



Test report

Battery angle nutrunner – homologation

- I. Customer**
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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 45-330

Serial number 14E88485
15E93366
15E93524

Model	EABC 45-330
Ordering No	6151658440
Square Drive / Female Hex	Square drive
Torque range ft lb	6.6 – 30
Torque range Nm	9 – 45
CS distance mm	-
Weight kg	1.76
Weight lb	3.88
Length mm	506
Speed r/min	330
Height mm	51
Square drive in	3/8



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

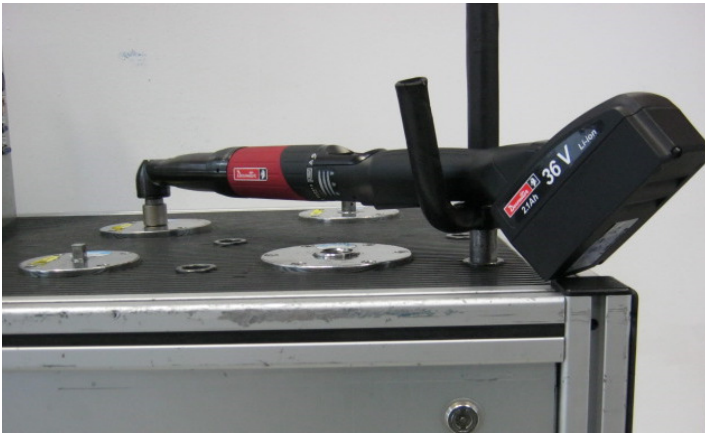


Controller CVI3 – Vision
Serial number: 27011100077



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**
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 :	9 – 45 Nm
Testing torque / 30% hard/soft joint	19.80 Nm
Testing torque / 80% hard/soft joint	37.80 Nm
Testing torque / 100% hard/soft joint	45.00 Nm
Speed 1 step	330 rpm
Speed 2 step	50 rpm
Angle threshold / 30%	9.90 Nm
Angle threshold / 80%	18.90 Nm
Angle threshold / 100%	22.50 Nm
Switching torque / 30%	8.91 Nm
Switching torque / 80%	17.01 Nm
Switching torque / 100%	20.25 Nm
Angle strategy 40°	9 Nm (27.00)Nm
Angle strategy 180°	9 Nm (36.00)Nm
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°
EABC45-330		Test torque	19,80 Nm		37,80 Nm		45,00 Nm	
		Speed 1st stage	330 rpm					
		Speed 2st stage	50 rpm					
		Start angle measurement	9,90 Nm		18,90 Nm		22,50 Nm	
	14E88485	cm	2,71	2,68	2,97	3,28	2,68	3,15
		cmk	2,54	2,03	2,92	2,82	2,56	2,95
	15E93366	cm	3,05	2,52	3,13	3,64	3,20	2,69
		cmk	2,92	2,30	3,06	3,55	3,00	2,67
	15E93524	cm	2,79	2,70	2,42	3,93	2,91	3,11
		cmk	2,54	2,34	2,27	3,78	2,78	2,90

Min cm/cmk	cm	2,71	2,52	2,42	3,28	2,68	2,69
	cmk	2,54	2,03	2,27	2,82	2,56	2,67

	Range:	≥ 1,67	
Capability Index:	C_m	2,42	OK
Capability Index:	C_{mk}	2,03	OK

Ranges of tolerance for angle and torque

Tool type	Serial Nr.	Test data	60% from range		80% from range	
			40°		180°	
EABC45-330		Test torque	27,00 Nm		36,00 Nm	
		Speed 1st stage	330 rpm			
		Start angle	9,00 Nm		9,00 Nm	
	14E88485	Torque	±	4,85%	±	4,18%
		Angle	±	1,7°	±	2,2°
	15E93366	Torque	±	4,93%	±	6,16%
		Angle	±	0,9°	±	3,7°
	15E93524	Torque	±	5,40%	±	5,01%
		Angle	±	1,5°	±	4,7°

Max Torque	Torque	Range:	7%	Range:	7%	40°
	lst:	±	5,40%	±	6,16%	OK
Max Angle	Angle	Range:		Soll: ±		40°
	lst:	±	1,7°	±	4,7°	OK

CERTIFIKAT

Machine capability test

Certificate no.:

234086-01

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC45-330**

Serial - No. : **14E88485**

Torque range

of: **9 Nm**
to: **45 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30% ==> **19,80 Nm**
at 80% ==> **37,80 Nm**
at 100% ==> **45,00 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:

2015-07-27

CERTIFIKAT

Machine capability tests

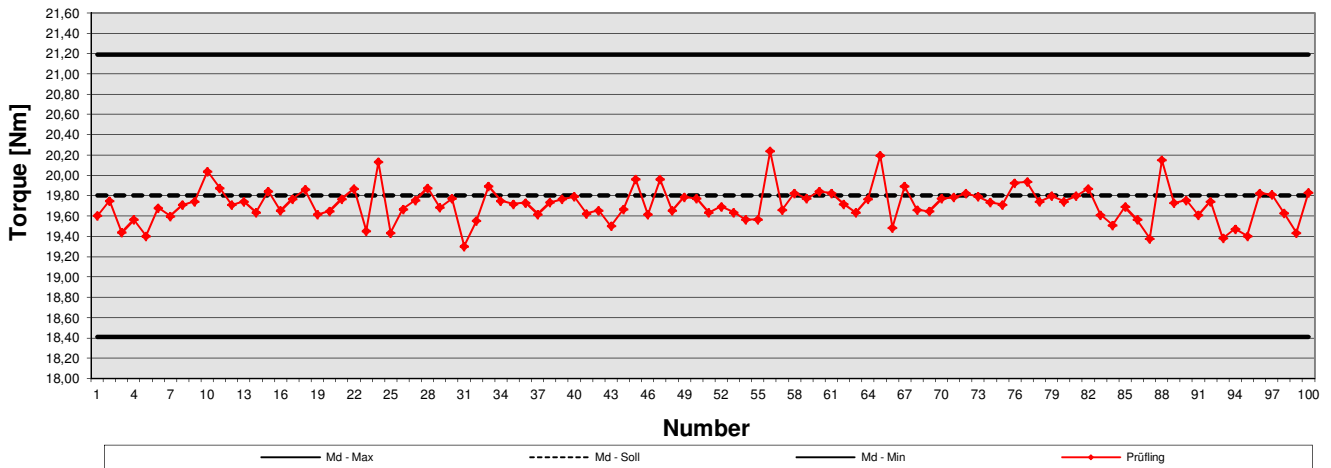


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 14E88485

30% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	21,19	19,80	18,41	+/- 7,00%

