

## Test Instruction

# Inspection Criteria for Regular and Periodical Inspections of the DN30 Package

0023-PA-2015-016-Rev3

Prepared	Checked	Released
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## MODIFICATIONS

Revision	Date of revision	Modifications
0	01.12.2016	Original
1	29.09.2017	Numbering of chapters Additions to chapter 9 Combination of chapters 11 and 12 into chapter 10 Modifications to chapter 11
2	29.10.2018	Modifications to chapter 4 and 11
3	18.07.2019	<ul style="list-style-type: none"> <li>• Editorial changes</li> <li>• The term maintenance is no longer used. Regular and periodical inspections are used instead.</li> <li>• Attachment 1, which refers to the visual inspection of 30B cylinders with expired 5-year recertification, has been moved from 0023-PA-2015-015 to this test instruction.</li> <li>• The description of the DN30 PSP in chapter 4 has been reworked and made consistent with other instructions.</li> <li>• Chapter 6 has been supplemented with more specific requirements for each inspection and for certain tests to be performed during the inspections.</li> <li>• Chapter 7 "Visibility conditions" and chapter 8 "Equipment" have been removed from this test instruction. Both are already described in 0023-PA-2015-015.</li> <li>• Changes to the inspection criteria in chapter 9: <ul style="list-style-type: none"> <li>○ Details added for the nameplate and markings measures in case of non-conformances</li> <li>○ Added "cracks, cuts or holes" as non-conformances for the gasket</li> <li>○ Added inspection criteria for functional checks of the securing bolts</li> <li>○ Added deformations to non-conformances for the pins of the rotation prevention and closure devices, the hinges, the housing as well as all handling devices.</li> <li>○ Changed the part "General welding seams" to "Welding seams (as far as accessible)" because certain welding seams can only be tested during manufacturing of the DN30 PSP</li> <li>○ For dye penetrant tested welding seams, the non-conformances have been changed from "Holes, cracks" to "Indications as described in the test description"</li> <li>○ For all handling devices, a dye penetrant test has been added to the measures in case of non-conformances and repairs</li> </ul> </li> </ul>

## 1 OBJECTIVE AND SCOPE

These instructions describe the inspections to be performed during the regular and periodical inspections of the DN30 package and the applicable acceptance criteria. They describe the conditions for the inspections as well as the assessment of the results of the checks.

Furthermore, these instructions specify the measures in case of non-conformances.

## 2 PRIMARY DOCUMENTS

Primary documents are:

<b>Specification</b> <b>0023-SPZ-2016-001</b>	Manufacturing of the DN30 PSP
<b>Handling Instruction</b> <b>0023-HA-2015-001</b>	Use and handling of the DN30 package
<b>Test Instruction</b> <b>0023-PA-2015-015</b>	Periodical inspections of the DN30 PSP

## 3 FURTHER APPLICABLE DOCUMENTS

<b>DIN ISO 1502</b>	ISO general purpose metric screw threads – gauges and gauging
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## 4 DESCRIPTION OF THE DN30 PSP

The DN30 Protective Structural Packaging (PSP) is shown in Figure 1 to Figure 5. It consists of a bottom and a top half.

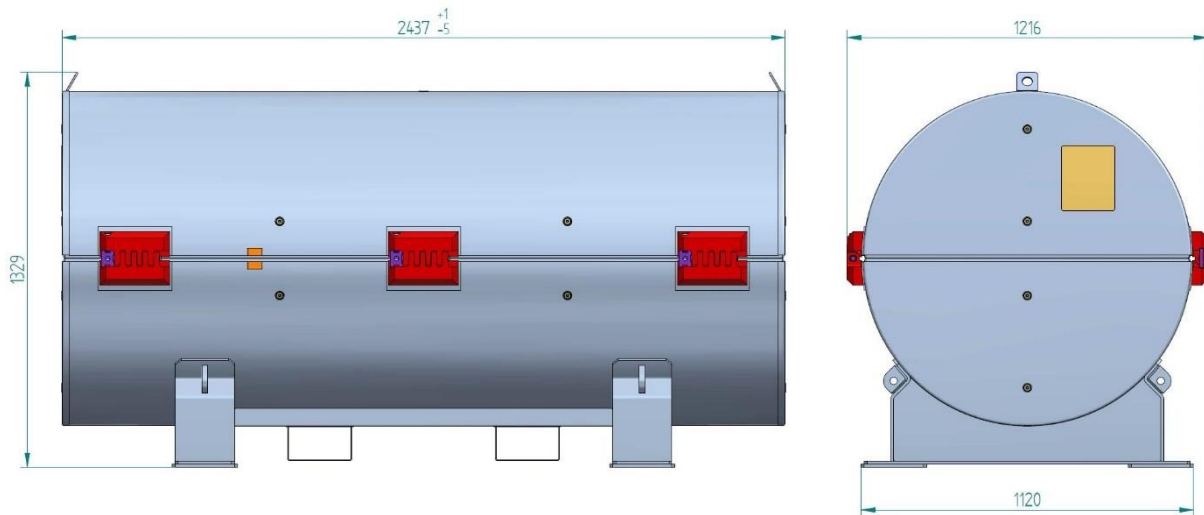
Lifting lugs at the feet as well as forklift pockets permit the safe handling of the DN30 package. The tie-down interfaces allow for safe stowing of the DN30 package and are compatible with existing PSP designs. The bottom half also includes a valve protecting device, a plug protecting device, two rotation 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 top half with integrated handling attachment points suitable for lifting the top half only also 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.

