



# Test report

## Battery angle nutrunner – homologation

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- I. Customer**  
CP Georges Renault  
Mr. Thibault Valantin  
ZAC de la Lorie-38 rue Bobby Sands  
BP 10273  
F – 44818 Saint Herblain
- II. Date of test/ location**  
July 2015  
Power Tools Central Service Workshop  
Różyniec 83C, 59-706 Gromadka,  
Polen

### III. Testobject

Battery nutrunner:

EABC 95-240

Serial number 14E87890  
15E93337  
15E93561

<b>Model</b>	<b>EABC 95-240</b>
<b>Ordering No</b>	6151658480
<b>Square Drive / Female Hex</b>	Square drive
<b>Torque range ft lb</b>	14 – 70
<b>Torque range Nm</b>	19 – 95
<b>CS distance mm</b>	-
<b>Weight kg</b>	2.98
<b>Weight lb</b>	6.57
<b>Length mm</b>	582
<b>Speed r/min</b>	240
<b>Height mm</b>	60.4
<b>Square drive in</b>	1/2



Li-Ion 36 VDC 2,1 Ah  
Serial number 00198-15-W13

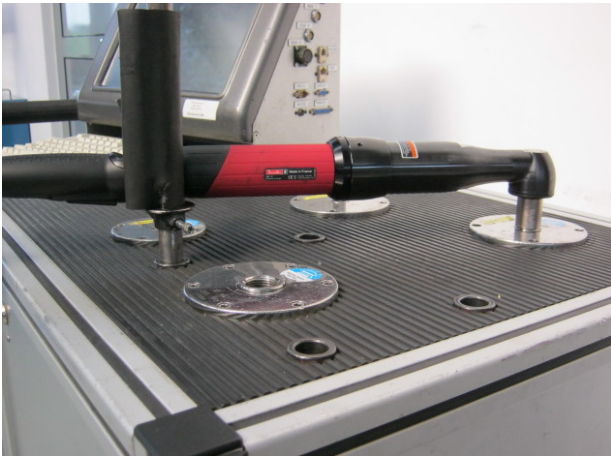


Controller CVI3 – Vision  
Serial number: 27011100077



## IV. Test condition

### a. Mounting



### b. Test equipment

Manufacturer: **BLM, Mailand ( Italien )**  
Type: **3860/4**  
Ser.-Nr.: **3860SKY.103**  
Cell 2 : **10-50 N·m, dynamisch**  
Calibration certificate: **EN2530, E15253 and EN2531, E15254**  
Software: **QS – Torque ( 32 Bit)**  
Filter Frequency: **300 Hz**



MANUFACTURER: **BLM**  
MODEL: **3860/4**  
SERIAL NUMBER: **3860SKY.103**  
POWER SUPPLY: PRIMARY: **220 V**  
**50-60 Hz**  
SECONDARY: **24 V**  
POWER **1320 W**  
NOMINAL **10A**  
**07/2004 CE**

### c. Explanation of the test

The screwdrivers were provided for homologation test from the production line of the manufacturer.

After evaluation the built-in torque for each class within 25 pre adjusting joints the measurement series of each 100 screws were documented without any changing of calibration value of the battery nutrunner.

From the VDI / VDE 2647, the standard values for break times between were the fastening cycles taken:

30% hart:	2 Sekunden
30% weich:	5 Sekunden
80% hart:	15 Sekunden
80% weich:	20 Sekunden
100% hart:	35 Sekunden
100% weich:	45 Sekunden

### d. Nutrunner test conditions

Range of the screwdriver device :	19 – 95 N•m
Testing torque / 30% hard/soft joint	41.80 N•m
Testing torque / 80% hard/soft joint	79.80 N•m
Testing torque / 100% hard/soft joint	95.00 N•m
Speed 1 step	240 rpm
Speed 2 step	50 rpm
Angle threshold / 30%	20.90 Nm
Angle threshold / 80%	39.90 Nm
Angle threshold / 100%	47.50 Nm
Switching torque / 30%	18.81 Nm
Switching torque / 80%	35.91 Nm
Switching torque / 100%	42.75 Nm
Angle strategy 40°	19 N•m (57.00) N•m
Angle strategy 180°	19 N•m (76.00) N•m
Series	8 x 100 Joint/ results

## e. Results

### Reached Cm and Cmk values

Desoutter / 2-Step tool			Cm - Cmk result					
Tool type	Serial Nr.	Test data	30,00%		80,00%		100,00%	
			30 °±5°	360 °±15°	30 °±5°	360 °±15°	30 °±5°	
EABC95-240		Test torque	41,80 Nm		79,80 Nm		95,00 Nm	
		Speed 1st stage	240 rpm					
		Speed 2st stage	50 rpm					
		Start angle measurement	20,90 Nm		39,90 Nm		47,50 Nm	
	14E87890	cm	2,70	3,84	3,37	4,26	3,36	4,84
		cmk	2,56	3,61	3,23	4,04	3,23	4,52
	15E93337	cm	3,26	3,22	2,73	4,25	2,40	4,45
		cmk	3,22	3,11	2,57	4,16	2,26	4,12
	15E93561	cm	2,37	3,84	2,25	4,13	3,22	4,19
		cmk	2,25	3,25	2,19	4,13	3,08	4,05

Min cm/cmk	cm	2,37	3,22	2,25	4,13	2,40	4,19
	cmk	2,25	3,11	2,19	4,04	2,26	4,05

	Range:	≥ 1,67	
Capability Index:	<b>C<sub>m</sub></b>	2,25	<b>OK</b>
Capability Index:	<b>C<sub>mk</sub></b>	2,19	<b>OK</b>

### Ranges of tolerance for angle and torque

Tool type	Serial Nr.	Test data	60% from range		80% from range	
			40°		180°	
EABC95-240		Test torque	57,00 Nm		76,00 Nm	
		Speed 1st stage	240 rpm			
		Start angle	19,00 Nm		19,00 Nm	
	14E87890	Torque	±	4,45%	±	4,41%
		Angle	±	0,8°	±	3,9°
	15E93337	Torque	±	4,58%	±	4,17%
		Angle	±	1,9°	±	4,7°
	15E93561	Torque	±	4,44%	±	5,18%
		Angle	±	2,0°	±	3,0°

Max Torque	Torque	Range:	7%	Range:	7%	40°
	lst:	±	4,58%	±	5,18%	<b>OK</b>
Max Angle	Angle	Range:	5°	Soll: ±	10°	40°
	lst:	±	2,0°	±	4,7°	<b>OK</b>



# CERTIFIKAT

## Machine capability test

Certificate no.:

**234085-01**

**Customer**

**Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**

Tool type: **EABC95-240**

Serial - No. : **14E87890**

**Torque range**

of: **19 Nm**

to: **95 Nm**

Number of screw tightenings

at 30% ==> **100**

at 80% ==> **100**

at 100% ==> **100**

Torque to be achieved

at 30% ==> **41,80 Nm**

at 80% ==> **79,80 Nm**

at 100% ==> **95,00 Nm**

Above mentioned number of unions were performed on a hard and on a soft joint.

The series of measurements were divided into 30%, 80% and 100% of the torque range, and a joint with a rotation angle of 30 ° (hard) and 360 ° (soft).

Tolerance is the difference between USL, upper limit, and LSL, Lower Limit.

