



# 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**  
June 2015  
Power Tools Central Service Workshop  
Różyniec 83C, 59-706 Gromadka,  
Polen

### III. Testobject

Battery nutrunner:  
EABC32-410

Serial number 14 E 87401  
15 E 92979  
15 E 93100

<b>Model</b>	<b>EABC32-410</b>
<b>Ordering No</b>	6151658430
<b>Square Drive / Female Hex</b>	Square drive
<b>Torque range ft lb</b>	5.2 – 24
<b>Torque range Nm</b>	7 – 32
<b>CS distance mm</b>	-
<b>Weight kg</b>	1.65
<b>Weight lb</b>	3.64
<b>Length mm</b>	496
<b>Speed r/min</b>	410
<b>Height mm</b>	45.7
<b>Square drive in</b>	3/8



Li-Ion 36 VDC 2,1 Ah  
Serial number 00123-14-W40



Controller CVI3 – Vision  
Serial number: 27011100077



## IV. Test condition

### a. Mounting



### b. Test equipment

Hersteller: **BLM, Mailand ( Italien )**  
Typ: **3860/4**  
Ser.-Nr.: **3860SKY.103**  
Zelle 2 : **10-50 N·m, dynamisch**  
Ser.-Nr.: **188.50.143**  
Rückführung: **EN2530**  
Filterfrequenz: **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 :	7 - 32 N•m
Testing torque / 30% hard/soft joint	14.50 N•m
Testing torque / 80% hard/soft joint	27.00 N•m
Testing torque / 100% hard/soft joint	32.00 N•m
Speed 1 step	410 rpm
Speed 2 step	50 rpm
Angle threshold / 30%	7.25 Nm
Angle threshold / 80%	13.50 Nm
Angle threshold / 100%	16.00 Nm
Switching torque / 30%	6.525 Nm
Switching torque / 80%	12.15 Nm
Switching torque / 100%	14.40 Nm
Angle strategy 40°	6.4 N•m (19.2) N•m
Angle strategy 180°	6.4 N•m (25.6) 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°	360 °±15°
EABC32-410		Test torque	14,50 Nm		27,00 Nm		32,00 Nm	
		Speed 1st stage	410 rpm					
		Speed 2st stage	50 rpm					
		Start angle measurement	7,25 Nm		13,50 Nm		16,00 Nm	
	14E87401	cm	3,11	3,28	5,00	4,96	3,98	4,08
		cmk	2,68	2,93	4,96	4,64	3,88	4,02
	15E92979	cm	2,70	2,33	3,09	3,77	2,80	3,22
		cmk	2,47	2,12	3,00	3,66	2,69	3,21
	15E93100	cm	2,57	2,59	2,65	4,00	3,76	3,57
		cmk	2,41	2,40	2,64	3,91	3,75	3,52

Min cm/cmk	cm	2,57	2,33	2,65	3,77	2,80	3,22
	cmk	2,41	2,12	2,64	3,66	2,69	3,21

		Range:	≥ 1,67	
Capability Index:		<b>C<sub>m</sub></b>	2,33	<b>OK</b>
Capability Index:		<b>C<sub>mk</sub></b>	2,12	<b>OK</b>

### Ranges of tolerance for angle and torque

Tool type	Serial Nr.	Test data	60% from range		80% from range	
			40°		180°	
EABC32-410		Test torque	19,2 Nm		25,6 Nm	
		Speed 1st stage	410 rpm			
		Start angle	6,4 Nm		6,4 Nm	
	14E87401	Torque	±	6,41%	±	6,67%
		Angle	±	4,6°	±	5,8°
	15E92979	Torque	±	6,50%	±	4,96%
		Angle	±	1,8°	±	5,8°
	15E93100	Torque	±	6,54%	±	5,05%
		Angle	±	4,2°	±	6,8°

Max Torque	Torque	Range:	7%	Range:	7%	40°	180°
	1st:	±	6,54%	±	6,67%	<b>OK</b>	<b>OK</b>
Max Angle	Angle	Range:	5°	Range:	10°	40°	180°
	1st:	±	4,6°	±	6,8°	<b>OK</b>	<b>OK</b>

# CERTIFIKAT

## Machine capability test

Certificate no.: **234087-01**

**Customer**                      **Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**  
Tool type: **EABC32-410**                      Serial - No. : **14E87401**

**Torque range**

of:                      **7 Nm**  
to:                      **32 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%    ==>    **14,50 Nm**  
  
at 80%    ==>    **27,00 Nm**  
  
at 100%   ==>    **32,00 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:

2015-06-05

# CERTIFIKAT

## Machine capability tests

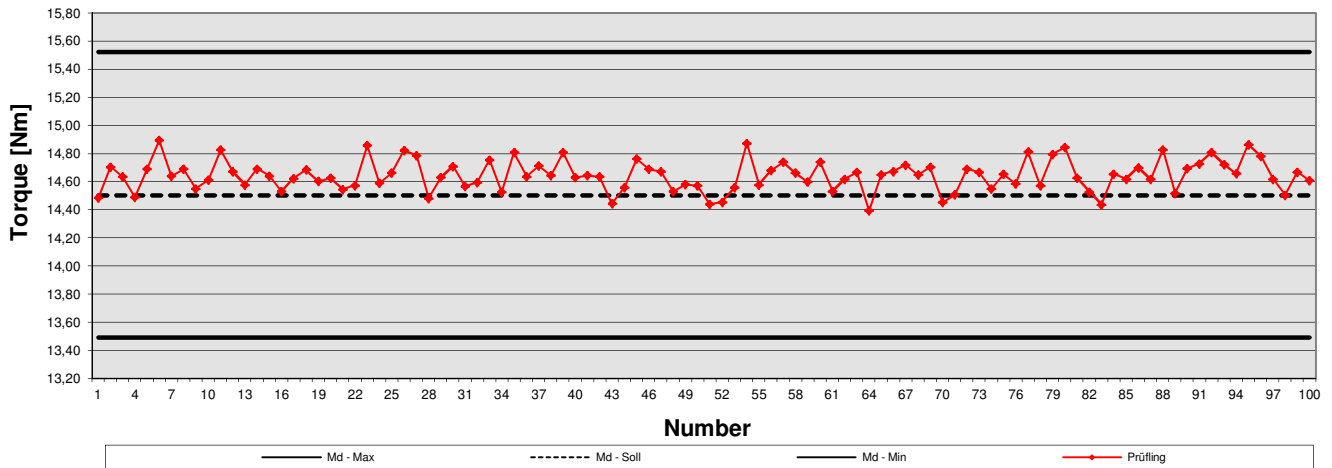


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 14E87401

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	15,52	14,50	13,49	+/- 7,00%