All surfaces of the inner shells of the bottom and 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.

The identification number of each DN30 PSP is engraved on the top and bottom part of each closure device. That way the top half of each DN30 PSP is uniquely associated to its 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.



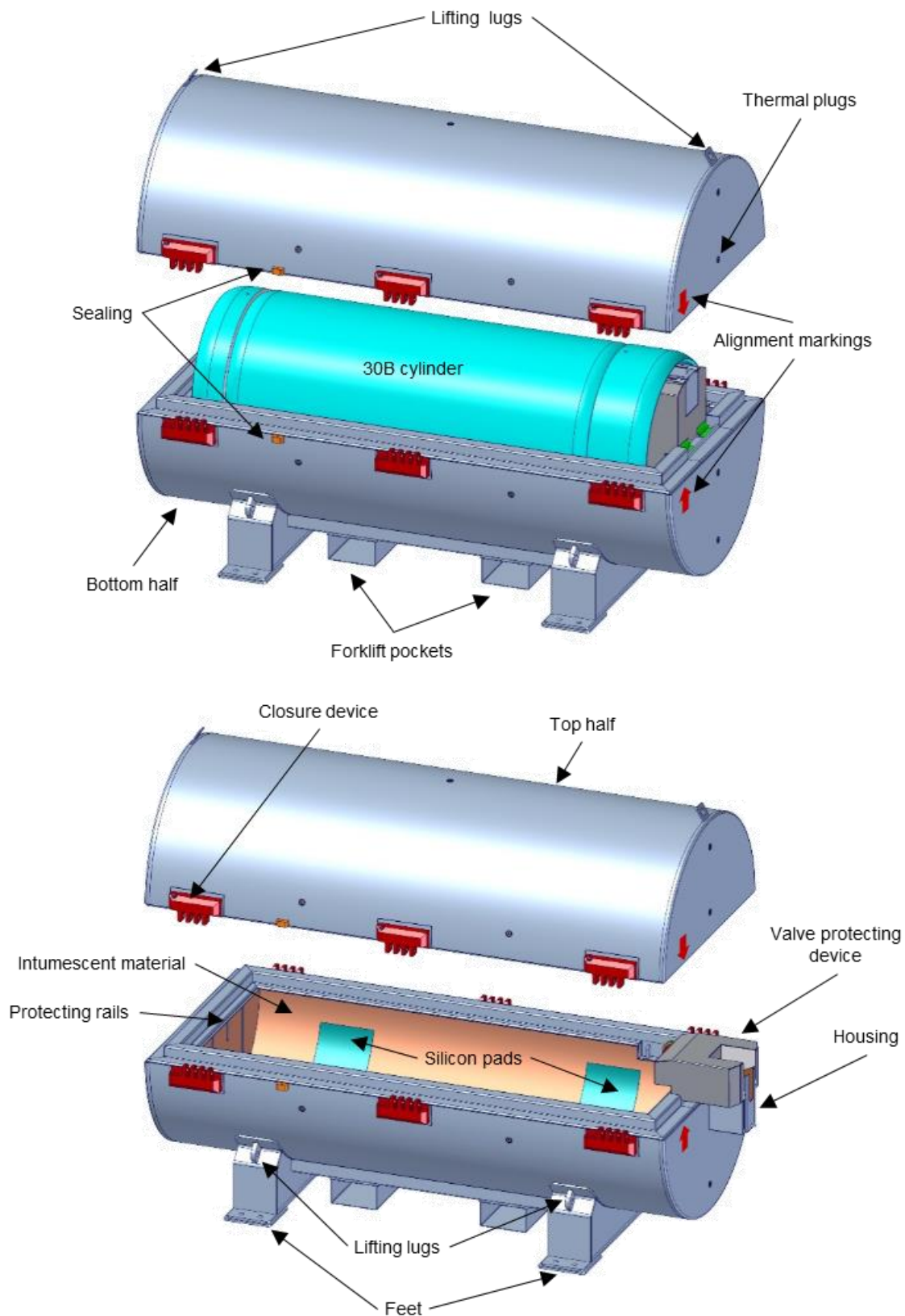