Date:

2015-07-17

# CERTIFIKAT

## Machine capability tests

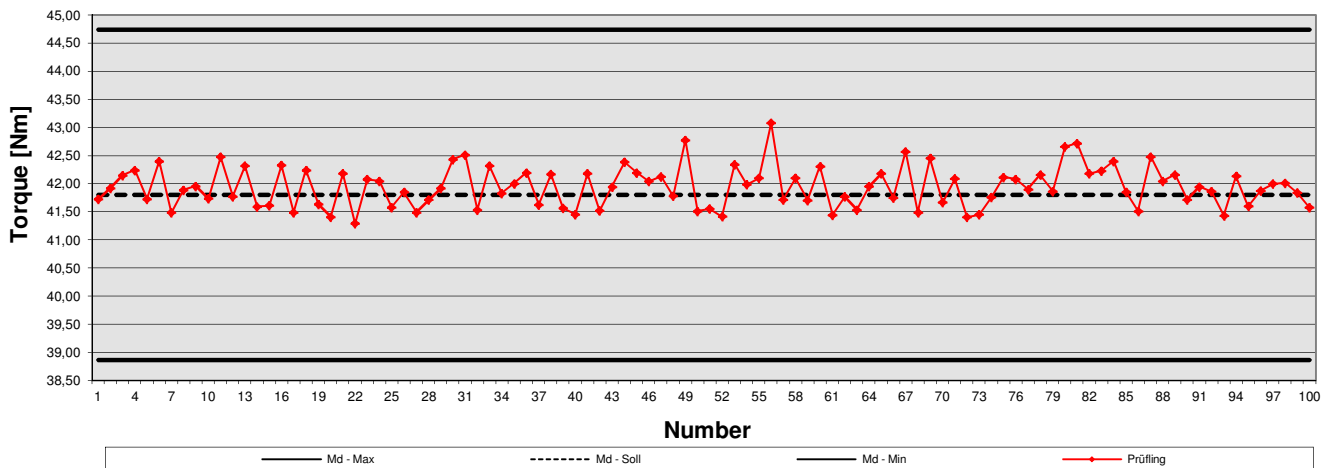


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 14E87890

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	44,73	41,80	38,87	+/- 7,00%

### Hard joint 30°



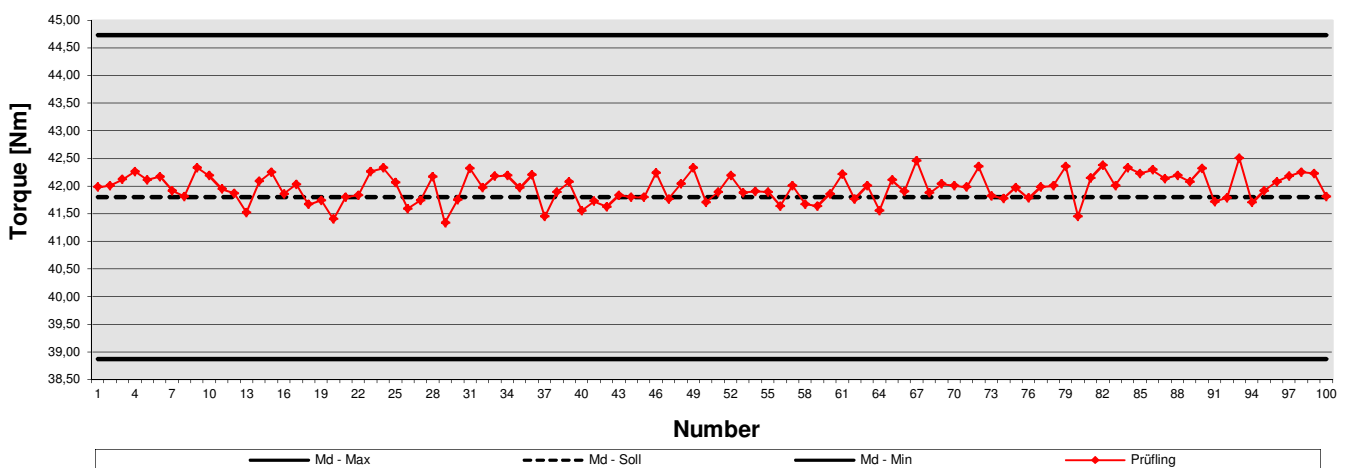
#### Statistics of the test piece

max. Torque	43,08 Nm		1 sig	0,362 Nm
min. Torque	41,29 Nm		6 sig	2,173 Nm
spread	1,78 Nm		+3 sig	43,03 Nm
Average	41,95 Nm		-3 sig	40,86 Nm

$$C_m = 2,70$$

$$C_{mk} = 2,56$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	42,50 Nm		1 sig	0,255 Nm
min. Torque	41,34 Nm		6 sig	1,528 Nm
spread	1,17 Nm		+3 sig	42,73 Nm
Average	41,97 Nm		-3 sig	41,21 Nm

$$C_m = 3,84$$

$$C_{mk} = 3,61$$

# CERTIFIKAT

## Machine capability tests

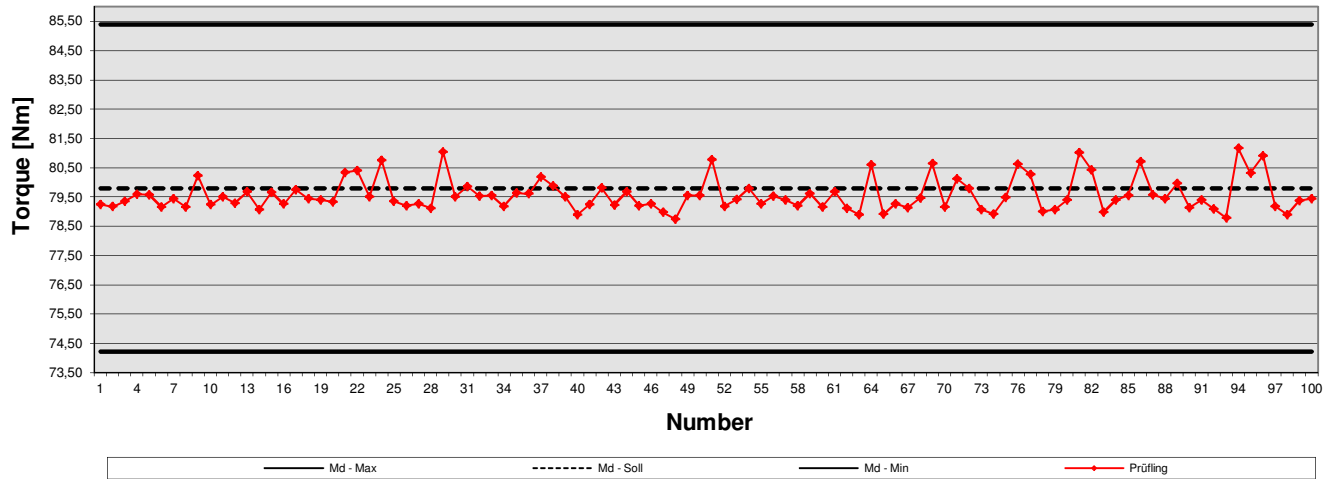


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 14E87890

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	85,39	79,80	74,21	+/- 7,00%

