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1 Purpose

This LESER Global Standard (LGS) describes torques ranges for screws and bolts.

2 Scope

This LGS is valid for all members of LESER Quality union.

3 References

None

4 Introduction

The above torque ranges are valid for material marked full shaft screws or full shaft bolts and nuts used for the connection between body and bonnet according to AD-B7 and similar applications.

The torque ranges are valid for lubricated threads with a friction factor of 0.1 and rectangular facings of the nuts in relation to the bore. With the above torques about 70 – 90 % of the yield strength of the material is reached.

For higher friction factors (0.12 – 0.15) the higher values for the torque are required. The maximum limits must not be exceeded.

Data base: The 70 % valves (low torque valve) for friction factor 0.1 are taken from the catalogue of „Fa. Gebr. Grohmann, 1991, Wissenswertes über Edelstahlschrauben“.

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5 Body and Bonnet Connection

(Observe note on next page)

Table 1 for screws and nuts DIN 931, 933, 938 and EN 24032

Material	Material equivalent	Min. – max. Torque [Nm]						
		DIN	ASME	Thread				
				M10	M 12	M 16	M 20	M 24
Ck 35/ C 35 (1.1181)	Steel							
A4 - 70 (1.4401)	A193 B8M Cl.2	25 - 30	45 - 58	108 - 138	204 - 261	202 - 258	310 - 345	
A4 - 70 (1.4401)	A193 B8M Cl.1	25 - 30	45 - 58	108 - 138	204 - 261	202 - 258		
5.6	-	19 - 22	30 - 39	73 - 93	--	--	--	
8.8	-	40 - 45	65 - 84	155 - 198	--	--	--	
	A320 Gr. B8M	25 - 30	45 - 58	108 - 138	204 - 261	202 - 258	310 - 345	
1.7225	A 193 Gr. B7		55 (50*)	130 (120*)	220 - 250	280 - 320		
	A 320 Gr. L7		55 (50*)	130 (120*)	220 - 250	280 - 320		
	A 320 Gr. L7M		60 - 70	135 - 170	220 - 250	280 - 320	450-480	
1.4301	A 193 Gr. B8 CL. 2		60 - 70	135 - 170	250 - 260	250 - 300		
	A 193 Gr. B8T CL. 2			135 - 170	250 - 260			
	A320 Gr. B8 CL. 2	35 - 40	60 - 70	135 - 170	250 - 260	250 - 300		
1.4462	SA-479	25 - 30	45 - 58	108 - 138	204 - 261	202 - 258	310 - 345	
1.4501	SA-479	25 - 30	45 - 58	108 - 138	204 - 261	202 - 258		
	A 193 Gr. B7M		60 - 70	135 - 170	220 - 250	280 - 320		
	A453 Gr.660 Class D		70-85	160-190	280-300	340-360		
A5 - 70 (1.4571)		25 - 30	45 - 58	108 - 138	204 - 261	202 - 258	310 - 345	
2.4819	N10276	19 - 22	30 - 39	73 - 93	170-185	280-300		
	B8MLCu N-Cl.1B	18 - 22	28 - 36	68 - 87	130 - 166	255 - 288		
Torque to yield bolts:								
17709	A 193 Gr. B16	-	31 - 37	98 - 118	190 - 228	280 - 320		
	A 193 Gr. B7	-	31 - 37	98 - 118	190 - 228	280 - 320		

* for cast iron

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Note Table 1 (see previous page): In case of Gylon gasket application, the nuts resp. screws have to be tightened again after 15 min.

Table 2 for screws and nuts for safety valves Type 447/547

Material DIN	Material- equivalent ASME	Min. – max. Torque [Nm] *			
		Thread			
		M 12	M 16		
Ck 35/ C 35 (1.1181)	Steel	39 – 41	59 - 61		
5.6	-	39 – 41	59 - 61		

*) The torques above mentioned are based on field tests. They allow a tight connection without destroying the PTFE-material.