Hard joint 30°



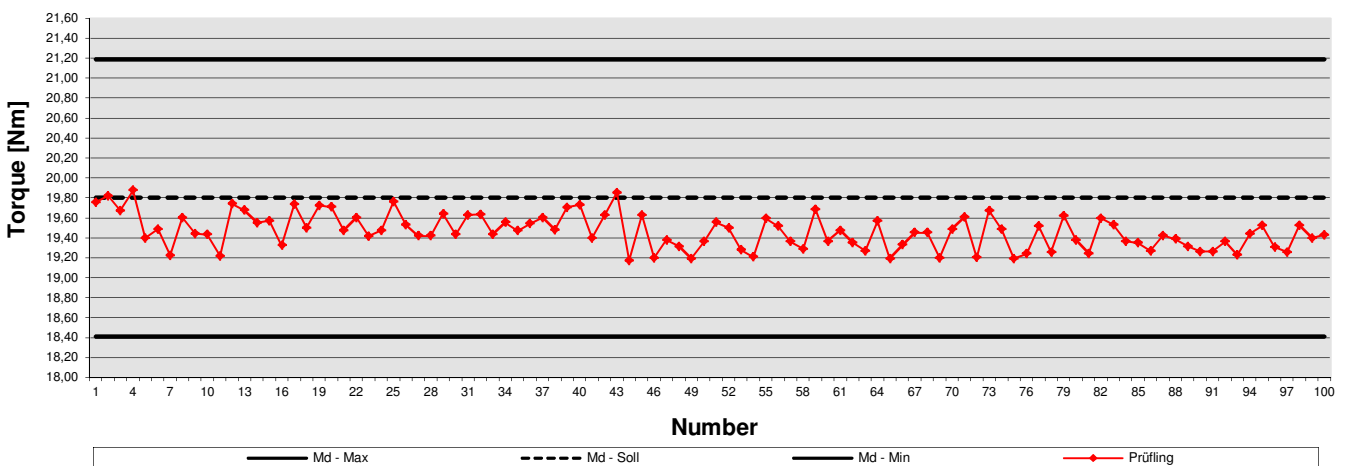
Statistics of the test piece

max. Torque	20,24 Nm	1 sig	0,171 Nm
min. Torque	19,31 Nm	6 sig	1,027 Nm
spread	0,93 Nm	+3 sig	20,23 Nm
Average	19,72 Nm	-3 sig	19,20 Nm

$$C_m = 2,71$$

$$C_{mk} = 2,54$$

Soft joint 360°



Statistics of the test piece

max. Torque	19,87 Nm	1 sig	0,173 Nm
min. Torque	19,17 Nm	6 sig	1,039 Nm
spread	0,70 Nm	+3 sig	19,98 Nm
Average	19,46 Nm	-3 sig	18,94 Nm

$$C_m = 2,68$$

$$C_{mk} = 2,03$$

CERTIFIKAT

Machine capability tests

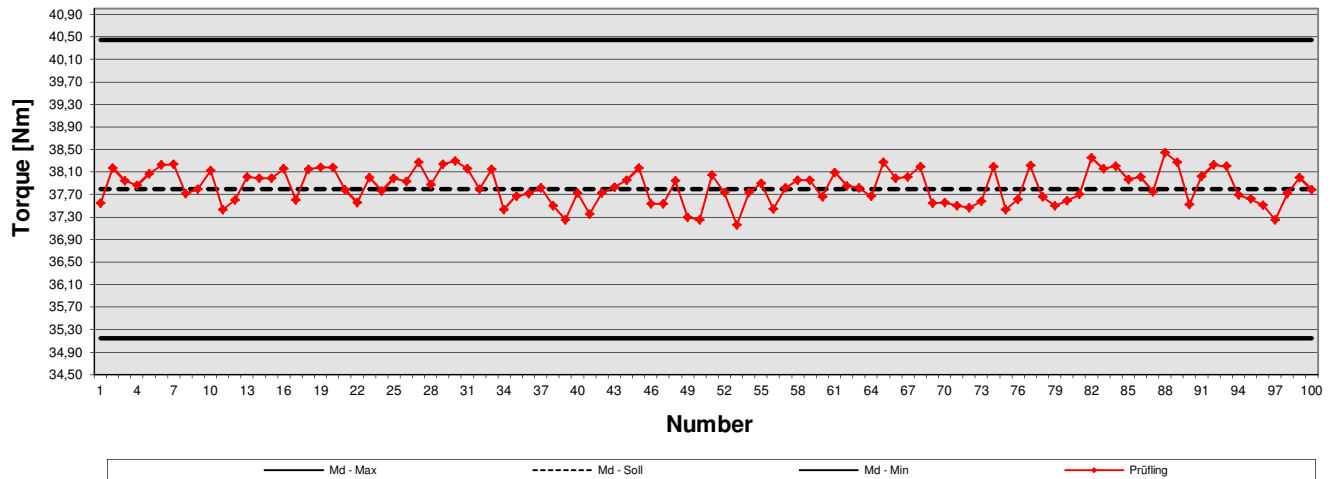


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 14E88485

80% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	40,45	37,80	35,15	+/- 7,00%

Hard joint 30°



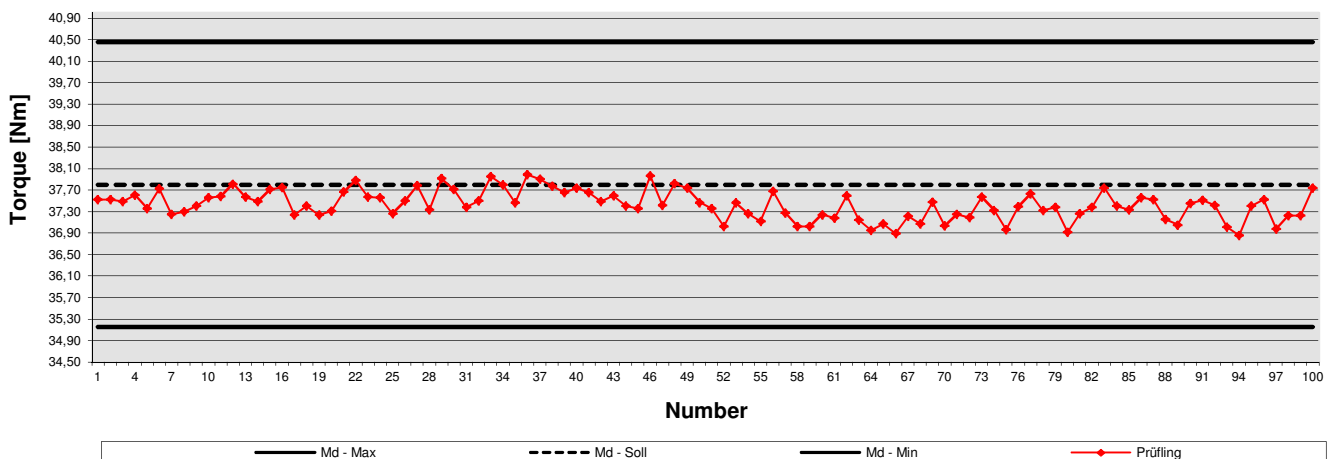
Statistics of the test piece

max. Torque	38,44 Nm	1 sig	0,298 Nm
min. Torque	37,16 Nm	6 sig	1,785 Nm
spread	1,28 Nm	+3 sig	38,73 Nm
Average	37,84 Nm	-3 sig	36,95 Nm