### Hard joint 30°



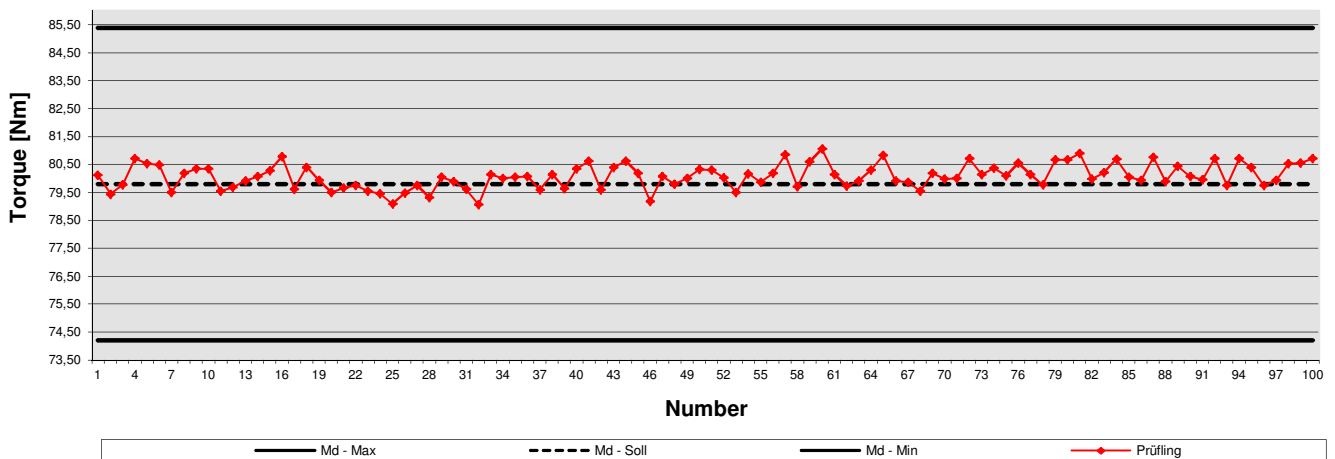
Statistics of the test piece

max. Torque	81,18 Nm	1 sig	0,553 Nm
min. Torque	78,75 Nm	6 sig	3,318 Nm
spread	2,43 Nm	+3 sig	81,23 Nm
Average	79,57 Nm	-3 sig	77,91 Nm

$$C_m = 3,37$$

$$C_{mk} = 3,23$$

### Soft joint 360°



Statistics of the test piece

max. Torque	81,06 Nm	1 sig	0,437 Nm
min. Torque	79,06 Nm	6 sig	2,624 Nm
spread	2,00 Nm	+3 sig	81,40 Nm
Average	80,08 Nm	-3 sig	78,77 Nm

$$C_m = 4,26$$

$$C_{mk} = 4,04$$



# CERTIFIKAT

## Machine capability tests

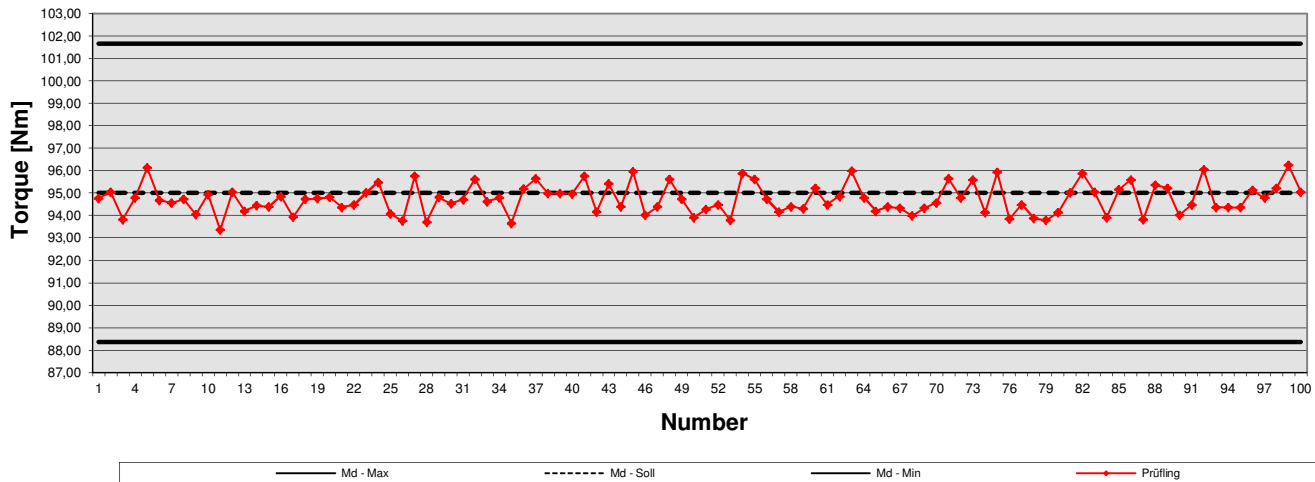


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 14E87890

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	101,65	95,00	88,35	+/- 7,00%

### Hard joint 30°



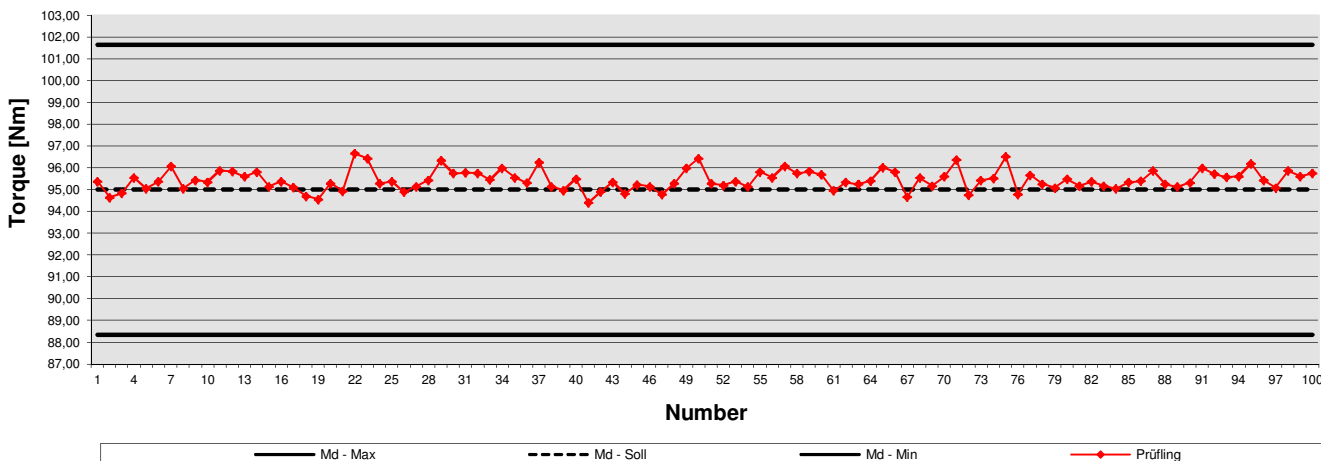
#### Statistics of the test piece

max. Torque	96,24 Nm	1 sig	0,659 Nm
min. Torque	93,37 Nm	6 sig	3,956 Nm
spread	2,87 Nm	+3 sig	96,71 Nm
Average	94,74 Nm	-3 sig	92,76 Nm

$$C_m = 3,36$$

$$C_{mk} = 3,23$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	96,66 Nm	1 sig	0,458 Nm
min. Torque	94,39 Nm	6 sig	2,748 Nm
spread	2,27 Nm	+3 sig	96,82 Nm
Average	95,45 Nm	-3 sig	94,07 Nm

$$C_m = 4,84$$

$$C_{mk} = 4,52$$

# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 14E87890

### Combined statistics for the test object ( hard and soft joint ) [ Md = 30% ]

Number of tightenings	200	6 sigma	1,87 Nm
Average	41,95 Nm	Mean value offset	0,02 Nm
Sigma	0,31 Nm	Mean value offset %	0,06 %
Dispersion	1,78 Nm	comb. average torque	41,95 Nm
max. Torque	43,08 Nm	comb. torque variation	2,17 Nm
min. Torque	41,29 Nm	comb. torque variation %	5,18 %