5.1 Type 483, 484, 485, 488, 444 Split-rings

Error! Reference source not found.3 lists torques for screws and nuts for split ring connection of body and bonnet and pneumatic lifting aid (if available) for Type 483, 484, 485, 488, 444

The following picture 1 shows 2 split rings (without screws/nuts) for information.



Picture 1: 2 split rings (without screws/nuts)

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Table 3: Torques for screws and nuts for split-ring connection

Material DIN	Material Equivalent ASME	Torque [Nm]						
		Size of split-ring Connection						
		EP50	EP65	EP80	EP100	EP125	EP150	EP175
A4 Class 70	(B8M)	3	4	6	6	9	14	16
Screw Size (informative)								

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(1.4401)	M6	M8	M10
	Wrench size (informative)		
	SW10	SW13	SW16

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6 Caps and Lifting Devices

Table 3: Caps and lifting devices (sealing torque)

Size	Thread	Torque [Nm]**		Wrench size
		Standard	HALAR-coated gasket	
0	M 24 x 1,5	60 – 75	60 - 75	SW 27
I	M 33 x 1,5	80 – 100	60 - 75	SW 46
II	M 42 x 1,5	100 – 125	100 - 125	SW 55
III	M 60 x 1,5	140 – 175	240 - 270	SW 75
IV+V	M 75 x 1,5	175 – 220	n.a.	SW 95

- **)
To achieve manually with 200 mm extended wrench.
Sufficient for clean and lubricated threads and not damaged sealing surfaces.
- n.a.
Gasket not available for this size

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7 Test Gag

7.1 Short Locking Screws

For tightening of the short locking screws (pos. 2, e.g. drawing 190.0309-XX-B01) the torque ranges of table 6 are recommended.

Table 4: Test Gag: Recommended starting torque ranges for short screws

Cap size Size lifting device	Thread size	Torque [Nm]***
0	M12	28 - 32
I	M12	
II	M12	
III	M12	
IV	M16	72 -76
V	M16	

***) The used sealing rings out of vulcanised fibre may not be deformed further because they are soft sealings.

7.2 Long locking screws

For tightening of the long locking screws (pos. 1, e.g. drawing 190.0309-XX-B01) the torque ranges of table 7 are recommended.

Table 5: Test Gag: Recommended starting torque ranges for long screws

Cap size Size lifting device	Thread size	Torque [Nm]*
0	M12	15
I	M12	
II	M12	
III	M12	20
IV	M16	
V	M16	35

*) The torques ranges are not valid for O-ring discs and sealing plates designs. In case of need they have to be required at TB/DD.

7.3 Long locking screw as transport locking device

For tightening the long locking screw as transport locking device (e.g. drawing 190.0809-XX-B01) the torques are adjusted acc. to table 6.

Table 6: Torque specification of long locking screw as transport locking device.

Cap size Size lifting device	Thread size	Torque (All types) [Nm]
0	M12	4
I	M12	
II	M12	
III	M12	
IV	M16	
V	M16	

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8 Screwed Plugs, Locking Screws (Metal Sealing)

Table 7: Recommended locking torques for screwed plugs (e. g. Type 526)

Material DIN	Material equivalent ASME	Min. – max. torques [Nm] *			
		Gewinde			
		G 1/8	G1/4	G1/2	
A4 Klasse 70 (1.4401)	(B8M)	15 - 20	35-40	65-90	

*) Lower values are valid for sealing with sealing ring acc. to DIN 7603.