$$C_m = 2,97$$

$$C_{mk} = 2,92$$

Soft joint 360°



Statistics of the test piece

max. Torque	37,99 Nm	1 sig	0,269 Nm
min. Torque	36,85 Nm	6 sig	1,614 Nm
spread	1,14 Nm	+3 sig	38,24 Nm
Average	37,43 Nm	-3 sig	36,62 Nm

$$C_m = 3,28$$

$$C_{mk} = 2,82$$

CERTIFIKAT

Machine capability tests

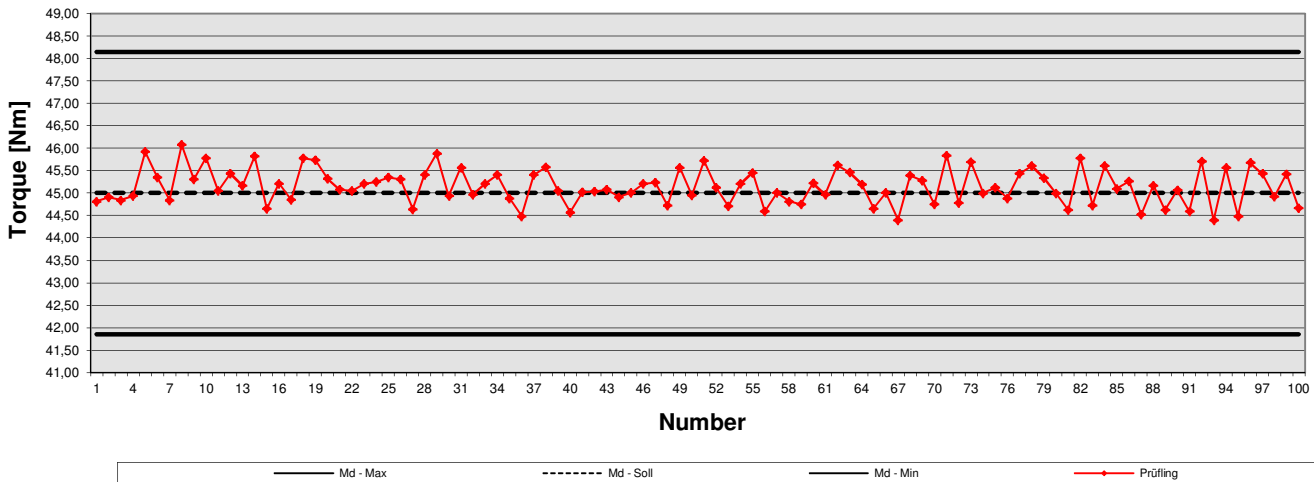


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 14E88485

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	48,15	45,00	41,85	+/- 7,00%

Hard joint 30°



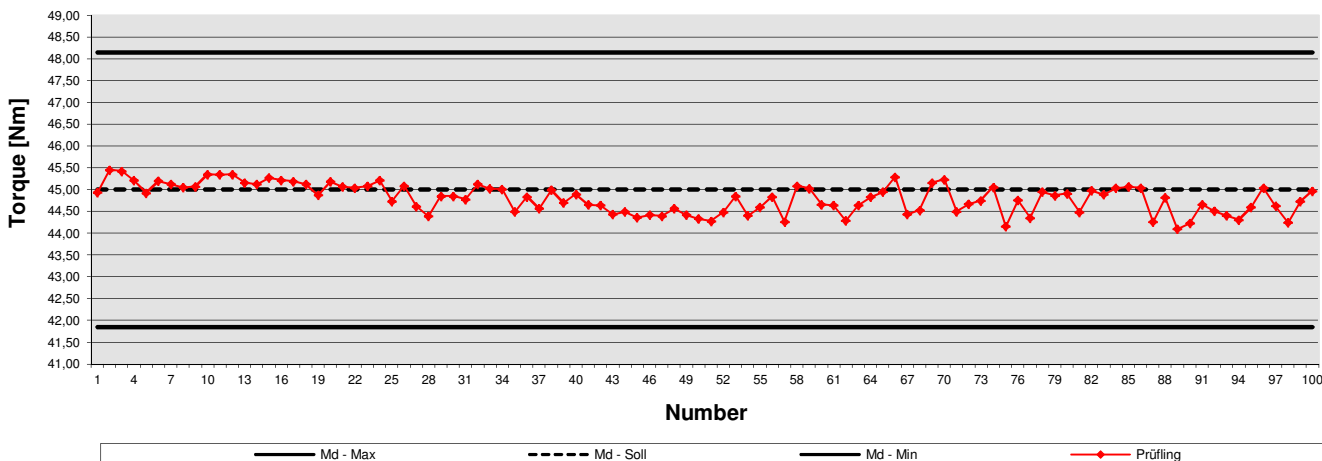
Statistics of the test piece

max. Torque	46,08 Nm	1 sig	0,391 Nm
min. Torque	44,40 Nm	6 sig	2,347 Nm
spread	1,68 Nm	+3 sig	46,32 Nm
Average	45,15 Nm	-3 sig	43,98 Nm

$$C_m = 2,68$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	45,45 Nm	1 sig	0,333 Nm
min. Torque	44,10 Nm	6 sig	2,000 Nm
spread	1,36 Nm	+3 sig	45,80 Nm
Average	44,80 Nm	-3 sig	43,80 Nm

$$C_m = 3,15$$

$$C_{mk} = 2,95$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 14E88485

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

Number of tightenings	200	6 sigma	1,03 Nm
Average	19,72 Nm	Mean value offset	0,25 Nm
Sigma	0,17 Nm	Mean value offset %	1,30 %
Dispersion	1,06 Nm	comb. average torque	19,59 Nm
max. Torque	20,24 Nm	comb. torque variation	1,29 Nm
min. Torque	19,17 Nm	comb. torque variation %	6,57 %