$C_m = 3,13$

$C_{mk} = 2,97$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 80% ]

Number of tightenings	200	6 sigma	2,98 Nm
Average	79,83 Nm	Mean value offset	0,51 Nm
Sigma	0,50 Nm	Mean value offset %	0,64 %
Dispersion	2,43 Nm	comb. average torque	79,65 Nm
max. Torque	81,18 Nm	comb. torque variation	3,48 Nm
min. Torque	78,75 Nm	comb. torque variation %	4,37 %

$C_m = 3,75$

$C_{mk} = 3,73$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 100% ]

Number of tightenings	200	6 sigma	3,40 Nm
Average	95,09 Nm	Mean value offset	0,71 Nm
Sigma	0,57 Nm	Mean value offset %	0,75 %
Dispersion	3,29 Nm	comb. average torque	94,79 Nm
max. Torque	96,66 Nm	comb. torque variation	4,06 Nm
min. Torque	93,37 Nm	comb. torque variation %	4,28 %

$C_m = 3,91$

$C_{mk} = 3,86$

# CERTIFIKAT

## Machine capability test

Certificate no.:

**234085-02**

**Customer**

**Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**

Tool type: **EABC95-240**

Serial - No. : **15E93337**

**Torque range**

of: **19 Nm**  
to: **95 Nm**

Number of screw tightenings

at 30% ==> **100**  
at 80% ==> **100**  
at 100% ==> **100**

Torque to be achieved

at 30% ==> **41,80 Nm**  
at 80% ==> **79,80 Nm**  
at 100% ==> **95,00 Nm**

Above mentioned number of unions were performed on a hard and on a soft joint.

The series of measurements were divided into 30%, 80% and 100% of the torque range, and a joint with a rotation angle of 30 ° (hard) and 360 ° (soft).

Tolerance is the difference between USL, upper limit, and LSL, Lower Limit.

Date:

2015-07-17

# CERTIFIKAT

## Machine capability tests

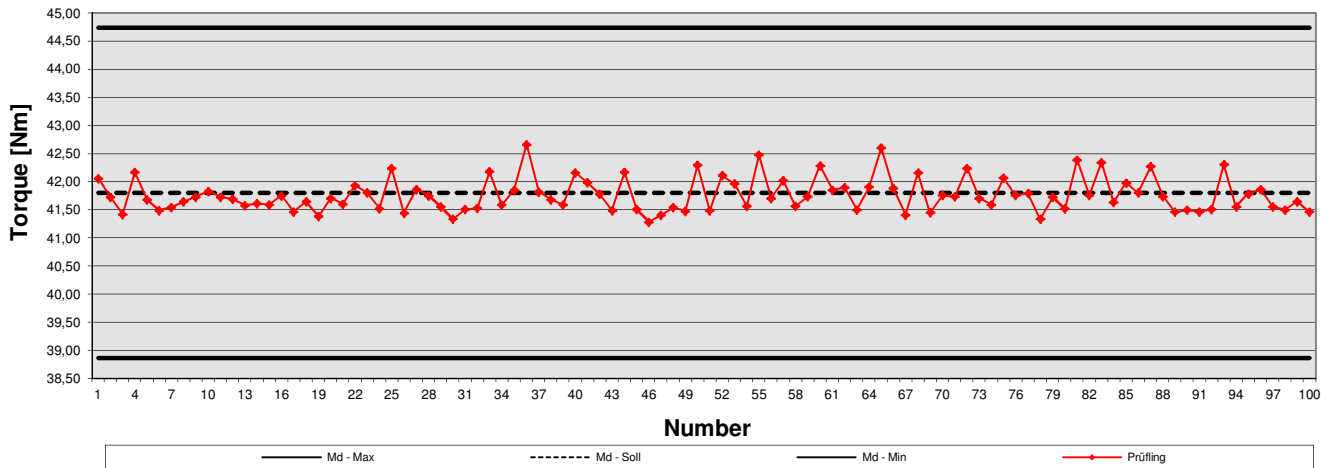


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93337

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	44,73	41,80	38,87	+/- 7,00%

### Hard joint 30°



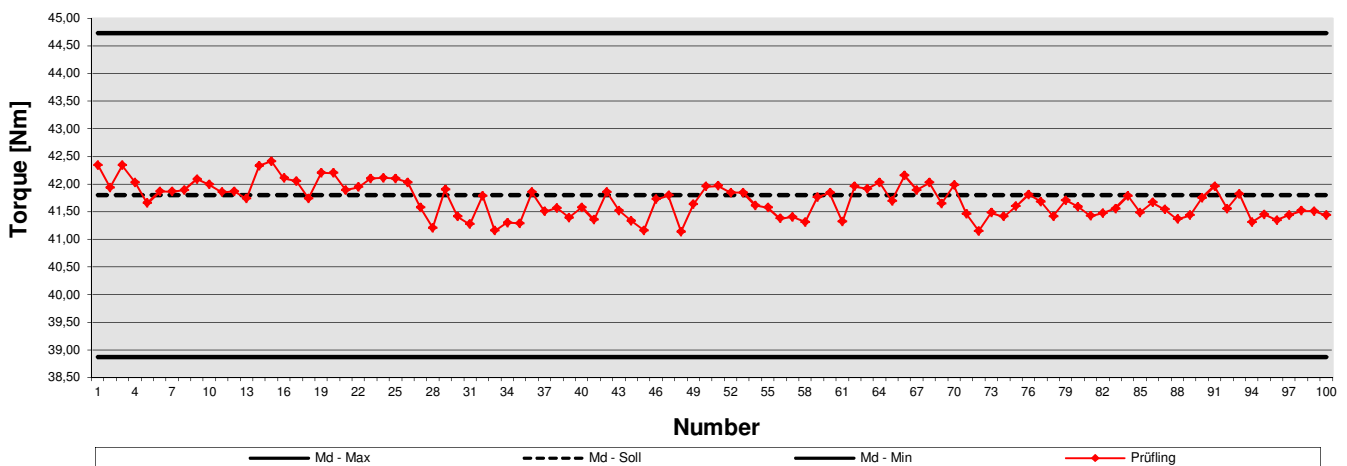
#### Statistics of the test piece

max. Torque	42,66 Nm	1 sig	0,300 Nm
min. Torque	41,28 Nm	6 sig	1,797 Nm
spread	1,38 Nm	+3 sig	42,66 Nm
Average	41,76 Nm	-3 sig	40,87 Nm

$$C_m = 3,26$$

$$C_{mk} = 3,22$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	42,41 Nm	1 sig	0,303 Nm
min. Torque	41,14 Nm	6 sig	1,819 Nm
spread	1,28 Nm	+3 sig	42,61 Nm
Average	41,70 Nm	-3 sig	40,79 Nm