### Hard joint 30°



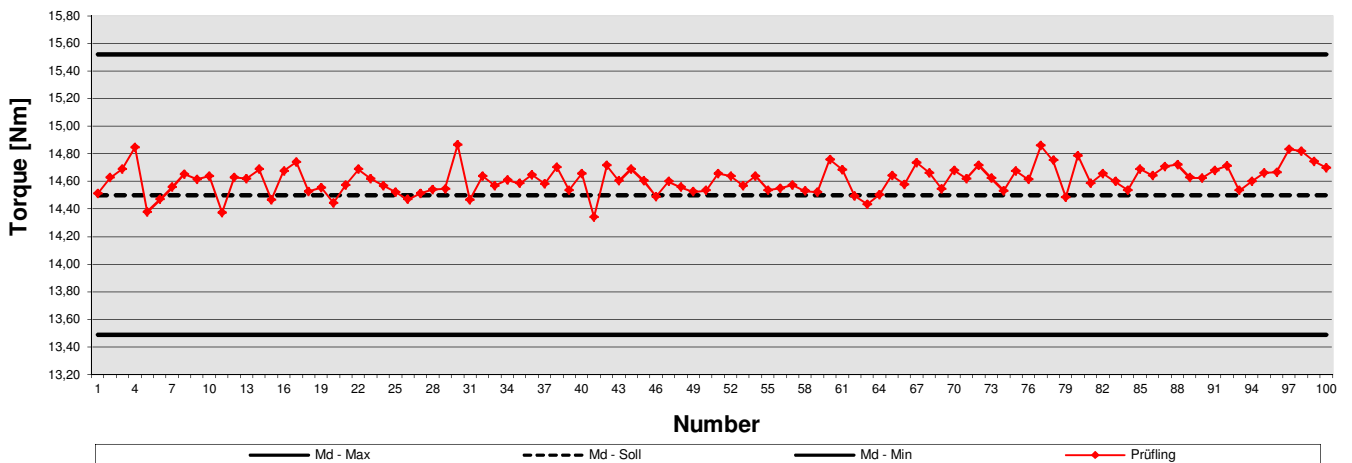
#### Statistics of the test piece

max. Torque	14,89 Nm	1 sig	0,109 Nm
min. Torque	14,40 Nm	6 sig	0,653 Nm
spread	0,50 Nm	+3 sig	14,97 Nm
Average	14,65 Nm	-3 sig	14,32 Nm

$$C_m = 3,11$$

$$C_{mk} = 2,68$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	14,87 Nm	1 sig	0,103 Nm
min. Torque	14,34 Nm	6 sig	0,620 Nm
spread	0,53 Nm	+3 sig	14,92 Nm
Average	14,61 Nm	-3 sig	14,30 Nm

$$C_m = 3,28$$

$$C_{mk} = 2,93$$

# CERTIFIKAT

## Machine capability tests

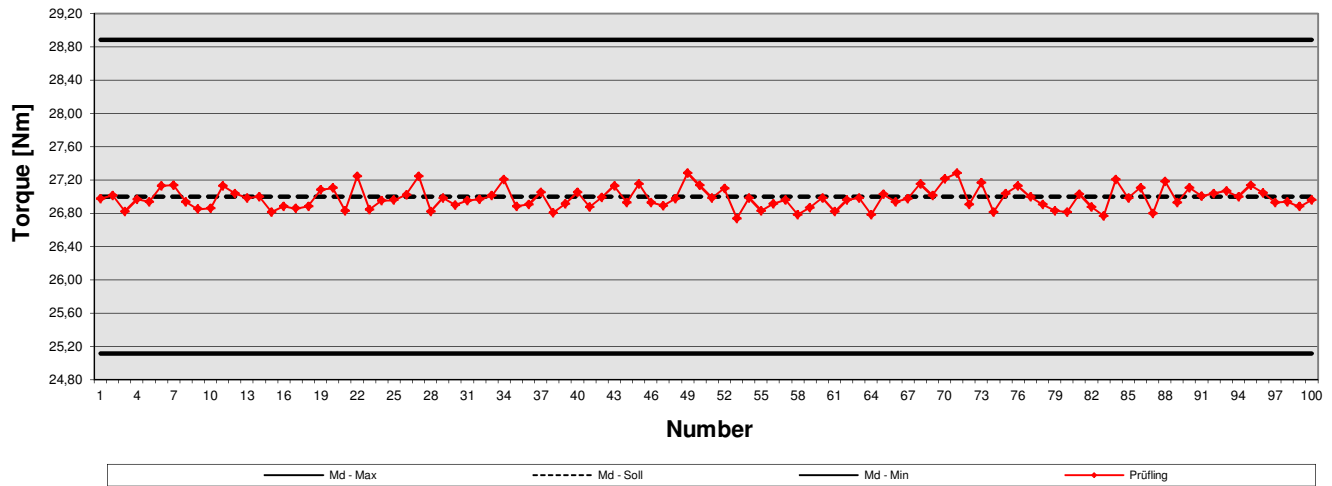


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 14E87401

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	28,89	27,00	25,11	+/- 7,00%

### Hard joint 30°



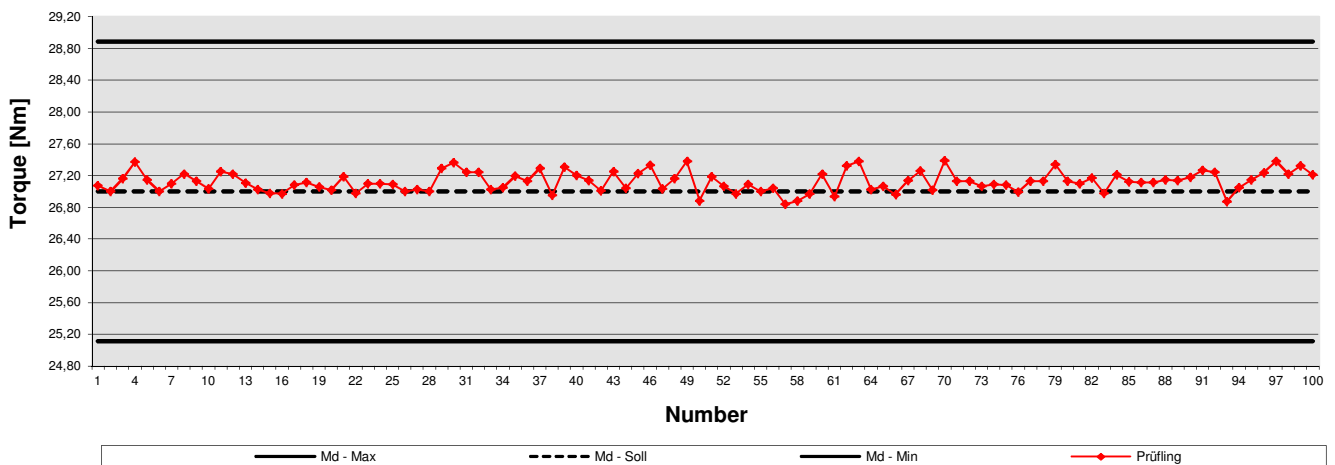
#### Statistics of the test piece

max. Torque	27,29 Nm	1 sig	0,126 Nm
min. Torque	26,74 Nm	6 sig	0,756 Nm
spread	0,55 Nm	+3 sig	27,36 Nm
Average	26,98 Nm	-3 sig	26,60 Nm

