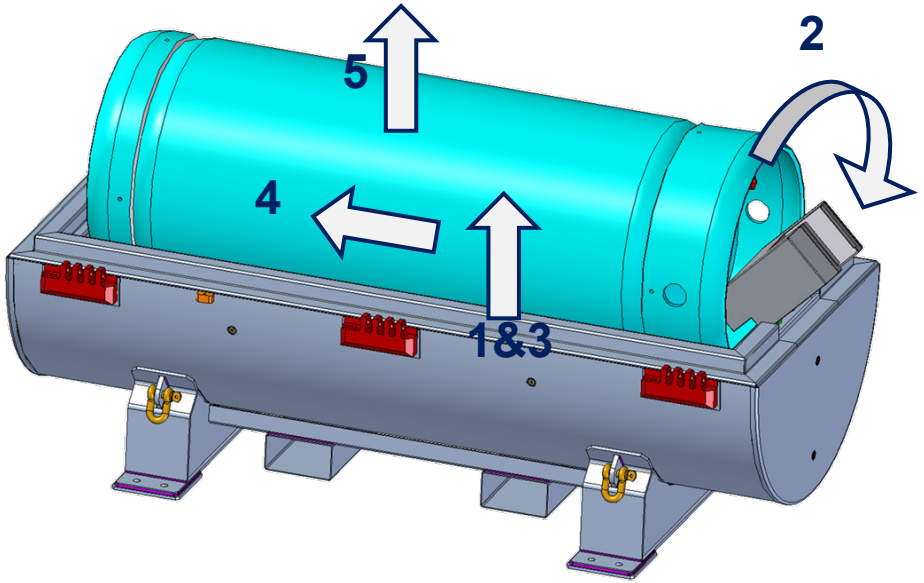
Step	Explanation	Illustration
U.9	For removing the 30B-X cylinder from the bottom half of the DN30 PSP, the following points must be observed to avoid a collision: • Carefully lift the loaded 30B-X cylinder a few centimeters out of the bottom half (1). • Tilt back the valve protecting device by 90° (2). • Continue lifting the 30B-X cylinder carefully out of the bottom half (3). • When the bottom line of the 30B-X cylinder is just below the valve protecting device, move the cylinder approx. 2 cm in the axial direction towards the plug side (4). • Remove the 30B-X cylinder completely (5).	

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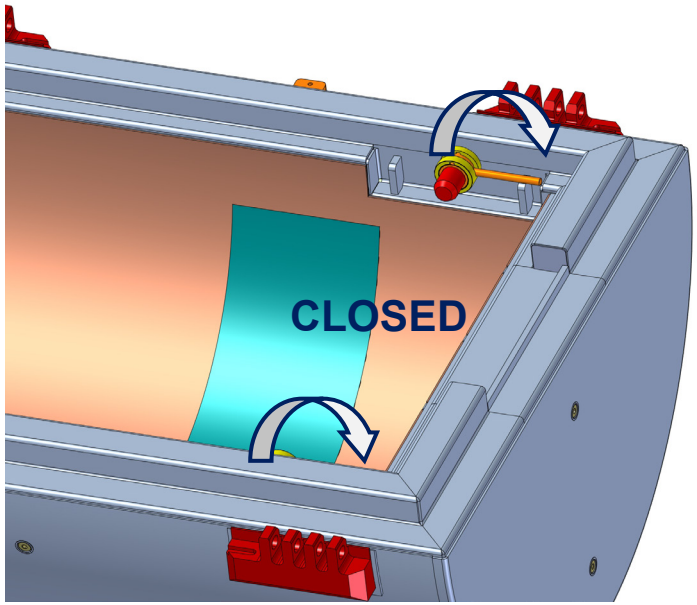
Step	Explanation	Illustration
U.10	Turn the rotation preventing devices (2 in total) into their closed position.	