$$C_m = 3,22$$

$$C_{mk} = 3,11$$

# CERTIFIKAT

## Machine capability tests

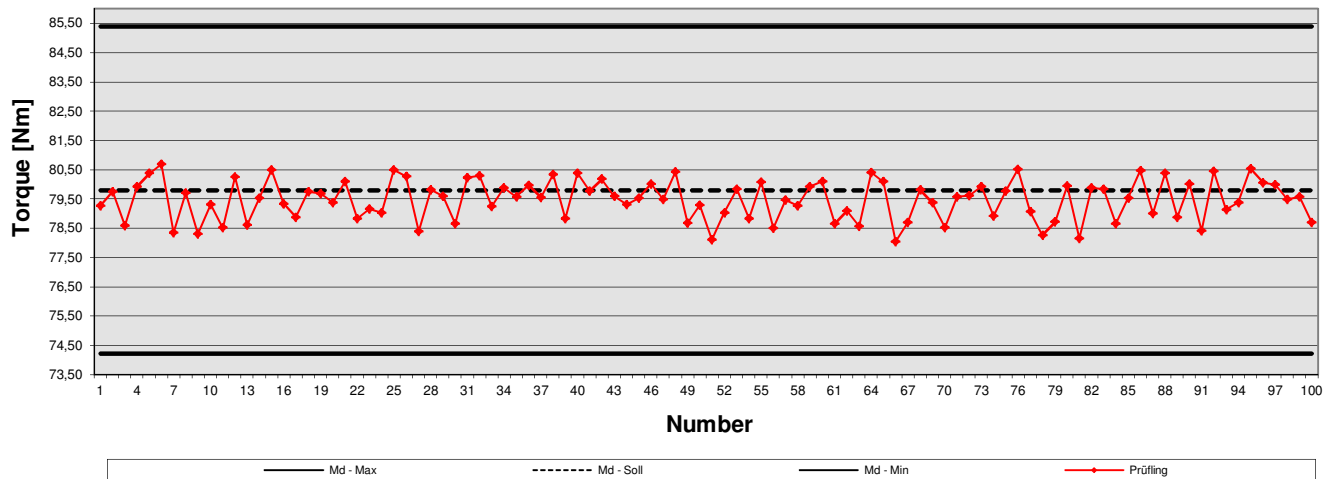


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93337

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	85,39	79,80	74,21	+/- 7,00%

### Hard joint 30°



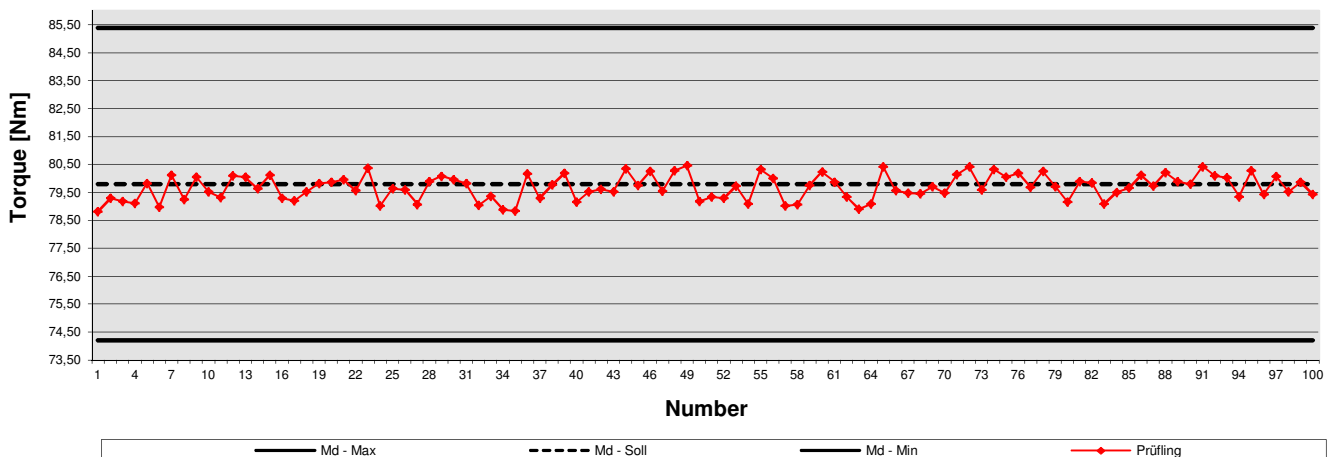
Statistics of the test piece

max. Torque	80,70 Nm	1 sig	0,683 Nm
min. Torque	78,04 Nm	6 sig	4,099 Nm
spread	2,66 Nm	+3 sig	81,52 Nm
Average	79,47 Nm	-3 sig	77,42 Nm

$$C_m = 2,73$$

$$C_{mk} = 2,57$$

### Soft joint 360°



Statistics of the test piece

max. Torque	80,45 Nm	1 sig	0,439 Nm
min. Torque	78,82 Nm	6 sig	2,632 Nm
spread	1,63 Nm	+3 sig	81,00 Nm
Average	79,68 Nm	-3 sig	78,36 Nm

$$C_m = 4,25$$

$$C_{mk} = 4,16$$

# CERTIFIKAT

## Machine capability tests

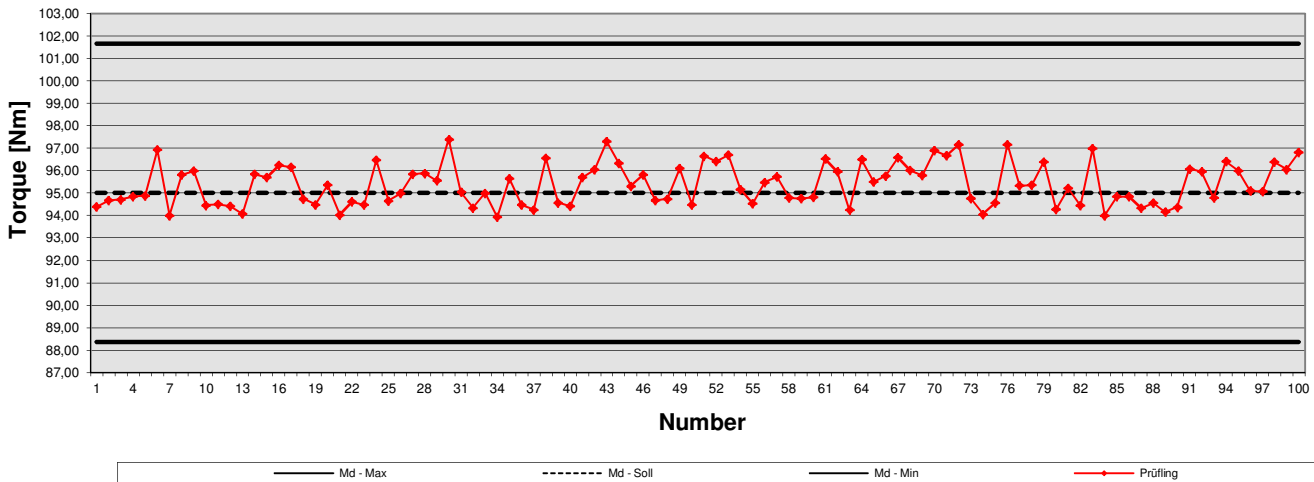


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93337

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	101,65	95,00	88,35	+/- 7,00%