$$C_m = 5,00$$

$$C_{mk} = 4,96$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	27,39 Nm	1 sig	0,127 Nm
min. Torque	26,84 Nm	6 sig	0,762 Nm
spread	0,55 Nm	+3 sig	27,50 Nm
Average	27,12 Nm	-3 sig	26,74 Nm

$$C_m = 4,96$$

$$C_{mk} = 4,64$$



# CERTIFIKAT

## Machine capability tests

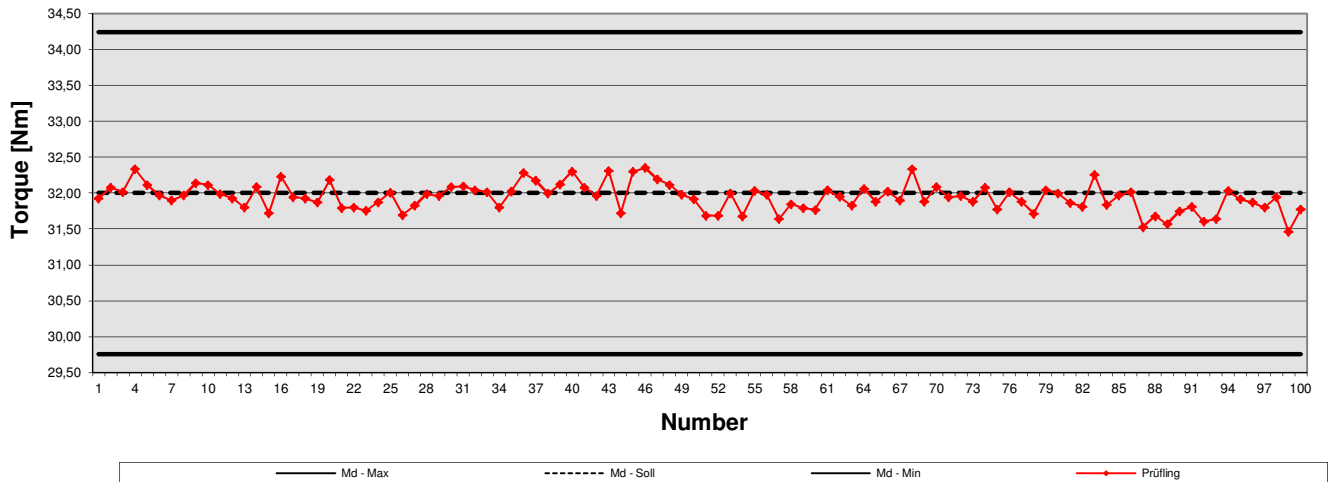


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 14E87401

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	34,24	32,00	29,76	+/- 7,00%

### Hard joint 30°



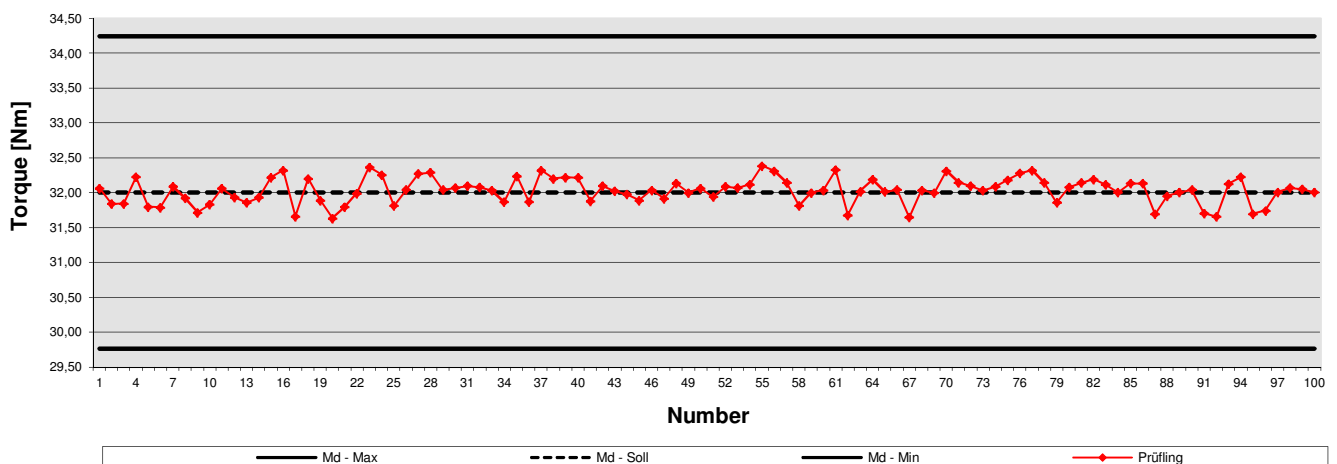
#### Statistics of the test piece

max. Torque	32,36 Nm	1 sig	0,188 Nm
min. Torque	31,46 Nm	6 sig	1,125 Nm
spread	0,90 Nm	+3 sig	32,51 Nm
Average	31,94 Nm	-3 sig	31,38 Nm

$$C_m = 3,98$$

$$C_{mk} = 3,88$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	32,38 Nm	1 sig	0,183 Nm
min. Torque	31,63 Nm	6 sig	1,099 Nm
spread	0,75 Nm	+3 sig	32,58 Nm
Average	32,03 Nm	-3 sig	31,48 Nm

$$C_m = 4,08$$

$$C_{mk} = 4,02$$

# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 14E87401

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

Number of tightenings	200	6 sigma	0,64 Nm
Average	14,65 Nm	Mean value offset	0,03 Nm
Sigma	0,11 Nm	Mean value offset %	0,23 %
Dispersion	0,55 Nm	comb. average torque	14,64 Nm
max. Torque	14,89 Nm	comb. torque variation	0,67 Nm
min. Torque	14,34 Nm	comb. torque variation %	4,58 %

$C_m = 3,20$

$C_{mk} = 2,75$

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

Number of tightenings	200	6 sigma	0,76 Nm
Average	27,05 Nm	Mean value offset	0,14 Nm
Sigma	0,13 Nm	Mean value offset %	0,52 %
Dispersion	0,66 Nm	comb. average torque	27,05 Nm
max. Torque	27,39 Nm	comb. torque variation	0,90 Nm
min. Torque	26,74 Nm	comb. torque variation %	3,33 %