**Figure 1: DN30 PSP**

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

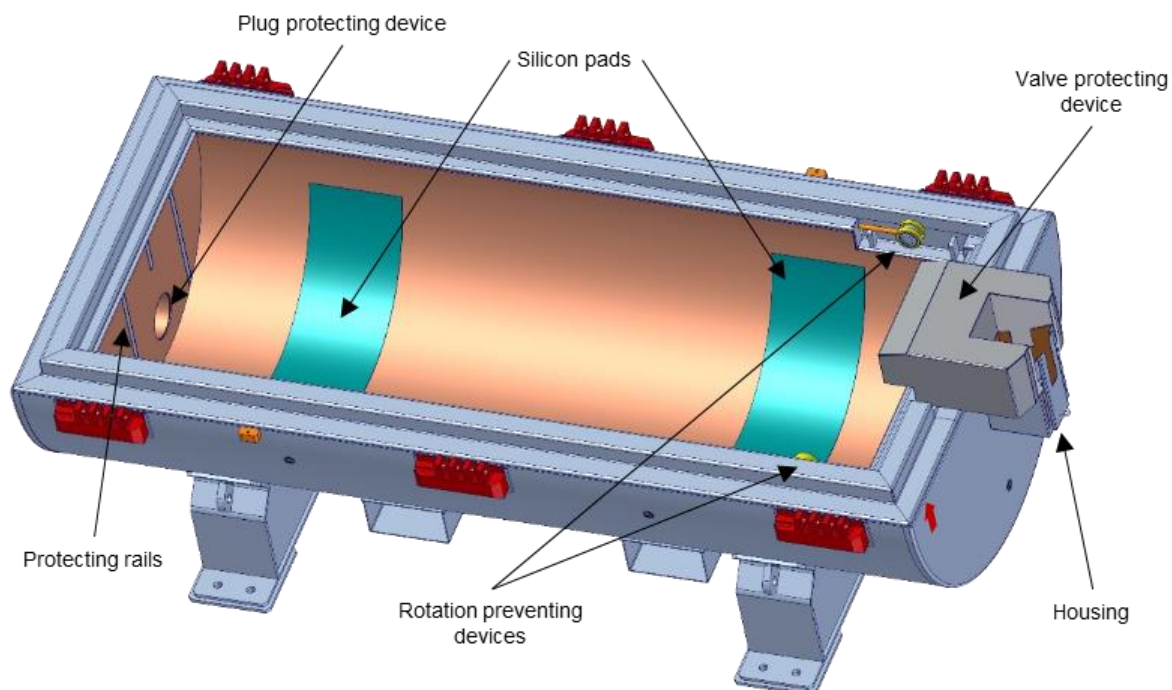
**Table 1: Main characteristics of the DN30 package**

<b><u>Masses* approx.:</u></b>	
Total DN30 PSP empty (nominal)	Ca. 1100 kg
Max. Gross weight package	Ca. 4100 kg
<b><u>Dimensions:</u></b>	
Length	2437 mm
Width	1216 mm
Height	1329 mm