$$C_m = 2,70$$

$$C_{mk} = 2,54$$

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

Number of tightenings	200	6 sigma	1,70 Nm
Average	37,64 Nm	Mean value offset	0,41 Nm
Sigma	0,28 Nm	Mean value offset %	1,09 %
Dispersion	1,59 Nm	comb. average torque	37,68 Nm
max. Torque	38,44 Nm	comb. torque variation	2,11 Nm
min. Torque	36,85 Nm	comb. torque variation %	5,60 %

$$C_m = 3,12$$

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

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

Number of tightenings	200	6 sigma	2,17 Nm
Average	44,98 Nm	Mean value offset	0,35 Nm
Sigma	0,36 Nm	Mean value offset %	0,78 %
Dispersion	1,98 Nm	comb. average torque	45,06 Nm
max. Torque	46,08 Nm	comb. torque variation	2,52 Nm
min. Torque	44,10 Nm	comb. torque variation %	5,60 %

$$C_m = 2,90$$

$$C_{mk} = 2,88$$

CERTIFIKAT

Machine capability test

Certificate no.:

234086-02

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC45-330**

Serial - No. : **15E93366**

Torque range

of: **9 Nm**
to: **45 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	19,80 Nm
at 80%	==>	37,80 Nm
at 100%	==>	45,00 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:

2015-07-28

CERTIFIKAT

Machine capability tests

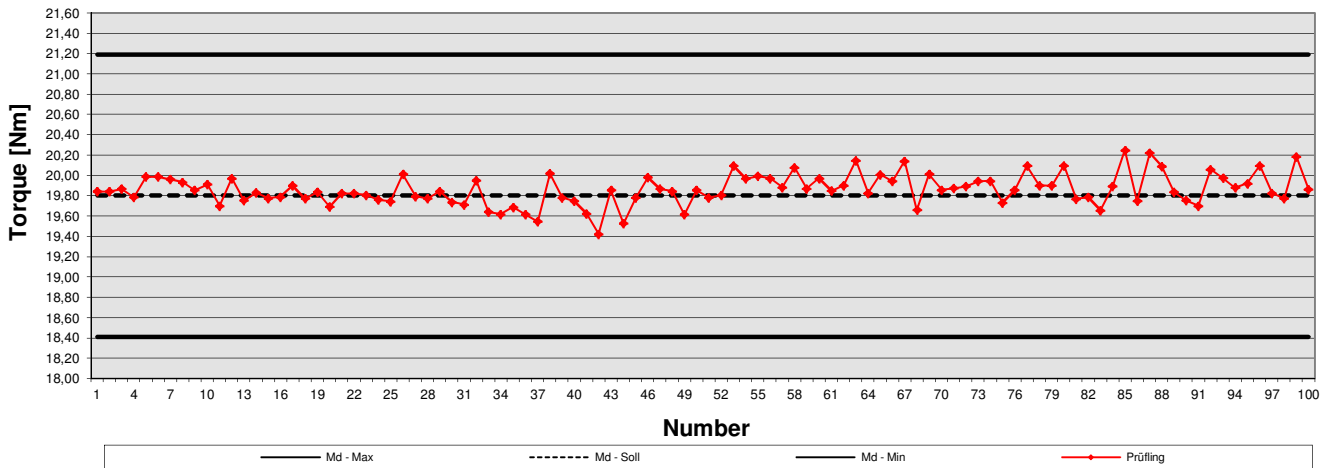


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93366

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	21,19	19,80	18,41	+/- 7,00%

Hard joint 30°



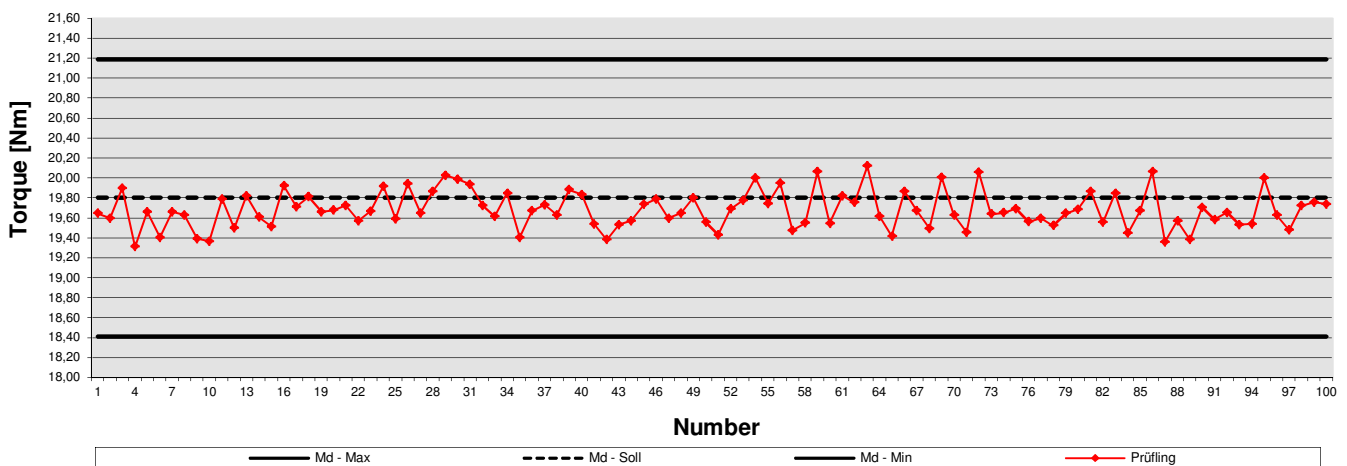
Statistics of the test piece

max. Torque	20,25 Nm	1 sig	0,152 Nm
min. Torque	19,42 Nm	6 sig	0,911 Nm
spread	0,83 Nm	+3 sig	20,32 Nm
Average	19,86 Nm	-3 sig	19,41 Nm

$$C_m = 3,05$$

$$C_{mk} = 2,92$$

Soft joint 360°



Statistics of the test piece

max. Torque	20,12 Nm	1 sig	0,184 Nm
min. Torque	19,31 Nm	6 sig	1,103 Nm
spread	0,81 Nm	+3 sig	20,23 Nm
Average	19,68 Nm	-3 sig	19,13 Nm