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9 Nozzles, Inlet Bodies and Screwed Bonnets (T459/462)

Table 8: Recommended torques of valve nozzles for type 441/442; 457/458 and 526, inlet bodies of type 437/438/438/459 and 462 and screwed bonnets (type 459/462)

Benennung/Name	Orifice/DN do or Size	Druckstufe/ Pressure Class	Gewindegröße Thread size	Anzugsmoment Torque [Nm]
SITZBUCHSE/Nozzle 526 1E2	1 D+E2	150-600	M38x1,5	95
SITZBUCHSE/Nozzle 526 1.5E2	1,5 D+E2	900 -1500	M38x1,5	95
SITZBUCHSE/Nozzle 526 1.5F2	1,5 F2	150-1500	M48x1,5	95
SITZBUCHSE/Nozzle 526 1.5G3	1,5 G3	150-900	M48x1,5	95
SITZBUCHSE/Nozzle 526 1.5H3	1,5 H3	150-300	M48x1,5	95
SITZBUCHSE/Nozzle 526 1.5EF3	1,5 E+F3	2500	M48x1,5	95
SITZBUCHSE/Nozzle 526 2H3	2 H3	150-1500	M64x1,5	115
SITZBUCHSE/Nozzle 526 2J3	2 J3	150-300L	M64x1,5	115
SITZBUCHSE/Nozzle 526 2G+H3	2 G+H3	2500	M64x1,5	115
SITZBUCHSE/Nozzle 526 3K4	3 K4	150-600	M100x2	300
SITZBUCHSE/Nozzle 526 3L4	3 L4	150-300L	M100x2	300
SITZBUCHSE/Nozzle 526 3J4	3 J4	300-1500	M100x2	300
SITZBUCHSE/Nozzle 526 3K4/6	3 K4/6	900-1500	M100x2	300
SITZBUCHSE/Nozzle 526 4L 6	4 L6	300-600	M120x2	430
SITZBUCHSE/Nozzle 526 4L6	4L6	900-1500	M120x2	430
SITZBUCHSE/Nozzle 526 4M6	4 M6	150-900	M120x2	430
SITZBUCHSE/Nozzle 526 4N6	4N6	150-900	M120x2	430
SITZBUCHSE/Nozzle 526 4P6	4 P6	150-900	M120x2	430
SITZBUCHSE/Nozzle 526 6Q8	6 Q8	150-600	M165x2	610
SITZBUCHSE/Nozzle 526 6R8	6 R8/10	150-600	M165x2	610
SITZBUCHSE/Nozzle 526 8T10	8 T10	150-300	M220x2	700
Type 457/458				
SITZBUCHSE Nozzle 458 DN 25/ 15	d015	Alle/all	M36x1,5	95
SITZBUCHSE Nozzle 458 DN 25/ 20	do20	Alle/all	M36x1,5	
SITZBUCHSE Nozzle 458 DN 50/ 30	do30	Alle/all	M64x1,5	115
SITZBUCHSE Nozzle 458 DN 50/ 40	do40	Alle/all	M64x1,5	
SITZBUCHSE Nozzle 458 DN 80/ 50	do50	Alle/all	M100x2	300
SITZBUCHSE Nozzle 458 DN 80/ 60	do60	Alle/all	M100x2	
SITZBUCHSE Nozzle 458 DN100 do50	do50	Alle/all	M120x2	450
SITZBUCHSE Nozzle 458 DN100 do60	do60	Alle/all	M120x2	
SITZBUCHSE Nozzle 458 DN100 do74	do74	Alle/all	M120x2	
SITZBUCHSE Nozzle 458 DN100 do88	do88	Alle/all	M120x2	
SITZBUCHSE Nozzle 458 DN150/110	do110	Alle/all	M165x2	650