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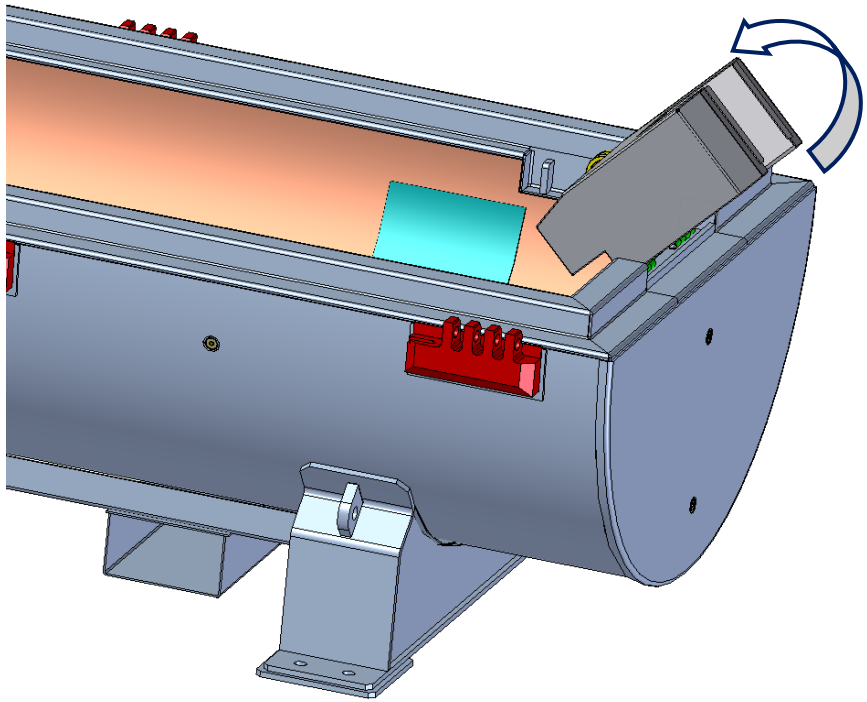
Step	Explanation	Illustration
U.11	Return the valve protecting device from its horizontal to its vertical closed position.	

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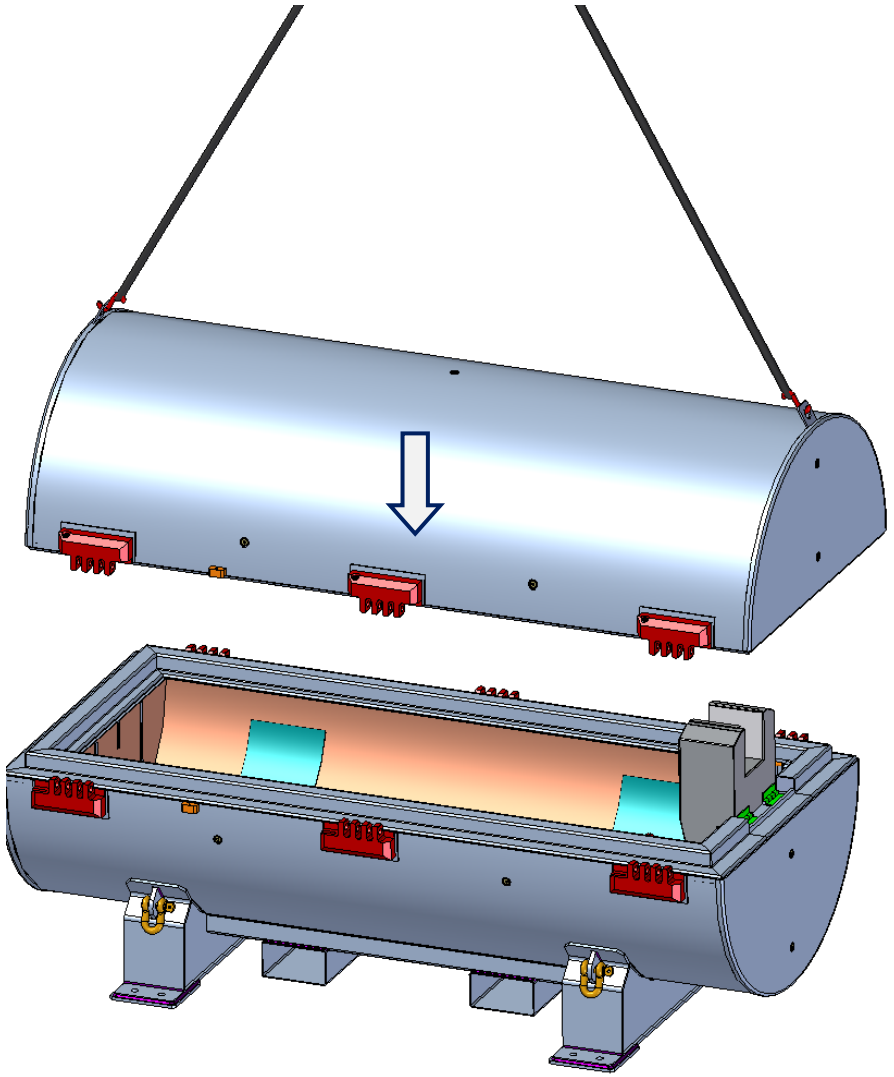
Step	Explanation	Illustration
U.12	Attach shackles (or other adequate lifting means) to each of the two lifting lugs of the top half of the DN30 PSP. Note: Ensure that the identification numbers on the bottom and top half of the DN30 PSP match. The lifting capacity of the slings and shackles has to be at least 500 kg each. The angle between the slings has to be 60° ± 10° (see also section 5.1.2). Lift the top half onto the bottom half. The markings (▲▼) on the top and bottom half have to be aligned and of the same color.	