### Hard joint 30°



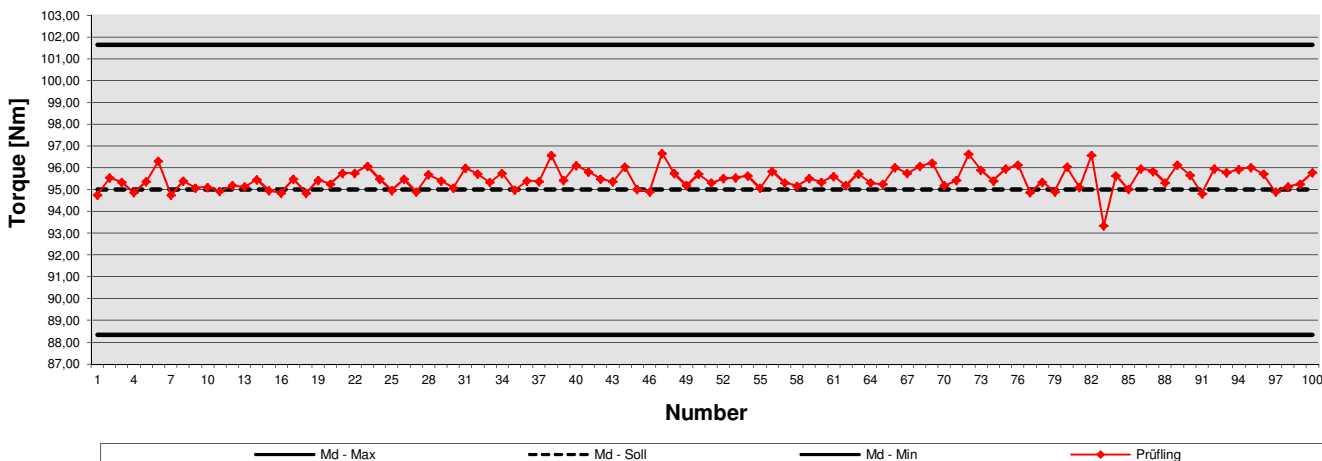
#### Statistics of the test piece

max. Torque	97,40 Nm	1 sig	0,925 Nm
min. Torque	93,94 Nm	6 sig	5,549 Nm
spread	3,46 Nm	+3 sig	98,15 Nm
Average	95,38 Nm	-3 sig	92,60 Nm

$$C_m = 2,40$$

$$C_{mk} = 2,26$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	96,67 Nm	1 sig	0,498 Nm
min. Torque	93,34 Nm	6 sig	2,990 Nm
spread	3,33 Nm	+3 sig	96,98 Nm
Average	95,49 Nm	-3 sig	93,99 Nm

$$C_m = 4,45$$

$$C_{mk} = 4,12$$

# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93337

### Combined statistics for the test object ( hard and soft joint ) [ Md = 30% ]

Number of tightenings	200	6 sigma	1,80 Nm
Average	41,76 Nm	Mean value offset	0,06 Nm
Sigma	0,30 Nm	Mean value offset %	0,15 %
Dispersion	1,53 Nm	comb. average torque	41,73 Nm
max. Torque	42,66 Nm	comb. torque variation	1,87 Nm
min. Torque	41,14 Nm	comb. torque variation %	4,48 %

$$C_m = 3,25$$

$$C_{mk} = 3,21$$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 80% ]

Number of tightenings	200	6 sigma	3,44 Nm
Average	79,58 Nm	Mean value offset	0,21 Nm
Sigma	0,57 Nm	Mean value offset %	0,26 %
Dispersion	2,66 Nm	comb. average torque	79,47 Nm
max. Torque	80,70 Nm	comb. torque variation	4,10 Nm
min. Torque	78,04 Nm	comb. torque variation %	5,16 %

$$C_m = 3,25$$

$$C_{mk} = 3,13$$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 100% ]

Number of tightenings	200	6 sigma	4,45 Nm
Average	95,44 Nm	Mean value offset	0,11 Nm
Sigma	0,74 Nm	Mean value offset %	0,11 %
Dispersion	4,06 Nm	comb. average torque	95,38 Nm
max. Torque	97,40 Nm	comb. torque variation	5,55 Nm
min. Torque	93,34 Nm	comb. torque variation %	5,82 %

$$C_m = 2,99$$

$$C_{mk} = 2,79$$

# CERTIFIKAT

## Machine capability test

Certificate no.:

**234085-03**

**Customer**

**Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**

Tool type: **EABC95-240**

Serial - No. : **15E93561**

**Torque range**

of: **19 Nm**  
to: **95 Nm**

Number of screw tightenings

at 30%	==>	<b>100</b>
at 80%	==>	<b>100</b>
at 100%	==>	<b>100</b>

Torque to be achieved

at 30%	==>	<b>41,80 Nm</b>
at 80%	==>	<b>79,80 Nm</b>
at 100%	==>	<b>95,00 Nm</b>

Above mentioned number of unions were performed on a hard and on a soft joint.

The series of measurements were divided into 30%, 80% and 100% of the torque range, and a joint with a rotation angle of 30 ° (hard) and 360 ° (soft).

Tolerance is the difference between USL, upper limit, and LSL, Lower Limit.

Date:

2015-07-17



# CERTIFIKAT

## Machine capability tests

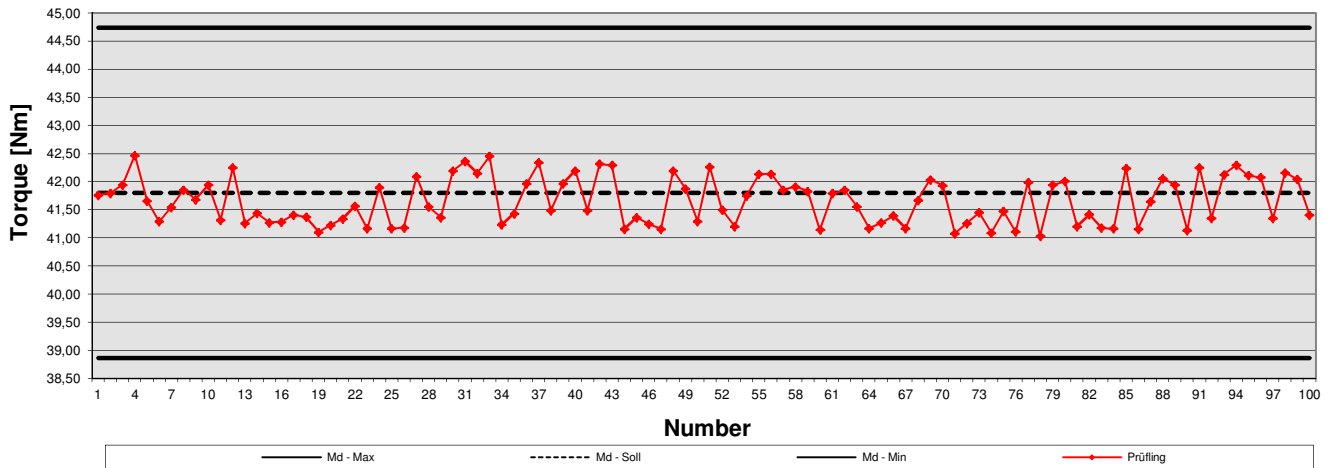


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93561

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	44,73	41,80	38,87	+/- 7,00%