$C_m = 5,00$

$C_{mk} = 4,85$

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

Number of tightenings	200	6 sigma	1,11 Nm
Average	31,99 Nm	Mean value offset	0,09 Nm
Sigma	0,18 Nm	Mean value offset %	0,27 %
Dispersion	0,92 Nm	comb. average torque	31,98 Nm
max. Torque	32,38 Nm	comb. torque variation	1,20 Nm
min. Torque	31,46 Nm	comb. torque variation %	3,75 %

$C_m = 4,04$

$C_{mk} = 4,01$

# CERTIFIKAT

## Machine capability test

Certificate no.:

**234087-02**

**Customer**

**Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**

Tool type: **EABC32-410**

Serial - No. : **15E92979**

**Torque range**

of: **7 Nm**  
to: **32 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>14,50 Nm</b>
at 80%	==>	<b>27,00 Nm</b>
at 100%	==>	<b>32,00 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:

2015-06-05

# CERTIFIKAT

## Machine capability tests

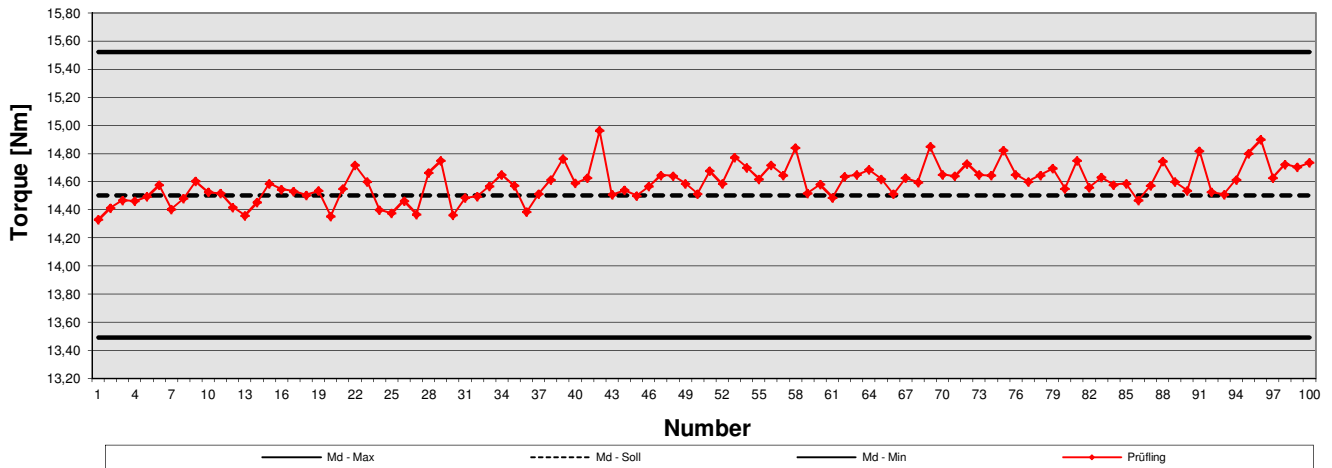


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E92979

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	15,52	14,50	13,49	+/- 7,00%

### Hard joint 30°



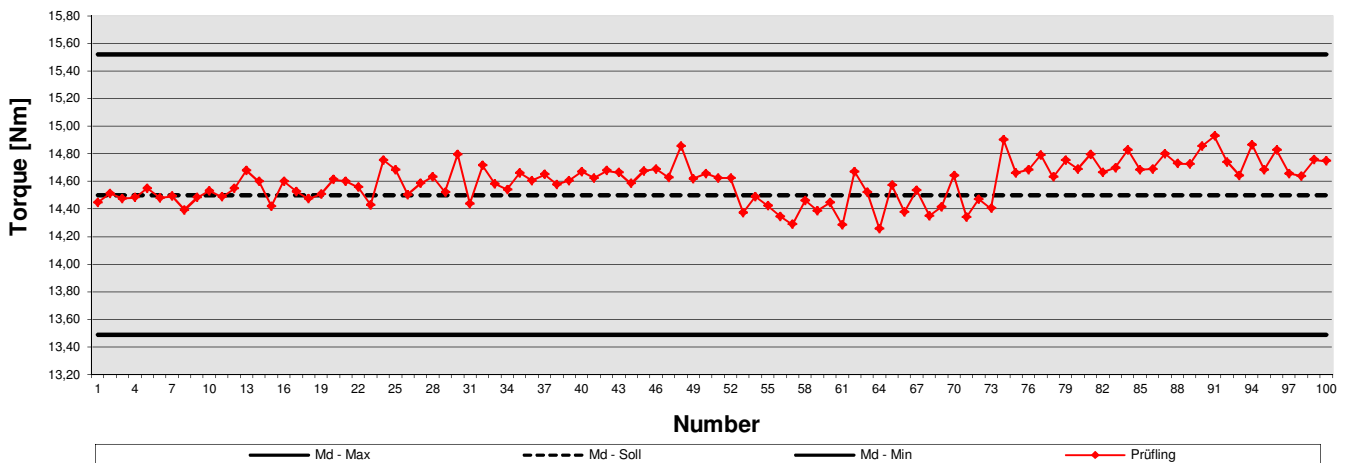
#### Statistics of the test piece

max. Torque	14,96 Nm	1 sig	0,126 Nm
min. Torque	14,33 Nm	6 sig	0,753 Nm
spread	0,63 Nm	+3 sig	14,97 Nm
Average	14,59 Nm	-3 sig	14,21 Nm

$$C_m = 2,70$$

$$C_{mk} = 2,47$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	14,93 Nm	1 sig	0,145 Nm
min. Torque	14,26 Nm	6 sig	0,871 Nm
spread	0,67 Nm	+3 sig	15,03 Nm
Average	14,59 Nm	-3 sig	14,16 Nm