$$C_m = 2,52$$

$$C_{mk} = 2,30$$

CERTIFIKAT

Machine capability tests

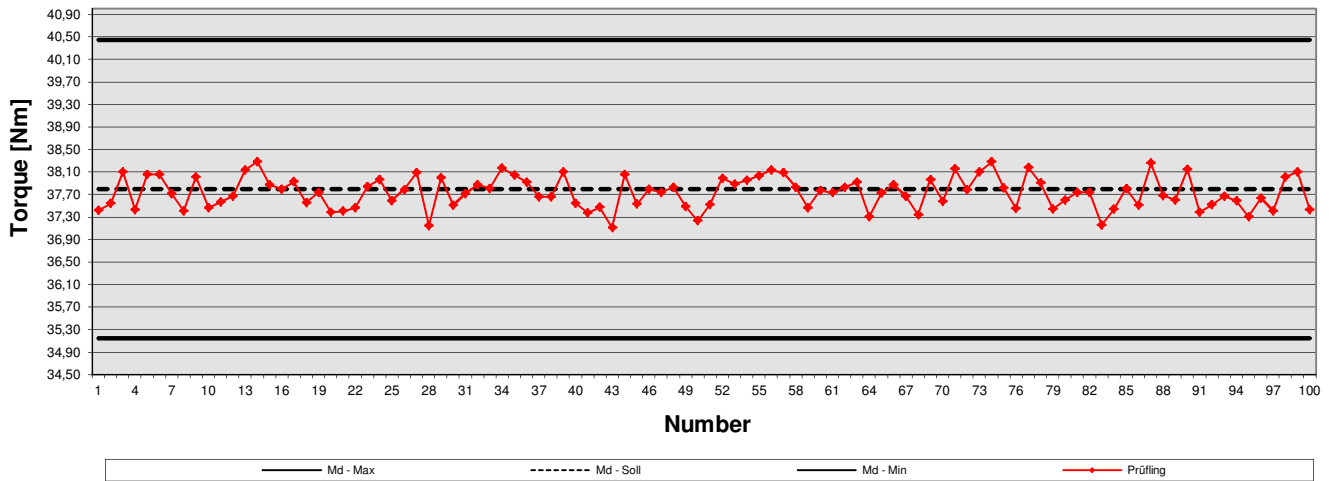


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93366

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	40,45	37,80	35,15	+/- 7,00%

Hard joint 30°



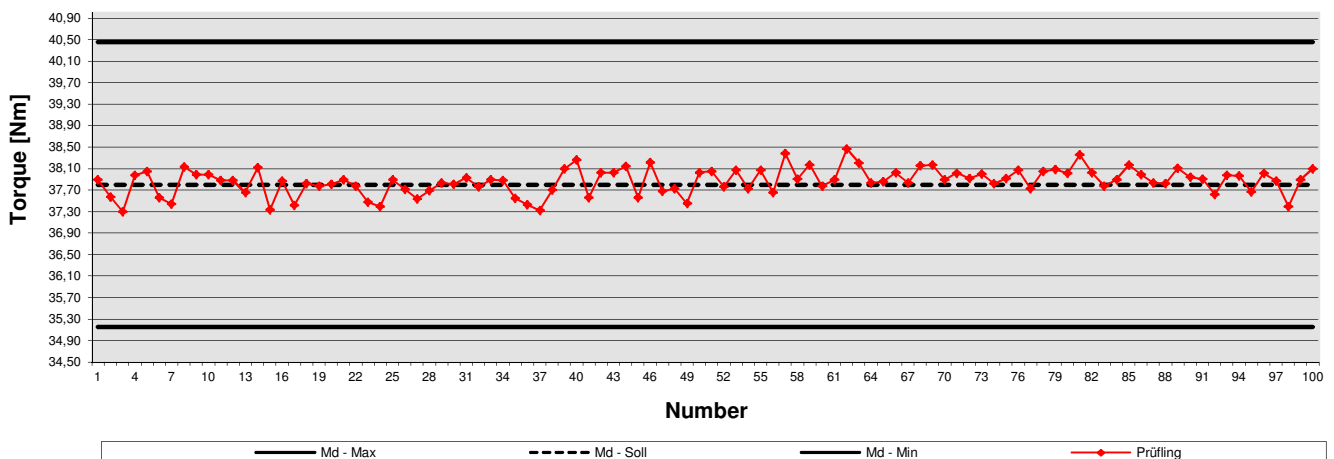
Statistics of the test piece

max. Torque	38,28 Nm	1 sig	0,282 Nm
min. Torque	37,12 Nm	6 sig	1,691 Nm
spread	1,17 Nm	+3 sig	38,58 Nm
Average	37,74 Nm	-3 sig	36,89 Nm

$$C_m = 3,13$$

$$C_{mk} = 3,06$$

Soft joint 360°



Statistics of the test piece

max. Torque	38,47 Nm	1 sig	0,243 Nm
min. Torque	37,30 Nm	6 sig	1,457 Nm
spread	1,16 Nm	+3 sig	38,59 Nm
Average	37,86 Nm	-3 sig	37,14 Nm

$$C_m = 3,64$$

$$C_{mk} = 3,55$$

CERTIFIKAT

Machine capability tests

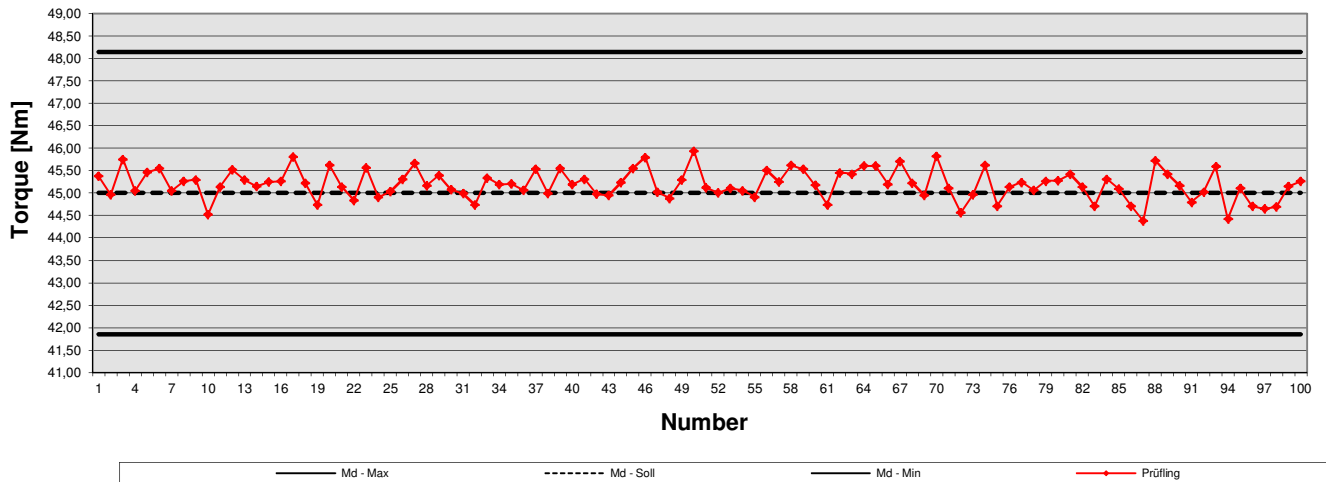


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93366

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	48,15	45,00	41,85	+/- 7,00%