### Hard joint 30°



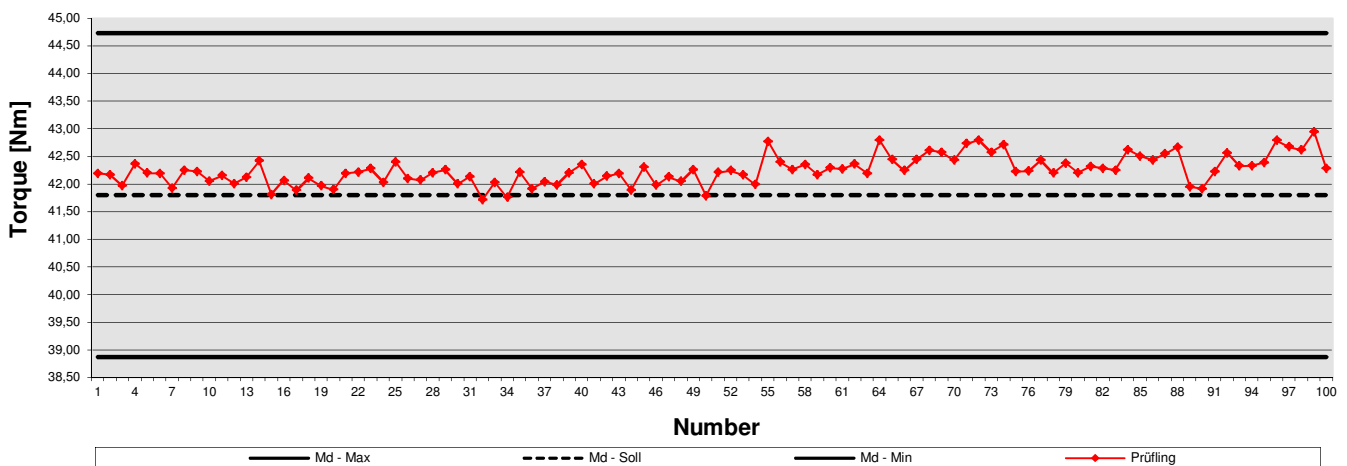
#### Statistics of the test piece

max. Torque	42,47 Nm	1 sig	0,413 Nm
min. Torque	41,04 Nm	6 sig	2,477 Nm
spread	1,43 Nm	+3 sig	42,90 Nm
Average	41,66 Nm	-3 sig	40,42 Nm

$$C_m = 2,37$$

$$C_{mk} = 2,25$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	42,95 Nm	1 sig	0,254 Nm
min. Torque	41,71 Nm	6 sig	1,524 Nm
spread	1,23 Nm	+3 sig	43,01 Nm
Average	42,25 Nm	-3 sig	41,49 Nm

$$C_m = 3,84$$

$$C_{mk} = 3,25$$

# CERTIFIKAT

## Machine capability tests

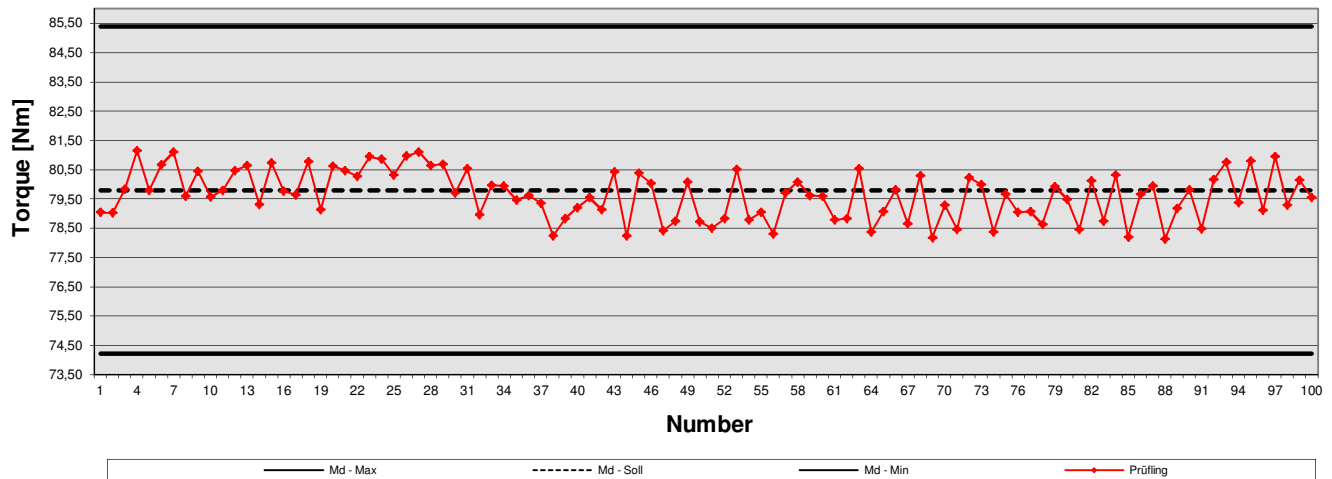


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93561

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	85,39	79,80	74,21	+/- 7,00%

### Hard joint 30°



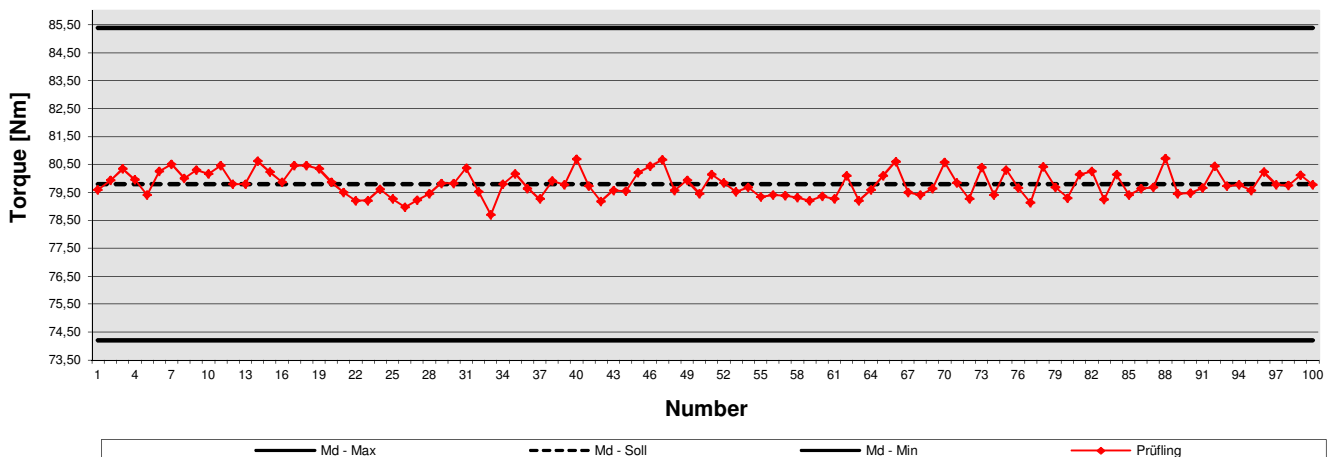
Statistics of the test piece

max. Torque	81,15 Nm	1 sig	0,826 Nm
min. Torque	78,13 Nm	6 sig	4,959 Nm
spread	3,02 Nm	+3 sig	82,12 Nm
Average	79,64 Nm	-3 sig	77,16 Nm

$$C_m = 2,25$$

$$C_{mk} = 2,19$$

### Soft joint 360°



Statistics of the test piece

max. Torque	80,72 Nm	1 sig	0,451 Nm
min. Torque	78,69 Nm	6 sig	2,705 Nm
spread	2,03 Nm	+3 sig	81,15 Nm
Average	79,80 Nm	-3 sig	78,45 Nm