$$C_m = 2,33$$

$$C_{mk} = 2,12$$

# CERTIFIKAT

## Machine capability tests

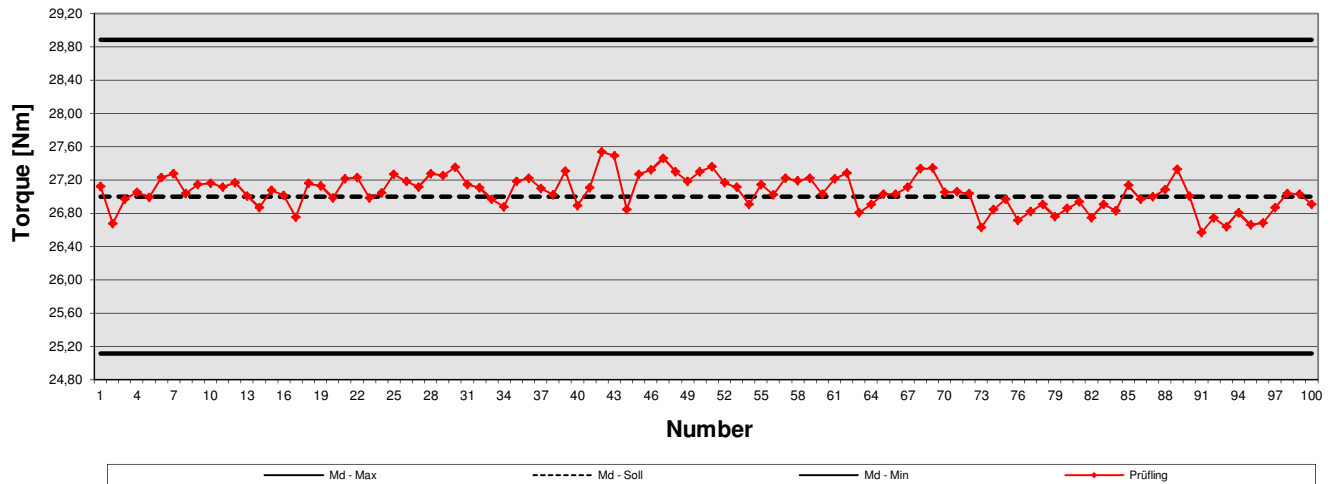


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E92979

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	28,89	27,00	25,11	+/- 7,00%

### Hard joint 30°



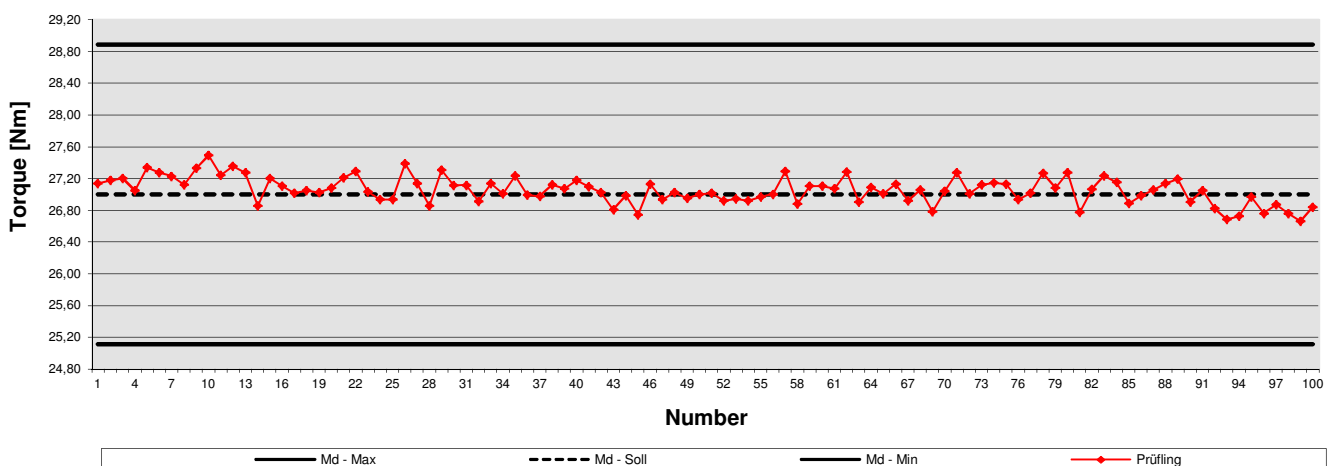
#### Statistics of the test piece

max. Torque	27,54 Nm	1 sig	0,204 Nm
min. Torque	26,57 Nm	6 sig	1,222 Nm
spread	0,97 Nm	+3 sig	27,67 Nm
Average	27,06 Nm	-3 sig	26,44 Nm

$$C_m = 3,09$$

$$C_{mk} = 3,00$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	27,49 Nm	1 sig	0,167 Nm
min. Torque	26,66 Nm	6 sig	1,003 Nm
spread	0,83 Nm	+3 sig	27,56 Nm
Average	27,05 Nm	-3 sig	26,55 Nm