Hard joint 30°



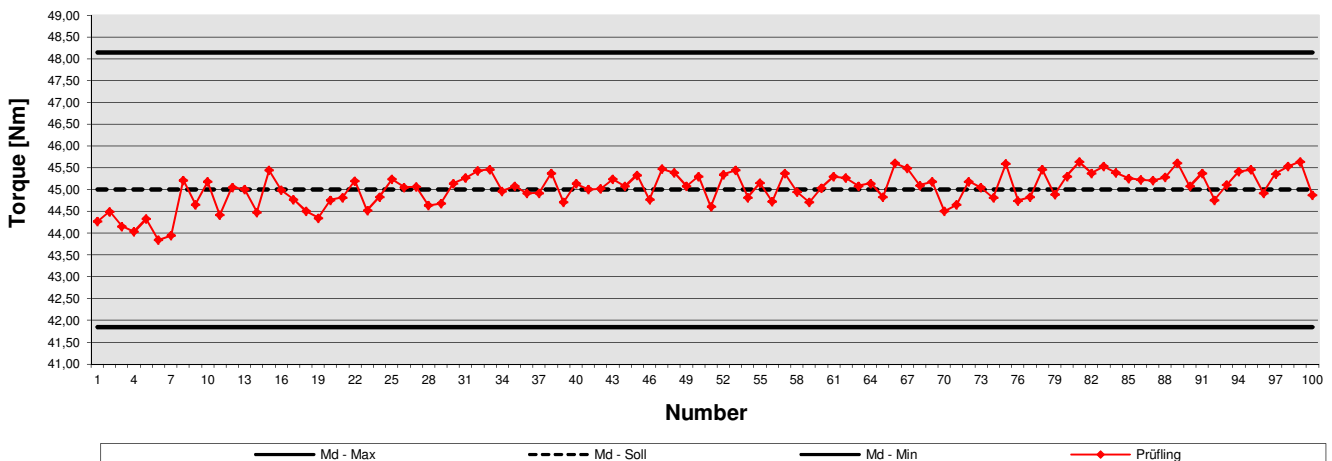
Statistics of the test piece

max. Torque	45,94 Nm	1 sig	0,328 Nm
min. Torque	44,38 Nm	6 sig	1,971 Nm
spread	1,56 Nm	+3 sig	46,18 Nm
Average	45,20 Nm	-3 sig	44,21 Nm

$$C_m = 3,20$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	45,64 Nm	1 sig	0,390 Nm
min. Torque	43,85 Nm	6 sig	2,343 Nm
spread	1,80 Nm	+3 sig	46,20 Nm
Average	45,02 Nm	-3 sig	43,85 Nm

$$C_m = 2,69$$

$$C_{mk} = 2,67$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93366

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

Number of tightenings	200	6 sigma	1,01 Nm
Average	19,86 Nm	Mean value offset	0,18 Nm
Sigma	0,17 Nm	Mean value offset %	0,91 %
Dispersion	0,94 Nm	comb. average torque	19,72 Nm
max. Torque	20,25 Nm	comb. torque variation	1,19 Nm
min. Torque	19,31 Nm	comb. torque variation %	6,02 %

$$C_m = 2,75$$

$$C_{mk} = 2,63$$

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

Number of tightenings	200	6 sigma	1,57 Nm
Average	37,80 Nm	Mean value offset	0,13 Nm
Sigma	0,26 Nm	Mean value offset %	0,34 %
Dispersion	1,35 Nm	comb. average torque	37,74 Nm
max. Torque	38,47 Nm	comb. torque variation	1,70 Nm
min. Torque	37,12 Nm	comb. torque variation %	4,51 %

$$C_m = 3,37$$

$$C_{mk} = 3,36$$

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

Number of tightenings	200	6 sigma	2,16 Nm
Average	45,11 Nm	Mean value offset	0,17 Nm
Sigma	0,36 Nm	Mean value offset %	0,38 %
Dispersion	2,10 Nm	comb. average torque	45,02 Nm
max. Torque	45,94 Nm	comb. torque variation	2,34 Nm
min. Torque	43,85 Nm	comb. torque variation %	5,20 %

$$C_m = 2,92$$

$$C_{mk} = 2,81$$



CERTIFIKAT

Machine capability test

Certificate no.:

234086-03

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC45-330**

Serial - No. : **15E93524**

Torque range

of: **9 Nm**

to: **45 Nm**

Number of screw tightenings

at 30% ==> **100**

at 80% ==> **100**

at 100% ==> **100**

Torque to be achieved

at 30% ==> **19,80 Nm**

at 80% ==> **37,80 Nm**

at 100% ==> **45,00 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:

2015-07-29

CERTIFIKAT

Machine capability tests

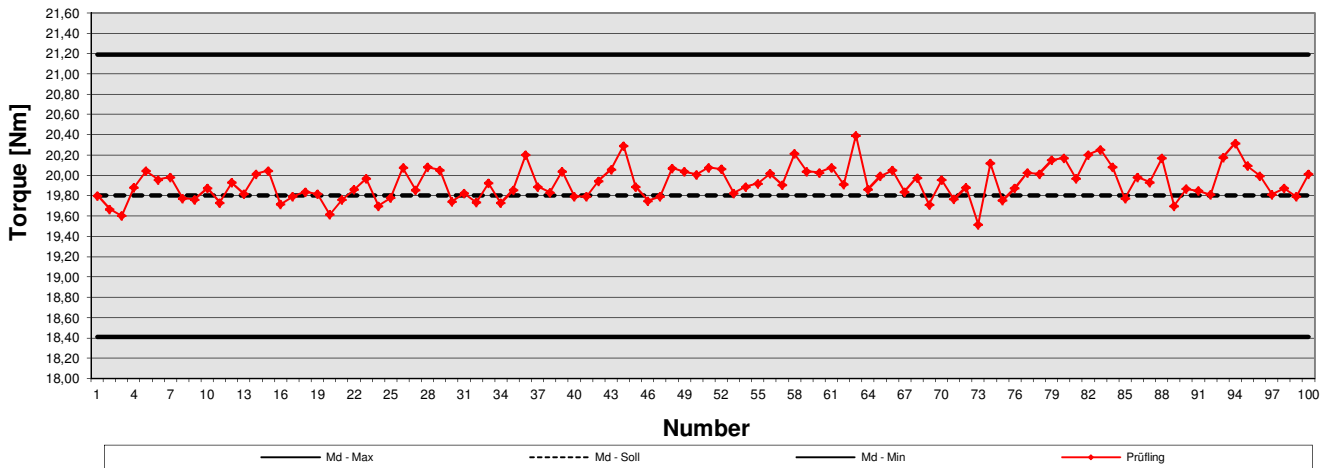


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93524

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	21,19	19,80	18,41	+/- 7,00%