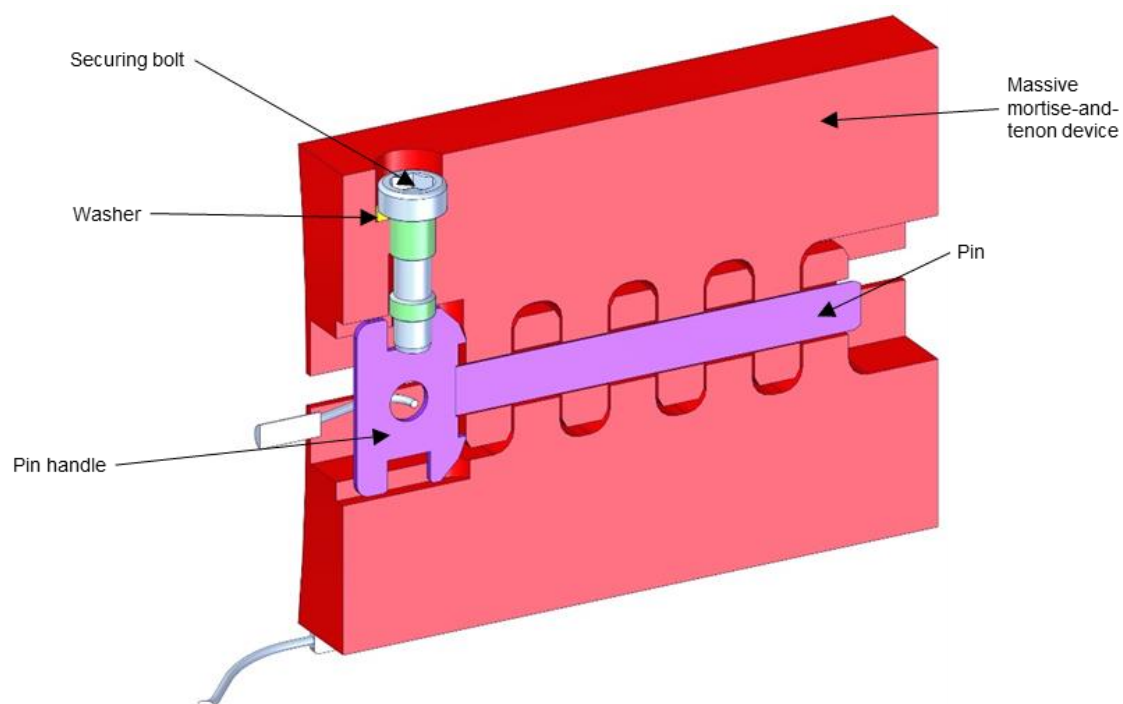
\*The actual weights of the units are stamped on the nameplate.



**Figure 2: The DN30 PSP and its main parts**

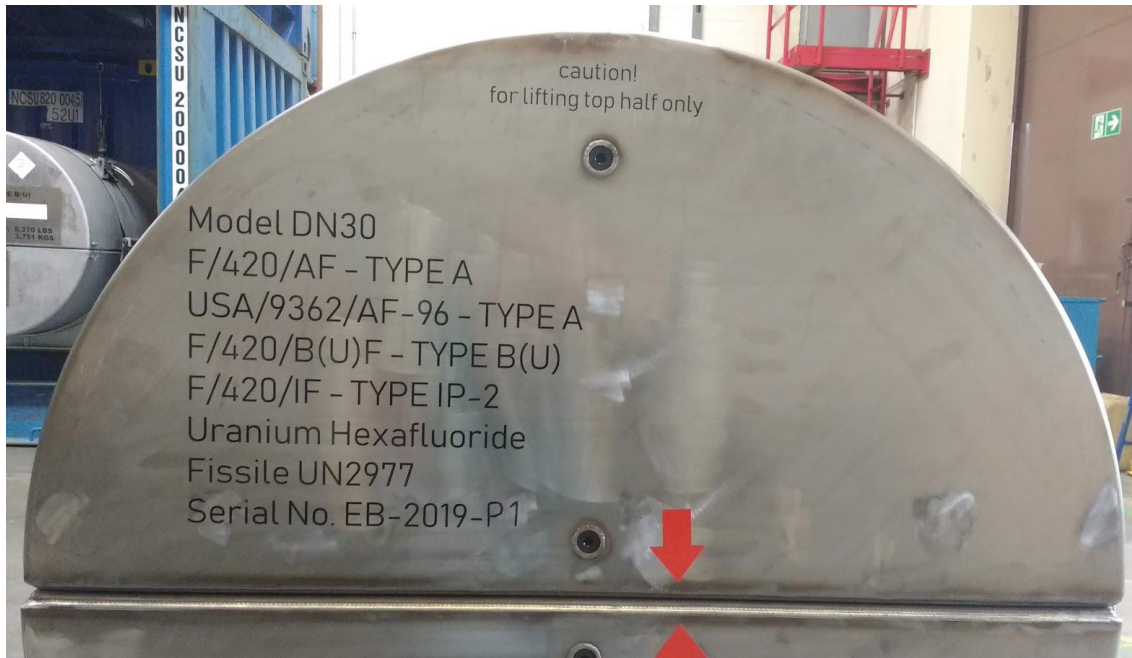


**Figure 3: Details of the bottom half**



**Figure 4: Detailed section illustration of the closure device**





**Figure 5: View of the DN30 PSP front face**

## **5 SCOPE AND TIME OF INSPECTION**

The scope and time of the inspections are defined in the primary documents.

## **6 QUALIFICATION OF PERSONNEL**

The personnel responsible for the periodical inspections have to be familiar with this test instruction, the handling instruction for the DN30 package and the test instruction for the periodical inspections of the DN30 PSP.

The responsible person for supervising the periodical inspections has to be appointed by the management of the user and has to be independent from operations.