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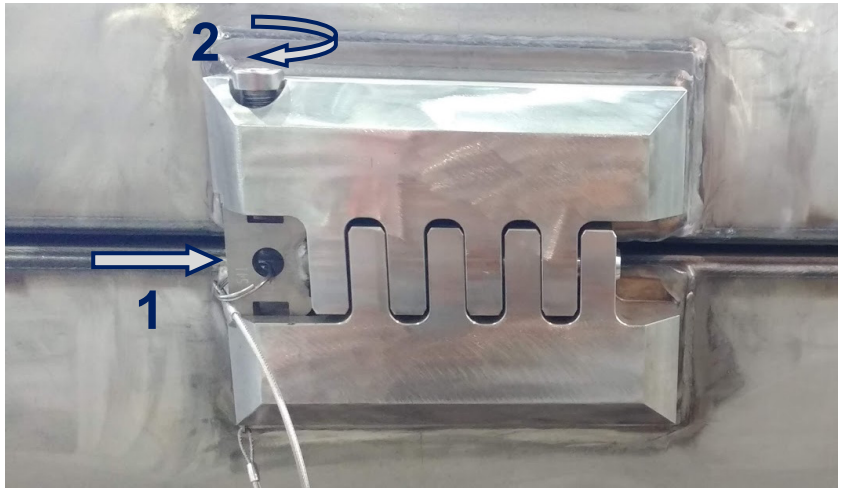
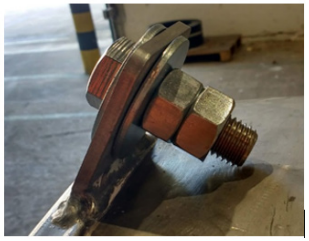
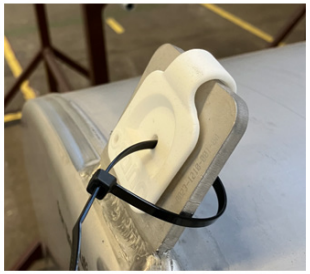
Step	Explanation	Illustration
U.13	Insert the six pins (1) into the corresponding closure devices. Secure the six pins with the corresponding securing bolts (2): • Use a calibrated torque wrench for hexagon socket screws with center per [DIN 6911]. • Apply a tightening torque of 150 Nm to each securing bolt. • Retighten each securing bolt with150 Nm.	
U.14	Return the blocking piece(s) onto the holes of the two top half lifting lugs to render them incapable of being used during transport.	 Example with a bolt including two nuts  Example with a clamp and cable binder

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Step	Explanation	Illustration
U.15	Final checks	• Check the presence of the 6 pins locking the corresponding closure devices • Ensure that the securing bolts are locked with the intended tightening torque (e.g., by applying the torque retightening test method)

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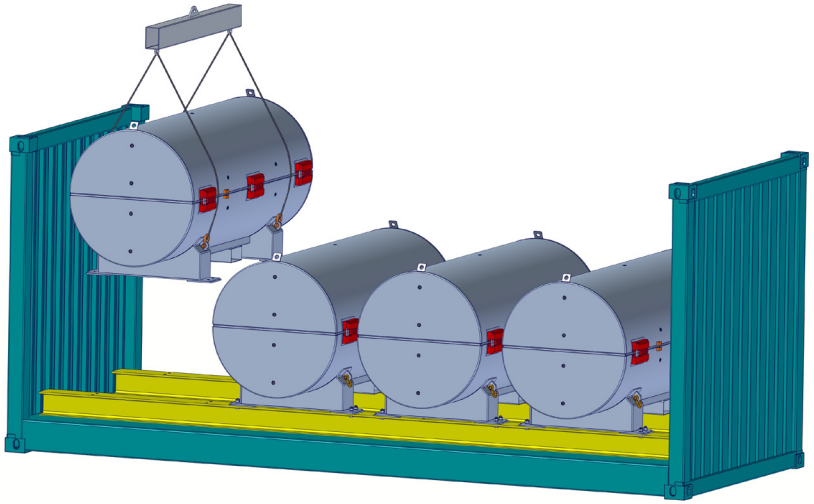
8 Handling Procedure: Fastening on a Transport Vehicle

8.1 Flatrack Transportation

For fastening loaded or empty DN30 PSPs on a dedicated flatrack, the following steps have to be strictly complied with.