Hard joint 30°



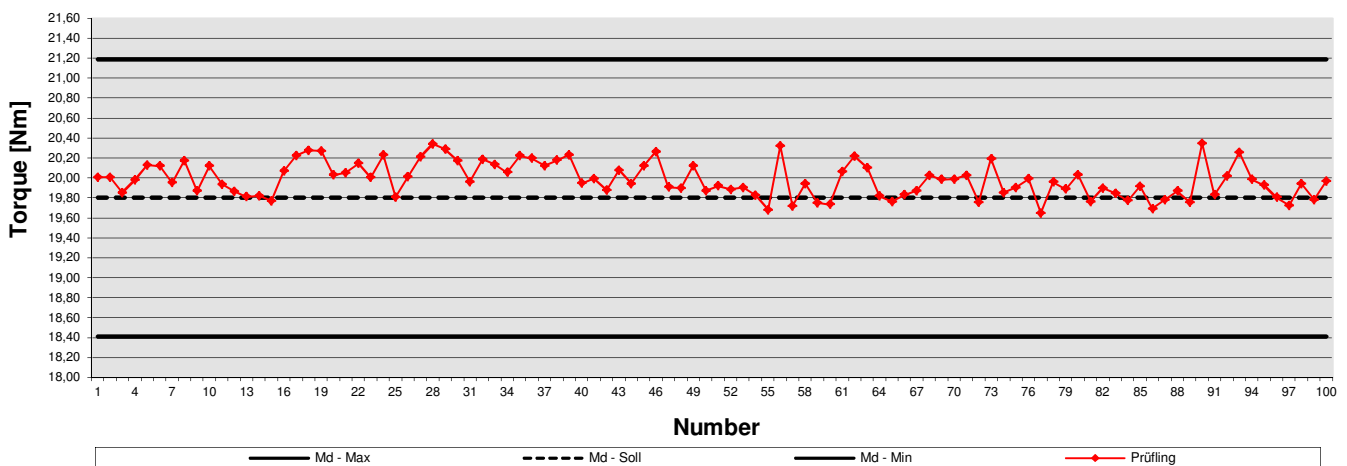
Statistics of the test piece

max. Torque	20,39 Nm	1 sig	0,166 Nm
min. Torque	19,52 Nm	6 sig	0,996 Nm
spread	0,88 Nm	+3 sig	20,43 Nm
Average	19,93 Nm	-3 sig	19,43 Nm

$$C_m = 2,79$$

$$C_{mk} = 2,54$$

Soft joint 360°



Statistics of the test piece

max. Torque	20,34 Nm	1 sig	0,172 Nm
min. Torque	19,65 Nm	6 sig	1,031 Nm
spread	0,70 Nm	+3 sig	20,50 Nm
Average	19,98 Nm	-3 sig	19,47 Nm

$$C_m = 2,70$$

$$C_{mk} = 2,34$$

CERTIFIKAT

Machine capability tests

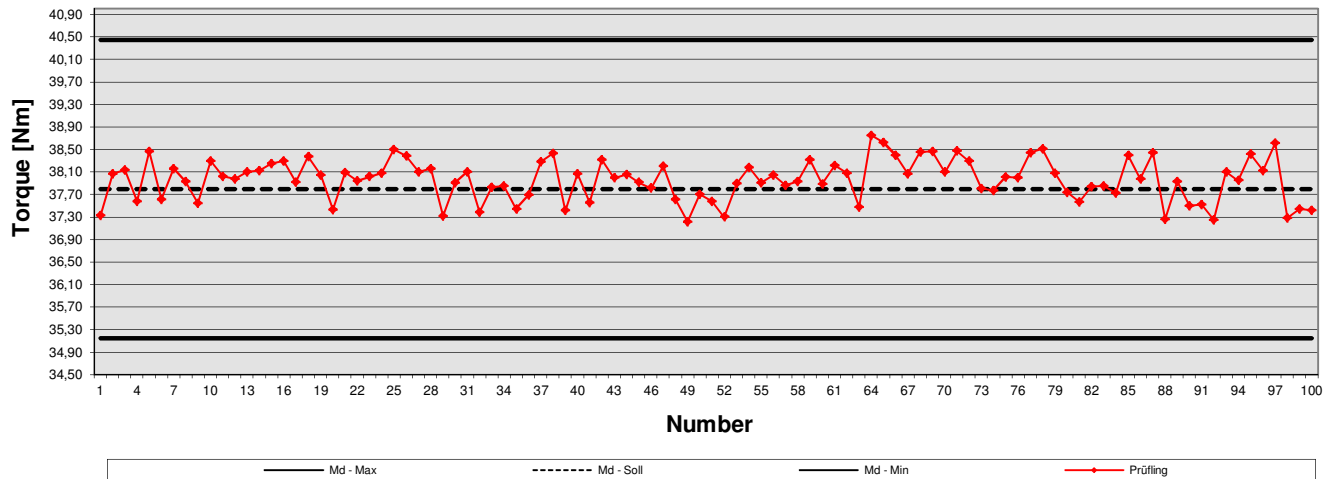


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93524

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	40,45	37,80	35,15	+/- 7,00%