In case of deviations during the regular or annual inspection, personnel have to be consulted that is certified according to [DIN EN ISO 9712], VT2 or any equivalent standard valid in the country of the user.

For the 5-year inspection, the personnel have to be certified according to [DIN EN ISO 9712], VT2 or any equivalent standard valid in the country of the user. The dye penetrant test of welding edges and welding seams has to be performed by personnel certified according to [DIN EN ISO 9712], PT2 or any equivalent standard valid in the country of the user. The leak-tightness test of the thermal plugs has to be performed by personnel certified according to [DIN EN ISO 9712], LT2 or any equivalent standard valid in the country of the user.

## **7 DOCUMENTATION OF NON-CONFORMANCES AND DEVIATIONS**

Non-conformances and deviations have to be recorded.

A report about the non-conformances and deviations has to be prepared by the user of the package and submitted to DAHER Nuclear Technologies GmbH, Germany (DAHER NT), for



assessment as required in chapter 9. Any repair is only allowed after prior written approval by DAHER NT. Repairs have to be documented in the packaging inspection book.

Measures in case of non-conformances and deviations have to be documented as well.

In case of free water inside the DN30 PSP cavity in excess of condensed humidity, the DN30 PSP is withdrawn from transport. DAHER NT has to be immediately informed about this deviation by the user. DAHER NT has to investigate together with the respective user the cause(s) of the presence of water. Corrective actions have to be implemented based on the results of this investigation.

## 8 REPLACEMENT OF SPARE PARTS

Spare parts have to comply with the parts lists and the manufacturing specification.

**The spare parts have to be ordered from DAHER NT to guarantee the quality assurance complying with the certificate of package approval.**

Replacement of parts has to be documented in the packaging inspection book; depending on the amount and nature of the replaced parts documentation comprising batches of DN30 PSPs containing lists of the respective DN30 PSPs are permitted.

Spare parts have to be replaced according to the schedule given in the following table.

Item	Quantity per DN30 PSP	Replacement schedule	Material
Washers (pairs)	6	Every 5 years	NL16-254SMO ®
Thermal plugs	18	Not leak tight or missing parts	Polyamide PA EPDM
Pads	2	Missing parts	Silicon
Gasket	1	Every 5 years or missing parts	EPDM
Pin	6	Missing parts	Stainless steel
Securing bolt	6	Damaged, not functional or missing parts	Stainless steel
Pin strings	6	Damaged, not functional or missing parts	Stainless steel
Valve protecting device	1	Damaged, not functional or missing parts	Stainless steel
Hinges of the valve protecting device	2	Damaged, not functional or missing parts	Stainless steel
Housing of the valve protecting device	1	Damaged, not functional or missing parts	Stainless steel + PROMASEAL- PL ®
Black intumescent material		Damaged or missing parts	PROMASEAL- PL ®

## 9 INSPECTION CRITERIA FOR THE DN30 PSP

<b>Component: A - Nameplate and markings</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Nameplate	Readability	Non-readable letters and figures	Non-readable letters are made readable by engraving or re-stamping the letters with metallic stamps; record repair in inspection book
	Completeness	Missing information	Missing information, e. g. in case of an additional package approval shall be added; record repair in inspection book
	Conformance with package inspection book	Deviations	Contact DAHER NT
Markings	Readability	Non-readable letters and figures	Non-readable letters are made readable by amending painted letters and figures or replacing the marking foil, as appropriate

Component: B - Bottom half, top half			
Part	Inspection with respect to:	Non-conformant are:	Measures in case of non-conformances/deviations
Exterior shell, interior shell	Condition of surface	Soiling, dirt	Clean from soiling, dirt
		Corrosion	Remove corrosion, in case of indication that wall thickness might be affected, wall thickness measurement by ultrasonic testing Minimal wall thickness allowed: see drawings; in case minimal wall thickness is less than allowed according to drawings, action acc. to chapter 7
	Structural changes	Dents with a depth of more than 25 mm, holes, cracks, through corrosion	Action acc. to chapter 7
	Dimensional check in case of visual irregularities	Dimension is outside of tolerance of drawing	Action acc. to chapter 7
	Water	Presence of moisture	Remove the moisture Clean the interior shell If required let the shell dry in a dry and ventilated building so that the black intumescent material does not release water and has a dry feel.
		Presence of free water in excess of moisture	Remove the water Clean the interior shell Let the shell dry in a dry and ventilated building so that the black intumescent material does not release water and has a dry feel  The DN30 PSP must not be used without the approval of DAHER NT, see chapter 7.