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Table 10 <continued>

Benennung/Name	Orifice/DN do or Size	Druckstufe/ Pressure Class	Gewinde größe Thread size	Anzugs- moment Torque [Nm]
Type 441/442				
Sitzbuchse/Full nozzle				
DN25	do23	Alle/all	M36x1,5	95
DN40	do29+37	Alle/all	M48x1,5 M52x1,5	95
DN50	do46	Alle/all	M64x1,5	115
3"	do60	Alle/all	M85x1,5	115
DN80	do60	Alle/all	M100x2	300
DN100	do92	Alle/all	M120x2	450
Type 437/438/439				
Eintrittskörper/Inlet body				
do6+10		Alle/all	M30x1,5	90
Type 459/462				
Eintrittskörper/Inlet body				
do6+9,13 und 17,5	Alle/all	Alle/all	M33x1,5	100
Type 459/462				
Gehäuse/Federhaube				
Outlet body/Bonnet/ Spacer				
do6+9,13 und 17,5	Alle/all	Alle/all	M33x1,5	100
Type 431/433 PN160				
Klemmring/Sitzbuchse Clamp/nozzle	do12	Alle/all	M33x1,5	100

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10 Torques for sealing plate disks (valve types 441/433/526)

Sealing plate disks of valve types 441/433/526 had been modified in project Vendi 95 (ECO 200295) and therefore the torques in table 9 for the fixing nuts are valid.

Table 9: Torques for sealing plate disks 441/433/526

Thread Size Fixing Nut	Torque [Nm]
M5	4
M8	15
M12	43
M16	70

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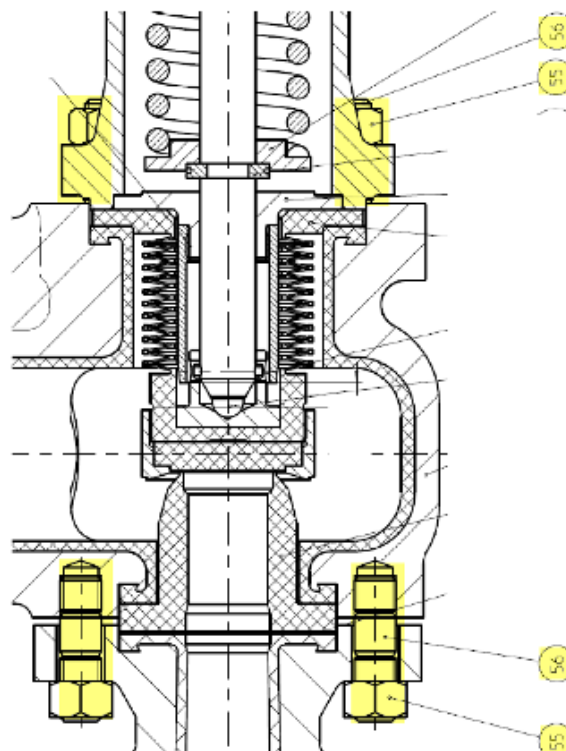
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11 Type 447: Torques for bolt/nut connections

Table 11 lists the torques, which have to be applied for correct mounting of the following bolt/nut connections for Type 447:

- between inlet nozzle and outlet body
- between bonnet und outlet body

The following picture 2 shows these connections using the example of 447 DN25.



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Figure 2: Bolt/nut connections of Type 447 to be mounted with tightening torques, illustrated using the example of nominal size 447 DN25

The bolt/nut connection have to be tightened crosswise. By using a step wise tightening process an even pressing of the PTFE lining over the circumference is ensured.

After the third step a minimum waiting time of 15 min to be followed, in order to be able to take into account the loss of prestress of the bolt/nut connection due to the flow of the PTFE lining.

Then, in a 5th step, retighten the bolt/nut connections to the specified tightening torque.

The tightening torques specified in Table 11 are based on practical experience values where the tightness to the outside is guaranteed and no impermissible flow of the PTFE lining is caused.

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Table 11: Stepwise tightening incl. tightening torques for bolts and nuts for Type 447

Screw material/strength class	Step	Torque Screw Size	
		M12	M16
all	1	5 Nm or less	5 Nm or less
	2	20 Nm	30 Nm
	3	40 Nm	60 Nm
	4	Waiting time: ≥ 15 minutes	
	5	40 Nm	60 Nm

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