$$C_m = 4,13$$

$$C_{mk} = 4,13$$

# CERTIFIKAT

## Machine capability tests

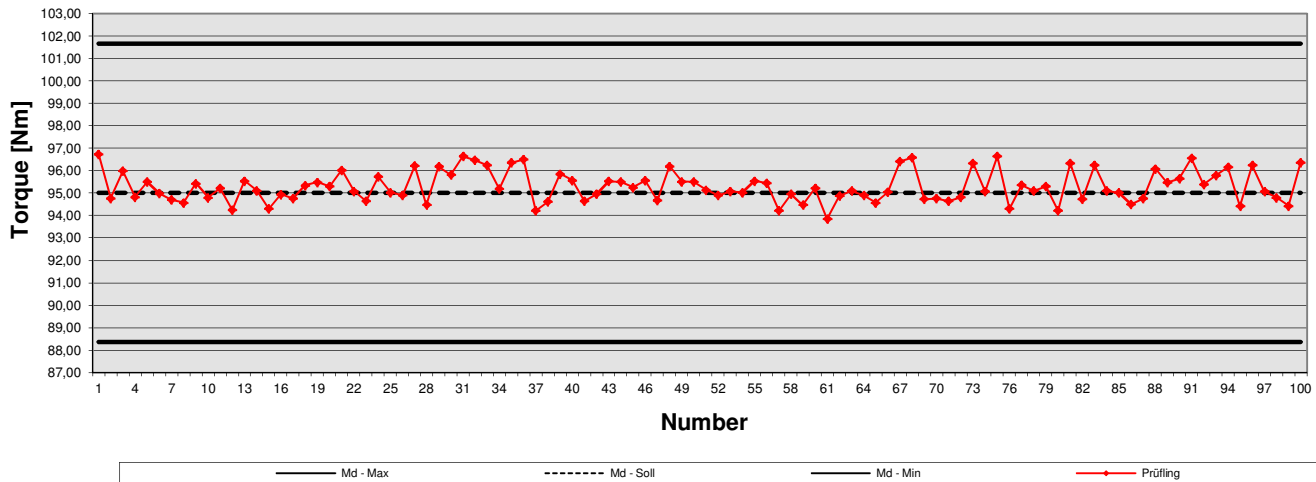


Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93561

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	101,65	95,00	88,35	+/- 7,00%

### Hard joint 30°

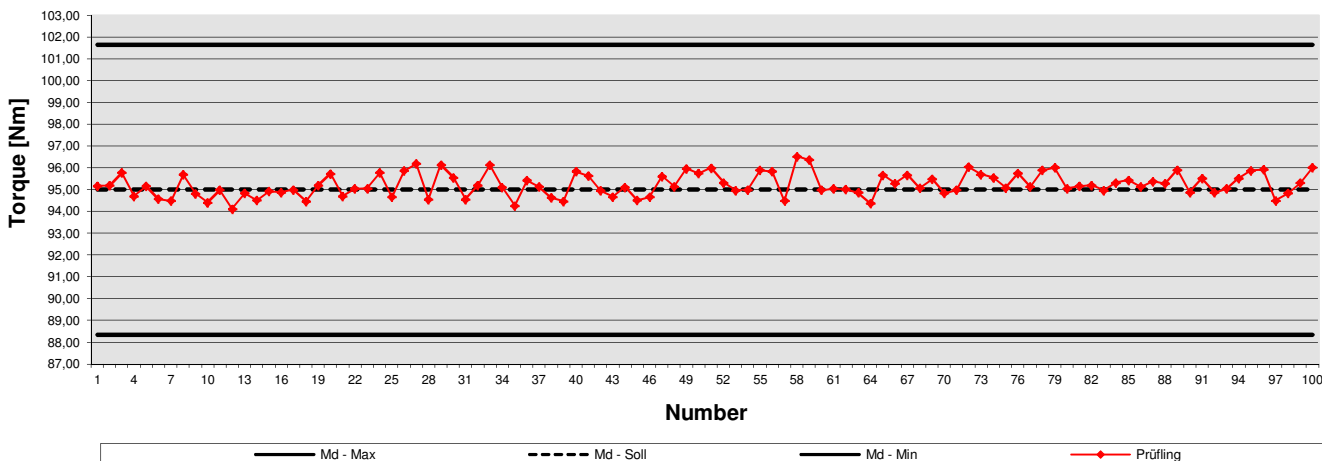


max. Torque	96,74 Nm	1 sig	0,688 Nm
min. Torque	93,84 Nm	6 sig	4,129 Nm
spread	2,90 Nm	+3 sig	97,36 Nm
Average	95,29 Nm	-3 sig	93,23 Nm

$$C_m = 3,22$$

$$C_{mk} = 3,08$$

### Soft joint 360°



max. Torque	96,53 Nm	1 sig	0,529 Nm
min. Torque	94,12 Nm	6 sig	3,173 Nm
spread	2,41 Nm	+3 sig	96,82 Nm
Average	95,23 Nm	-3 sig	93,64 Nm

$$C_m = 4,19$$

$$C_{mk} = 4,05$$

# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC95-240

Serial - No. : 15E93561

### Combined statistics for the test object ( hard and soft joint ) [ Md = 30% ]

Number of tightenings	200	6 sigma	2,05 Nm
Average	41,66 Nm	Mean value offset	0,59 Nm
Sigma	0,34 Nm	Mean value offset %	1,42 %
Dispersion	1,91 Nm	comb. average torque	41,72 Nm
max. Torque	42,95 Nm	comb. torque variation	2,59 Nm
min. Torque	41,04 Nm	comb. torque variation %	6,22 %

$$C_m = 2,86$$

$$C_{mk} = 2,72$$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 80% ]

Number of tightenings	200	6 sigma	3,98 Nm
Average	79,72 Nm	Mean value offset	0,16 Nm
Sigma	0,66 Nm	Mean value offset %	0,20 %
Dispersion	3,02 Nm	comb. average torque	79,64 Nm
max. Torque	81,15 Nm	comb. torque variation	4,96 Nm
min. Torque	78,13 Nm	comb. torque variation %	6,23 %

$$C_m = 2,81$$

$$C_{mk} = 2,77$$

### Combined statistics for the test object ( hard and soft joint ) [ Md = 100% ]

Number of tightenings	200	6 sigma	3,67 Nm
Average	95,25 Nm	Mean value offset	0,06 Nm
Sigma	0,61 Nm	Mean value offset %	0,07 %
Dispersion	2,90 Nm	comb. average torque	95,29 Nm
max. Torque	96,74 Nm	comb. torque variation	4,13 Nm
min. Torque	93,84 Nm	comb. torque variation %	4,33 %

$$C_m = 3,62$$

$$C_{mk} = 3,48$$

## **a. Temperature**

There was hardly no noticeable warming of the tool detected.

## **b. Battery lifetime**

After amount of 120 tightening on soft joint and 578 tightening on hard joint the nutrunner indicates a renewing of the battery load/ battery change.

## **V. Comments**

The testing process and statistical analysis were performed according to the currently applicable guideline VDI/VDE 2647.

The traceability of all generated static measurements and the traceability of measuring equipment used within calibration certificates are supported by the documentary proof of the legality of those accredited by the DKD laboratory according to DIN 51309 K 41401 guaranteed.

The corresponding proofs are in this report along with all other test results.

Responsible for implementing



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