$$C_m = 3,77$$

$$C_{mk} = 3,66$$

# CERTIFIKAT

## Machine capability tests

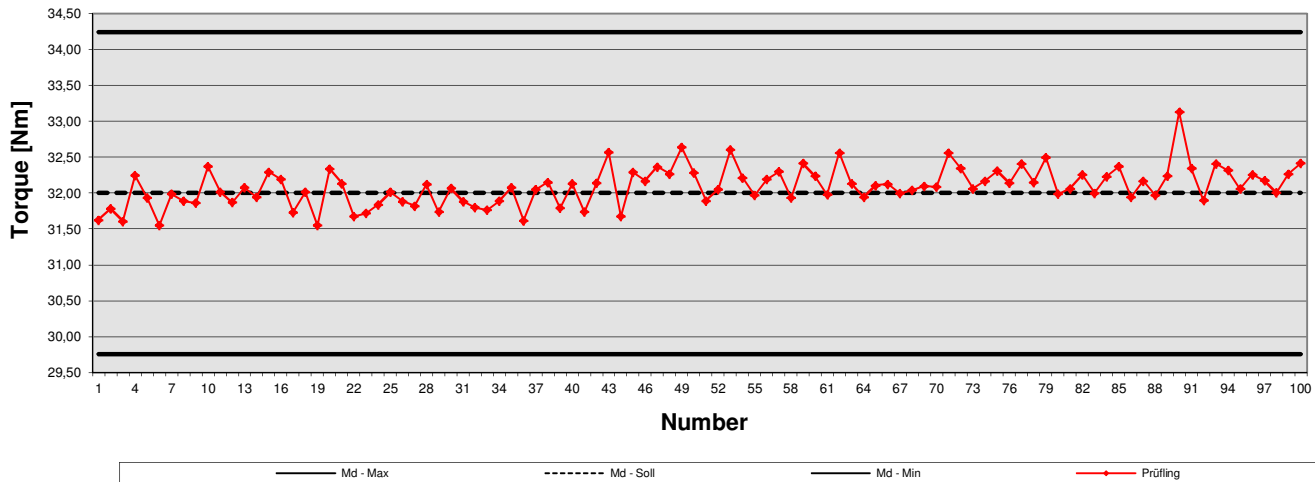


Manufacturer: Desoutter  
Tool type: EABC32-410

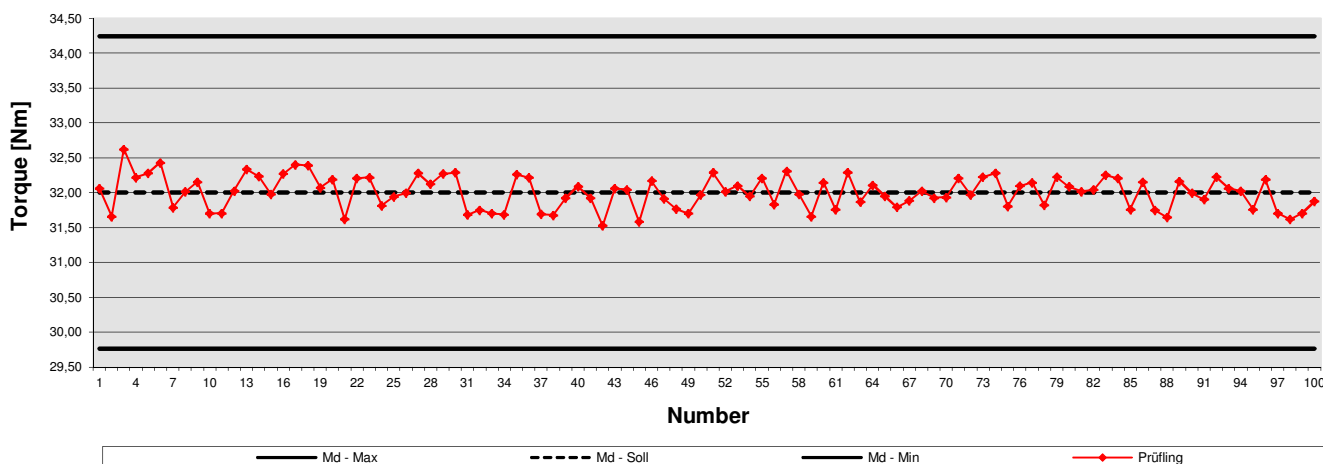
Serial - No. : 15E92979

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	34,24	32,00	29,76	+/- 7,00%

### Hard joint 30°



### Soft joint 360°



# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E92979

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

Number of tightenings	200	6 sigma	0,81 Nm
Average	14,59 Nm	Mean value offset	0,00 Nm
Sigma	0,14 Nm	Mean value offset %	0,02 %
Dispersion	0,71 Nm	comb. average torque	14,59 Nm
max. Torque	14,96 Nm	comb. torque variation	0,87 Nm
min. Torque	14,26 Nm	comb. torque variation %	5,97 %

$$C_m = 2,50$$

$$C_{mk} = 2,28$$

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

Number of tightenings	200	6 sigma	1,12 Nm
Average	27,05 Nm	Mean value offset	0,00 Nm
Sigma	0,19 Nm	Mean value offset %	0,01 %
Dispersion	0,97 Nm	comb. average torque	27,06 Nm
max. Torque	27,54 Nm	comb. torque variation	1,22 Nm
min. Torque	26,57 Nm	comb. torque variation %	4,52 %

$$C_m = 3,39$$

$$C_{mk} = 3,29$$

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

Number of tightenings	200	6 sigma	1,50 Nm
Average	32,05 Nm	Mean value offset	0,09 Nm
Sigma	0,25 Nm	Mean value offset %	0,27 %
Dispersion	1,60 Nm	comb. average torque	32,09 Nm
max. Torque	33,13 Nm	comb. torque variation	1,60 Nm
min. Torque	31,53 Nm	comb. torque variation %	4,99 %

$$C_m = 3,00$$

$$C_{mk} = 2,93$$

# CERTIFIKAT

## Machine capability test

Certificate no.:

**234087-03**

**Customer**

**Desoutter Industrial Tools**

**Test object**

Manufacturer: **Desoutter**

Tool type: **EABC32-410**

Serial - No. : **15E93100**

**Torque range**

of: **7 Nm**

to: **32 Nm**

Number of screw tightenings

at 30% ==> **100**

at 80% ==> **100**

at 100% ==> **100**

Torque to be achieved

at 30% ==> **14,50 Nm**

at 80% ==> **27,00 Nm**

at 100% ==> **32,00 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:

2015-06-05



# CERTIFIKAT

## Machine capability tests

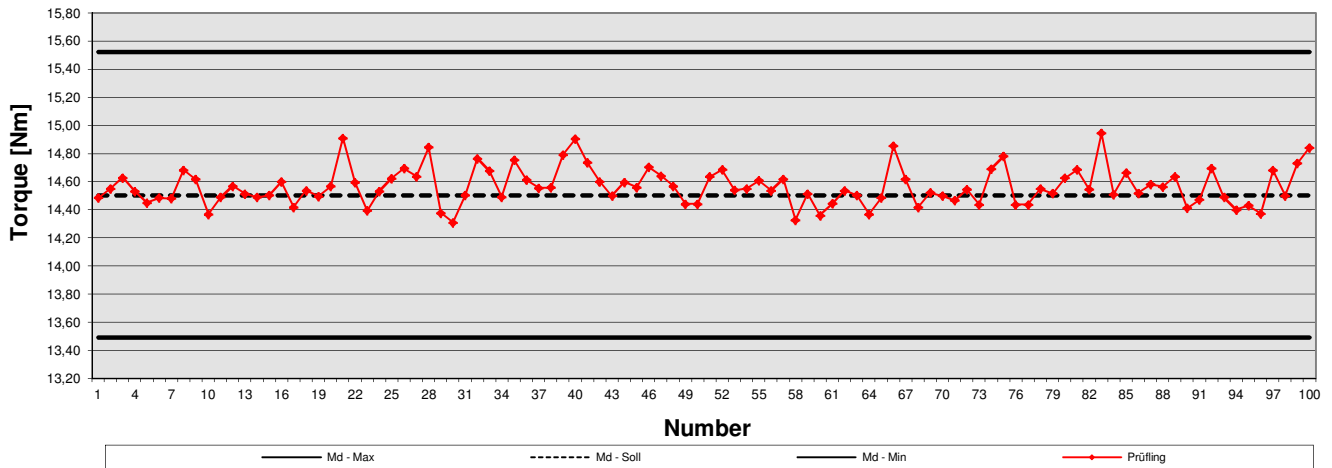


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E93100

<b>30% of the torque</b>	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	15,52	14,50	13,49	+/- 7,00%