Step	Explanation	Illustration
T.1	Visually inspect the DN30 PSP for damage and make sure all 6 securing bolts are inserted as well as locked and that the seals are properly set up.	
T.2	Lift the empty or loaded DN30 PSP, e.g., by means of a crane and bring it into position on the transport container. Handling of the empty or loaded DN30 PSPs shall be performed as described in section 5.1.1. Place the empty or loaded DN30 PSP on the H Section steel of the transport container such that the drilled holes in the base feet of the DN30 PSP and the holes in the H Section steel match as accurately as possible.	

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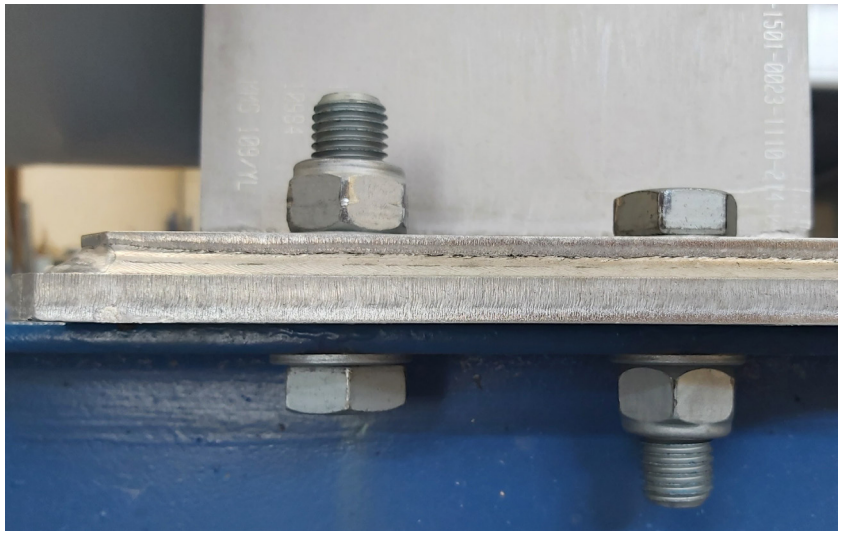
Step	Explanation	Illustration
T.3	Each base foot is fitted with two holes. To fix the DN30 PSP on the H-Section steel of the transport container, 8 bolts are required. The following combination of bolts, washers, and nuts are permissible: **a) M18 bolts** • 1 x hexagon head screw ISO 4017 – M18x70 – 10.9 – zinc flake coating • 2 x washers ISO 7089 – 18 – 300 HV – zinc flake coating • 1 x hexagon nut ISO 7042 – M18 – 10 – zinc flake coating **b) M20 bolts** • 1 x hexagon head screw ISO 4017 – M20x70 – 10.9 – zinc flake coating • 2 x washers ISO 7089 – 20 – 300 HV – zinc flake coating • 1 x hexagon nut ISO 7042 – M20 – 10 – zinc flake coating As lubricants, MoS_2, graphite or wax dispersions have to be used. Two assembly orders may be used: 1. Nut, washer, base foot plate, H-section, washer and screw. 2. Screw, washer, base foot plate, H-section, washer and nut. Torque controlled tightening with a torque wrench, a signaling wrench or a motorized nut runner with a dynamic torque measurement has to be used to tighten the bolts. The target tightening torque has to be: **a) M18 bolts: 265 Nm** **b) M20 bolts: 289 Nm**	 

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8.2 Other Transportation Configurations

Other transport configurations, for example empty DN30 PSPs loaded on a truck trailer, require an appropriate and valid tie-down plan.

The DN30 PSPs should be secured with straps or other means, as long as these cannot cause damage to the DN30 PSP.

8.3 Special Requirement for Transport by Rail

For transport by rail, label No. 15 from [RID] will be visibly affixed to the wagons used for the transport of loaded DN30 PSPs to forbid hump shunting.

References

[ANSI N14.1] ANSI N14.1-2023, “Uranium Hexafluoride – Packaging for Transport”, May 18, 2023

[ANSI N14.5] ANSI N14.5-2022, “Radioactive Materials – Leakage Tests on Packages for Shipment”, 2022

[DIN 6911] DIN 6911:2019-10, “Hexagon socket screw keys with pilot”, October 2019

[DIN EN ISO 9712] DIN EN ISO 9712:2022-09, “Non-destructive testing – Qualification and certification of NDT personnel”, September 2022

[ISO 7195] ISO 7195:2020-11, “Nuclear Energy – Packagings for the transport of uranium hexafluoride (UF_6)”, Third edition, November 2020

[ISO 12807] ISO 12807:2018-09, “Safe transport of radioactive materials – Leakage testing on packages”, September 2018

[RID] Règlement concernant le transport international ferroviaire de marchandises Dangereuses (RID) as applicable from 1. January 2025

[USEC-651] USEC-651, “The UF_6 Manual – Good Handling Practices for Uranium Hexafluoride”, Rev. 10, Centrus Energy Corp., 2017

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