Component: B - Bottom half, top half			
Part	Inspection with respect to:	Non-conformant are:	Measures in case of non-conformances/deviations
Flanges and sealing areas	Condition of surface	Soiling, dirt  Corrosion	Clean from soiling, dirt  In case of initial easily removable rust, remove corrosion; In case of corrosion affecting the sealing properties, action acc. to chapter 7
	Structural changes	Indents and incisions perpendicular to the gasket axis	Action acc. to chapter 7

<b>Component: B - Bottom half, top half</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Inner cylinder support pad	Condition of surface	Soiling, dirt	Clean from soiling, dirt
	Structural damages	Damaged area > 100 x 100 mm	Replace support pad acc. to chapter 8
Thermal plugs	Presence	Non-present plugs	Install plugs acc. to chapter 8
	Damages	Any damage except scratches on the surface	Replace plug acc. to chapter 8
	Leak-tightness	Visible bubbles	Replace plug acc. to chapter 8
Gasket	Presence	Non-present gasket	Install gasket acc. to chapter 8
	Damages	Cracks, cuts or holes as well as changes of form or color	Replace gasket acc. to chapter 8

<b>Component: C – Closure devices</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Mortise-and-tenon parts	Condition of surface	Soiling, dirt  Corrosion	Clean from soiling, dirt  In case of initial easily removable rust, remove corrosion; In case of corrosion deeper than 2 mm, action acc. to chapter 7
	Structural changes	Dents with a depth of more than 5 mm, holes, cracks, through corrosion, broken parts	Action acc. to chapter 7
	Dimensional check in case of visual irregularities	Dimension is outside of tolerance of drawing	Action acc. to chapter 7
Pins	Condition of surface	Soiling, dirt Corrosion	Clean from soiling, dirt In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion replace pins
	Structural changes	Deformations, cracks, indents and incisions with a depth of more than 1 mm, broken parts	Replace pins, acc. to chapter 8
	Function	Pins have to be moveable by hand	Use lubricant
Thread in mortise-and-tenon part	Cleanliness	Soiling, dirt, metal chips	Clean from soiling, dirt; Lubrication products are permitted
	Structural changes	Deformed threads, requirements of DIN ISO 1502 are not met	Action acc. to chapter 7



<b>Component: C – Closure devices</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Securing bolt	Cleanliness	Soiling, dirt, metal chips	Clean from soiling, dirt; Lubrication products are permitted
	Structural changes	Deformed threads, requirements of DIN ISO 1502 are not met	Replace bolt, acc. to chapter 8
	Function	Securing bolts have to be turnable by hand	Use lubricant
Pins strings	Cleanliness	Soiling, dirt, corrosion	Clean from soiling, dirt
	Structural changes	Cracks, broken parts	Replace pins strings, acc. to chapter 8
Washers	Not applicable		Replace washers acc. to chapter 8

<b>Component: D - Valve protecting device</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Surface	Condition of surface	Soiling, dirt Corrosion	Clean from soiling, dirt In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion action acc. to chapter 7
	Structural changes	Dents with a depth of more than 10 mm, holes, cracks, through corrosion, broken parts	Action acc. to chapter 7
Hinges	Function	Blocked movement  Corrosion	Use lubricant; in case of no improvement action acc. to chapter 7  In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion action acc. to chapter 7
	Structural changes	Deformations, holes, cracks, through corrosion, broken parts	Action acc. to chapter 7

<b>Component: D - Valve protecting device</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Housing	Function	Blocked movement	Use lubricant; in case of no improvement action acc. to chapter 7
		Corrosion	In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion action acc. to chapter 7
	Structural changes	Deformations, holes, cracks, through corrosion, deformed parts, broken parts	Action acc. to chapter 7
	Black intumescent material	Any damage larger than a disk with diameter of 20 mm; or more than 5 damages larger than a disk with diameter of 10 mm on any area of the inner shell of the housing of 100 x 100 mm Scratches with a width of more than 5 mm and a length of more than 50 mm  Any detachment of the intumescent material at the boundaries of each piece with a size of more than 10 mm	Action acc. to chapter 7   Action acc. to chapter 7