### Hard joint 30°



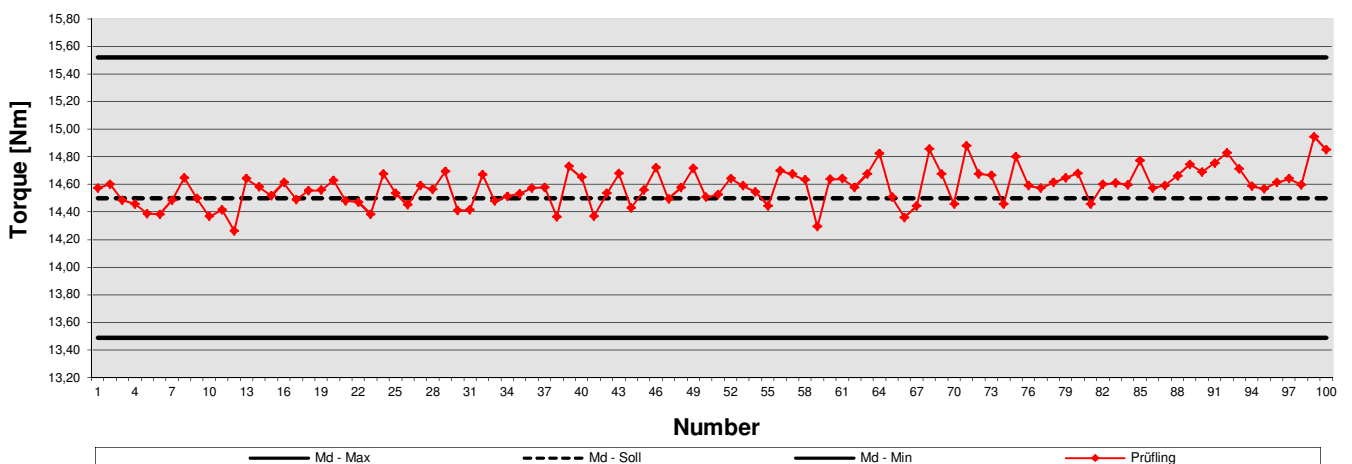
#### Statistics of the test piece

max. Torque	14,94 Nm		1 sig	0,132 Nm
min. Torque	14,31 Nm		6 sig	0,791 Nm
spread	0,63 Nm		+3 sig	14,96 Nm
Average	14,57 Nm		-3 sig	14,17 Nm

$$C_m = 2,57$$

$$C_{mk} = 2,41$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	14,94 Nm		1 sig	0,131 Nm
min. Torque	14,26 Nm		6 sig	0,783 Nm
spread	0,68 Nm		+3 sig	14,97 Nm
Average	14,58 Nm		-3 sig	14,19 Nm

$$C_m = 2,59$$

$$C_{mk} = 2,40$$

# CERTIFIKAT

## Machine capability tests

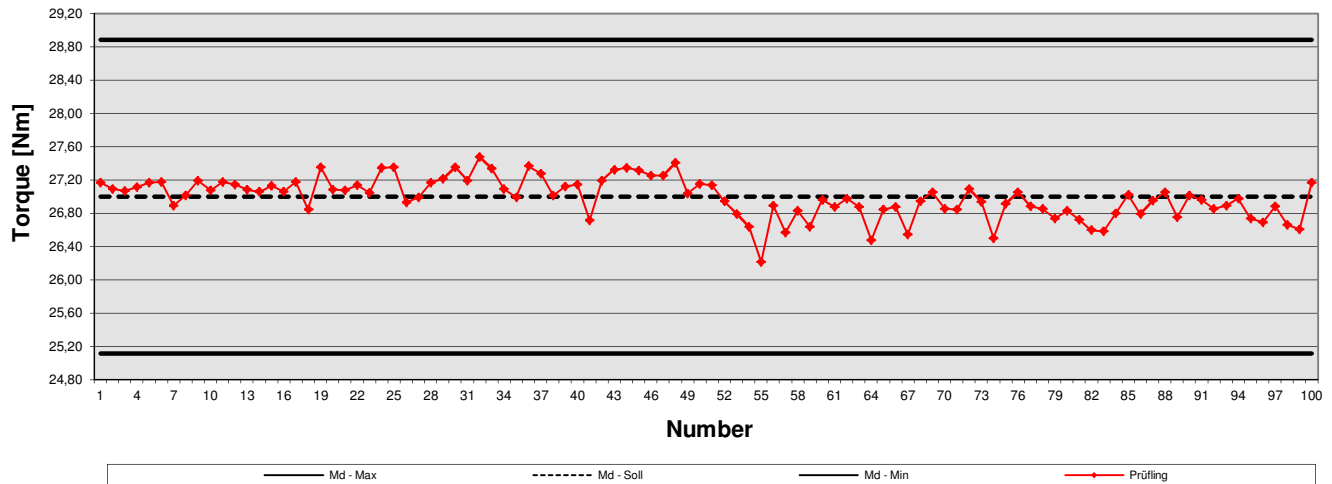


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E93100

<b>80% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	28,89	27,00	25,11	+/- 7,00%

### Hard joint 30°



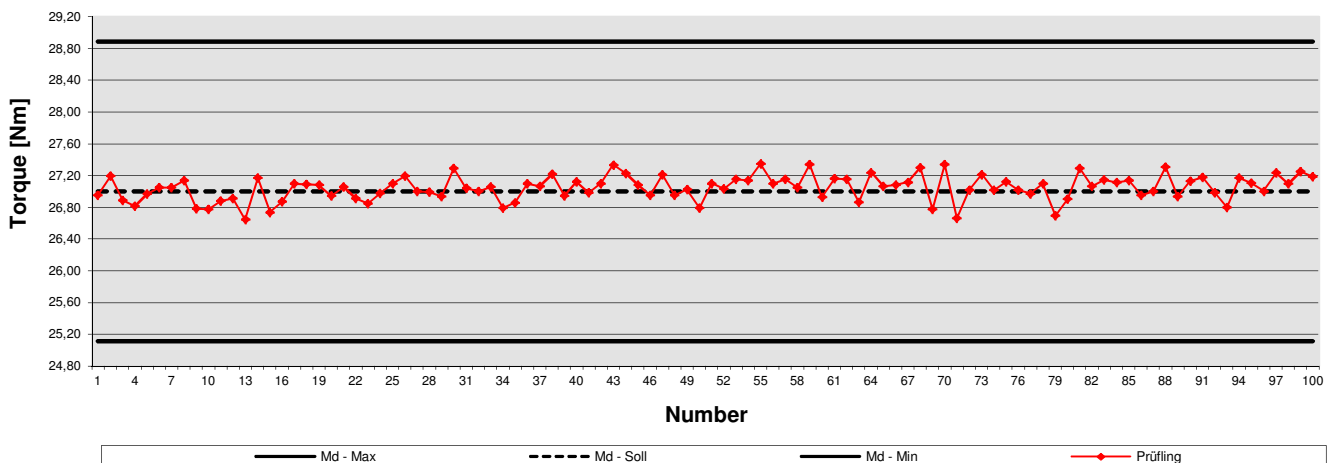
#### Statistics of the test piece

max. Torque	27,48 Nm	1 sig	0,237 Nm
min. Torque	26,22 Nm	6 sig	1,424 Nm
spread	1,26 Nm	+3 sig	27,70 Nm
Average	26,99 Nm	-3 sig	26,28 Nm

$$C_m = 2,65$$

$$C_{mk} = 2,64$$

### Soft joint 360°



#### Statistics of the test piece

max. Torque	27,35 Nm	1 sig	0,157 Nm
min. Torque	26,64 Nm	6 sig	0,945 Nm
spread	0,71 Nm	+3 sig	27,52 Nm
Average	27,04 Nm	-3 sig	26,57 Nm

$$C_m = 4,00$$

$$C_{mk} = 3,91$$

# CERTIFIKAT

## Machine capability tests

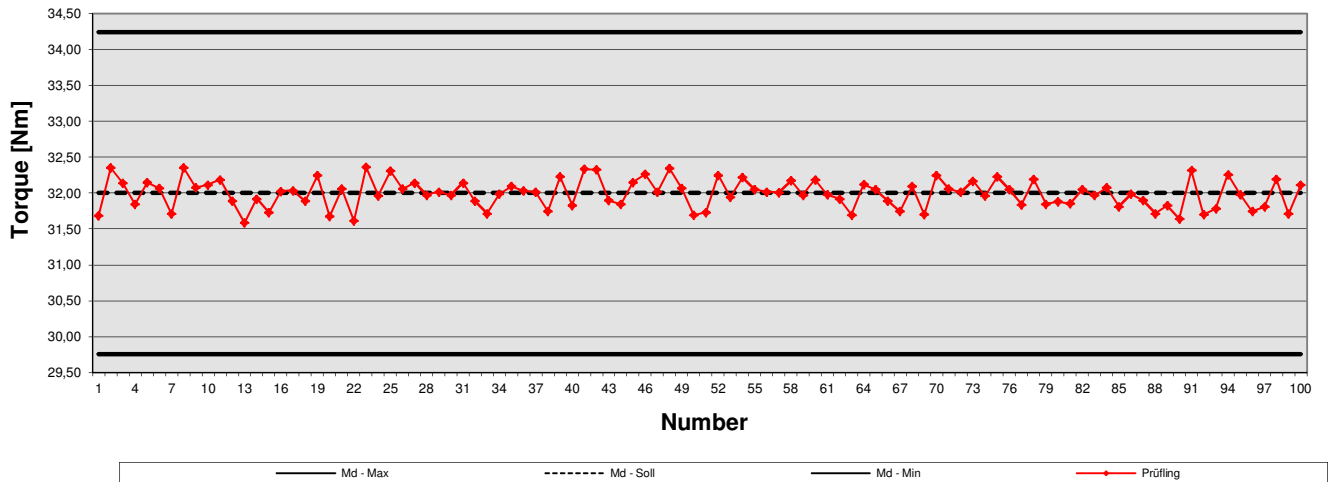


Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E93100

<b>100% of the torque</b>	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	34,24	32,00	29,76	+/- 7,00%

### Hard joint 30°



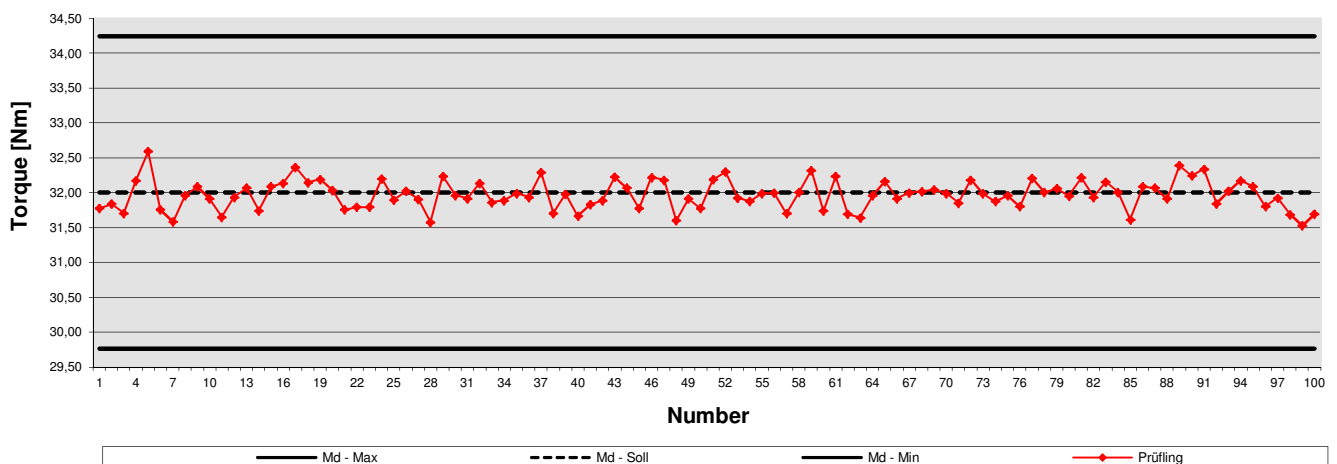
Statistics of the test piece

max. Torque	32,36 Nm	1 sig	0,198 Nm
min. Torque	31,58 Nm	6 sig	1,191 Nm
spread	0,78 Nm	+3 sig	32,59 Nm
Average	31,99 Nm	-3 sig	31,40 Nm

$$C_m = 3,76$$

$$C_{mk} = 3,75$$

### Soft joint 360°



Statistics of the test piece

max. Torque	32,59 Nm	1 sig	0,209 Nm
min. Torque	31,53 Nm	6 sig	1,254 Nm
spread	1,07 Nm	+3 sig	32,60 Nm
Average	31,97 Nm	-3 sig	31,34 Nm

$$C_m = 3,57$$

$$C_{mk} = 3,52$$

# CERTIFIKAT

## Machine capability tests



Manufacturer: Desoutter  
Tool type: EABC32-410

Serial - No. : 15E93100

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

Number of tightenings	200	6 sigma	0,79 Nm
Average	14,57 Nm	Mean value offset	0,02 Nm
Sigma	0,13 Nm	Mean value offset %	0,10 %
Dispersion	0,68 Nm	comb. average torque	14,57 Nm
max. Torque	14,94 Nm	comb. torque variation	0,80 Nm
min. Torque	14,26 Nm	comb. torque variation %	5,51 %

$$C_m = 2,59$$

$$C_{mk} = 2,43$$

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

Number of tightenings	200	6 sigma	1,21 Nm
Average	27,02 Nm	Mean value offset	0,05 Nm
Sigma	0,20 Nm	Mean value offset %	0,20 %
Dispersion	1,26 Nm	comb. average torque	26,99 Nm
max. Torque	27,48 Nm	comb. torque variation	1,42 Nm
min. Torque	26,22 Nm	comb. torque variation %	5,28 %

$$C_m = 3,14$$

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

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

Number of tightenings	200	6 sigma	1,22 Nm
Average	31,98 Nm	Mean value offset	0,02 Nm
Sigma	0,20 Nm	Mean value offset %	0,08 %
Dispersion	1,07 Nm	comb. average torque	31,97 Nm
max. Torque	32,59 Nm	comb. torque variation	1,25 Nm
min. Torque	31,53 Nm	comb. torque variation %	3,92 %

$$C_m = 3,67$$

$$C_{mk} = 3,65$$

## **a. Temperature**

There was hardly no noticeable warming of the tool detected.

## **b. Battery lifetime**

After amount of 434 tightening on soft joint and 917 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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Dariusz Bieganski

[dariusz.bieganski@desouttertools.com](mailto:dariusz.bieganski@desouttertools.com)