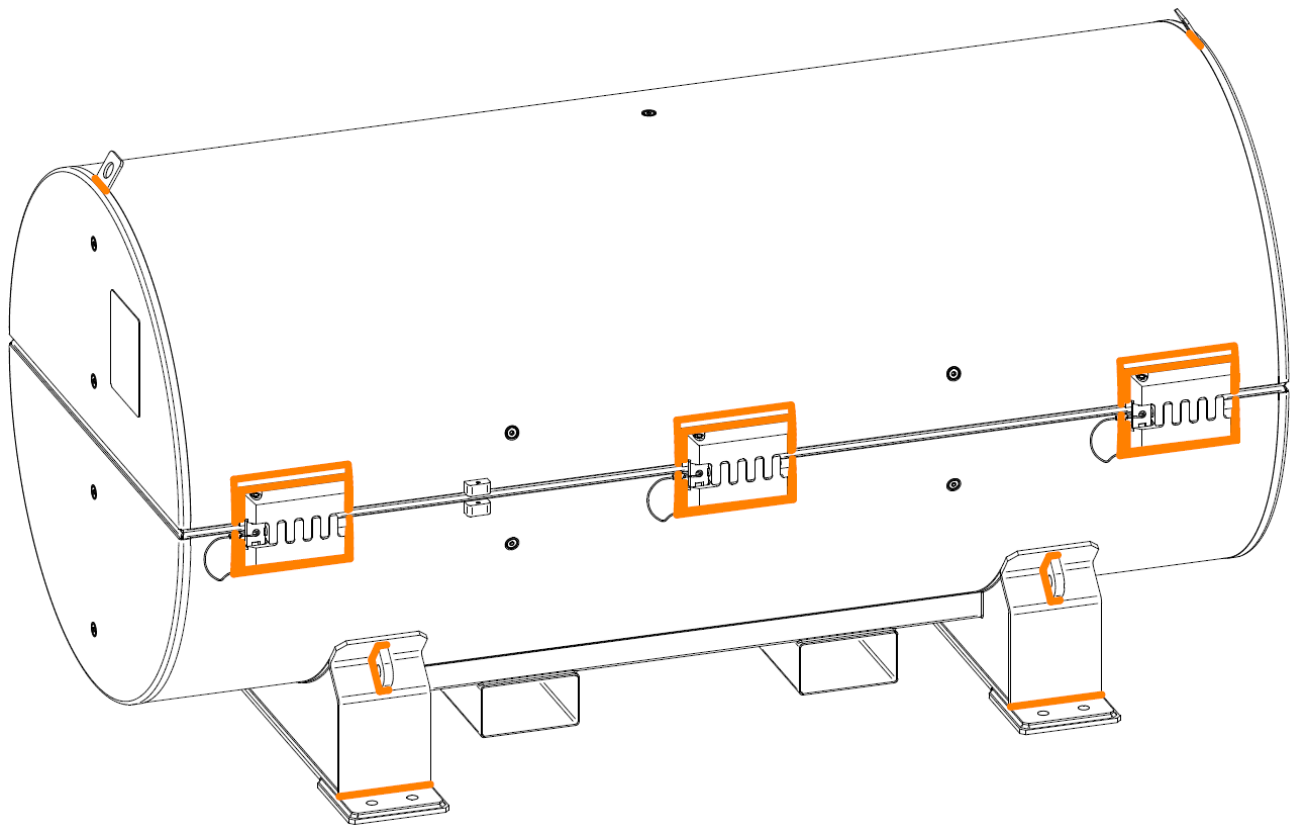
<b>Component: E - Rotation preventing device</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Pin	Function	Blocked movement  Corrosion	Use lubricant; in case of no improvement action acc. to chapter 7  In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion action acc. to chapter 7
	Structural changes	Deformations, holes, cracks, through corrosion, broken parts	Action acc. to chapter 7
Lever	Condition of surface	Soiling, dirt Corrosion	Clean from soiling, dirt In case of initial easily removable rust, remove corrosion; In case of non-easily removable corrosion action acc. to chapter 7
	Structural changes	Deformations, cracks, through corrosion, broken parts	Action acc. to chapter 7

<b>Component: F – Intumescent material</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Bottom half, top half	Black intumescent material	Any damage larger than a disk with diameter of 20 mm; or more than 5 damages larger than a disk with diameter of 10 mm on any area of the inner shell of the housing of 100 x 100 mm Scratches with a width of more than 5 mm and a length of more than 50 mm	Action acc. to chapter 7
		Any detachment of the intumescent material at the boundaries of each piece with a size of more than 10 mm	Action acc. to chapter 7

<b>Component: G – Weight</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Bottom half, Top half, DN30 PSP total	Water intake into the foam parts of the DN30 PSP and the Microtherm layer	Difference between weight stamped on the nameplate and measured weight: More than 0.5 kg for each half More than 1 kg for the total DN30 PSP	Action acc. to chapter 7



<b>Component: H – Welding seams</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Welding seams (as far as accessible)	Visual checks of structural changes	Holes, cracks, corrosion beyond surface rust	Action acc. to chapter 7
Welding seams of the closure devices, all lifting lugs and the feet (highlighted in orange in Figure 6)	Dye penetrant test	Indications as described in the test description	Action acc. to chapter 7



**Figure 6. Welding seams to be tested by a dye penetrant test (in orange)**

<b>Component: I - Handling points</b>			
<b>Part</b>	<b>Inspection with respect to:</b>	<b>Non-conformant are:</b>	<b>Measures in case of non-conformances/deviations</b>
Top lifting lugs	Structural changes	Deformations, holes, cracks, corrosion beyond surface rust, broken parts	Straighten up if possible and retest the welding seams by a dye penetrant test afterwards. If not, action acc. to chapter 7.
Bottom lifting lugs	Structural changes	Deformations, holes, cracks, corrosion beyond surface rust, broken parts	Straighten up if possible and retest the welding seams by a dye penetrant test afterwards. If not, action acc. to chapter 7.
Forklift pockets	Structural changes	Deformations, holes, cracks, corrosion beyond surface rust, broken parts	Straighten up if possible and retest the welding seams by a dye penetrant test afterwards. If not, action acc. to chapter 7.

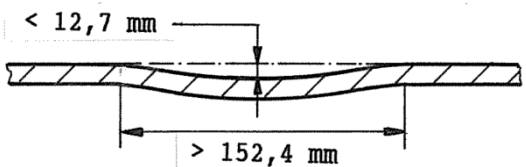

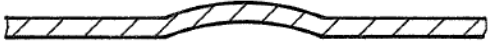



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|-------------------|---|
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| [DIN EN ISO 9712] | DIN EN ISO 9712:2012-12, Non-destructive testing – Qualification and certification of NDT personnel, December 2012            |
| [ISO 7195]        | ISO 7195, Nuclear Energy – Packaging of uranium hexafluoride (UF <sub>6</sub> ) for transport, Second edition, September 2005 |
| [USEC 651]        | The UF <sub>6</sub> Manual – Good Handling Practices for Uranium Hexafluoride, Rev. 9, USEC, 2006                             |

# ATTACHMENT 1. VISUAL INSPECTION OF 30B CYLINDERS WITH EXPIRED FIVE-YEAR RECERTIFICATION






VISUAL INSPECTION OF 30B CYLINDERS WITH EXPIRED FIVE-YEAR RECERTIFICATION			Protocol No.: .....	
30B Cylinder No.: .....		Date: .....	Place: .....	
Step	Description of working or control step	Criteria	Results	
			A	NA
1	Visual check of the degradation of the cylinder wall	See Table 2 and Table 3		
2	Visual check of the valve and the plug	Completeness No damage Complying valve orientation (12 o'clock)		
3	Check of the engaged valve and plug threads	The number of engaged threads has to comply with ANSI N14.1 and ISO 7195.		
A: Acceptable NA: Not acceptable				
<b>Inspection result</b>				
Transport of 30B cylinder permitted		<input type="checkbox"/>	Transport of 30B cylinder prohibited <input type="checkbox"/>	
Place of inspection	Date of inspection	DNT Inspector (Name and signature)		

**Table 2. Acceptable and unacceptable damage to 30B cylinders\***

	Check for:	Explanation
1	Pressure-envelope (shell or heads) curved dents	<p>Acceptable: any shallow/gentle curved dent in the cylinder shell that has a depth to diameter ratio of less than 1/12, providing the depth is less than 12.7 mm. Any cut, dent or gouge in the cylinder shell that is less than 2.54 mm in depth.</p> 
2	Cracks in the pressure envelope	<p>Unacceptable: visible cracks</p> 
3	Pressure-envelope bulges	<p>Unacceptable: visible bulges</p> 
4	Pressure-envelope dents	<p>Unacceptable: sharp dents</p> 
5	Pressure-envelope sharp curved dents	<p>Unacceptable: any gouge, cut or dent with a depth greater than 12.7 mm or a depth to diameter ratio greater than 1/12, if the depth is between 2.54 mm and 12.7 mm.</p> 
6	Pressure-envelope gouges, cuts or dents	<p>Unacceptable: any gouge, cut or dent with a depth greater than 2.54 mm and a noticeable loss of metal.</p> 
7	Skirt torn from head with removal of metal from head	

\*Further details are found in [USEC 651], [ISO 7195] or [ANSI N14.1].

**Table 3. Criteria for degree of corrosion for the 30B cylinder**

	Condition	Classifica- tion	Further action
1		Acceptable	
2		Acceptable	
3		Acceptable	Measurement of wall thick- ness in the corroded areas as further investigation required.
4		Acceptable	Measurement of wall thick- ness as further investigation required.
5		Not ac- ceptable	Inform DAHER NT.