Hard joint 30°



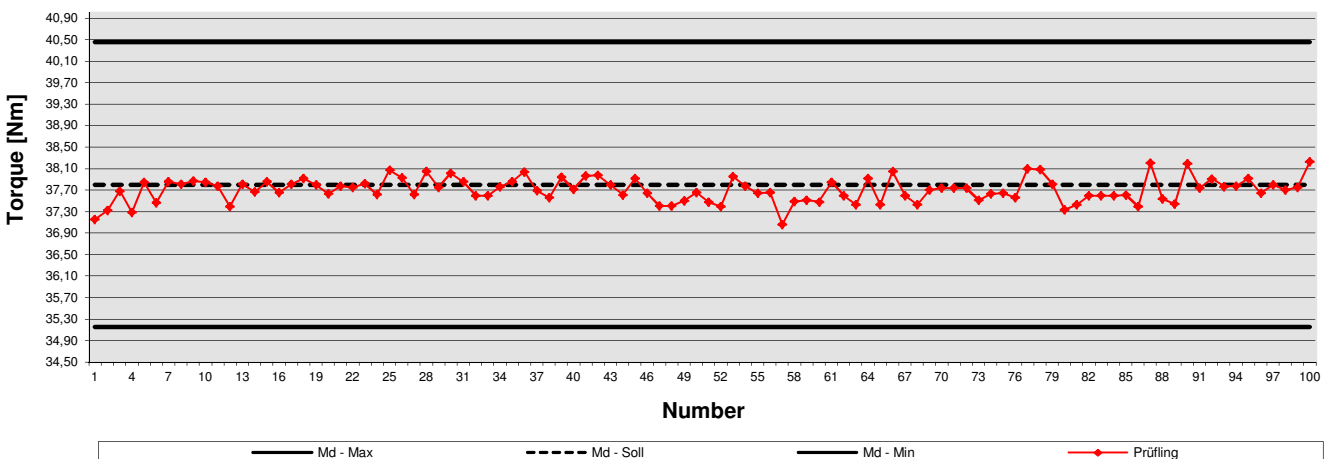
Statistics of the test piece

max. Torque	38,75 Nm	1 sig	0,365 Nm
min. Torque	37,22 Nm	6 sig	2,188 Nm
spread	1,54 Nm	+3 sig	39,06 Nm
Average	37,96 Nm	-3 sig	36,87 Nm

$$C_m = 2,42$$

$$C_{mk} = 2,27$$

Soft joint 360°



Statistics of the test piece

max. Torque	38,23 Nm	1 sig	0,225 Nm
min. Torque	37,06 Nm	6 sig	1,350 Nm
spread	1,16 Nm	+3 sig	38,38 Nm
Average	37,70 Nm	-3 sig	37,03 Nm

$$C_m = 3,93$$

$$C_{mk} = 3,78$$

CERTIFIKAT

Machine capability tests

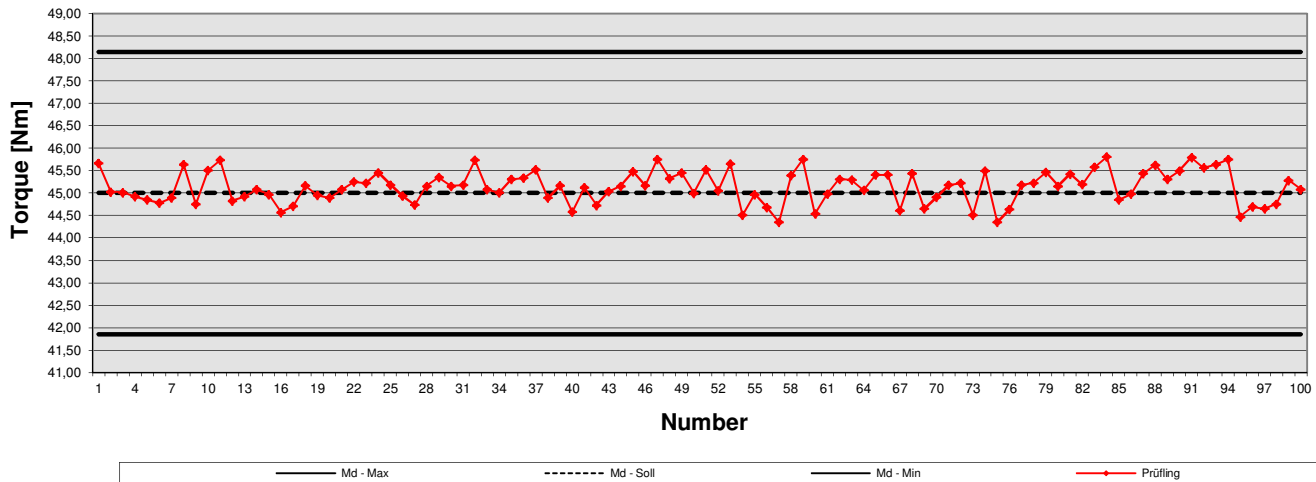


Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93524

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	48,15	45,00	41,85	+/- 7,00%

Hard joint 30°



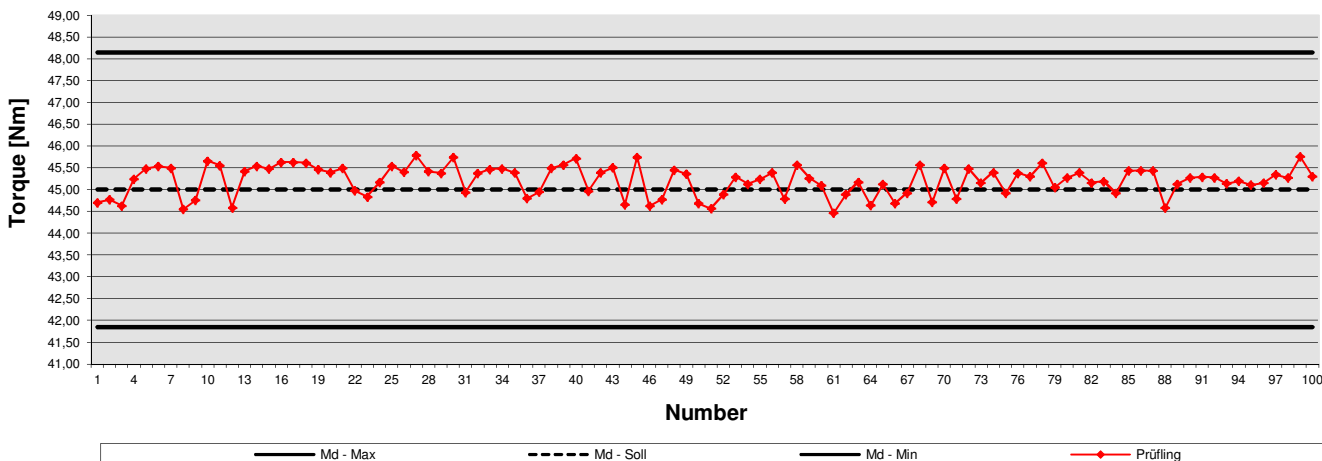
Statistics of the test piece

max. Torque	45,80 Nm	1 sig	0,361 Nm
min. Torque	44,35 Nm	6 sig	2,165 Nm
spread	1,45 Nm	+3 sig	46,22 Nm
Average	45,14 Nm	-3 sig	44,05 Nm

$$C_m = 2,91$$

$$C_{mk} = 2,78$$

Soft joint 360°



Statistics of the test piece

max. Torque	45,78 Nm	1 sig	0,338 Nm
min. Torque	44,46 Nm	6 sig	2,028 Nm
spread	1,32 Nm	+3 sig	46,23 Nm
Average	45,21 Nm	-3 sig	44,20 Nm

$$C_m = 3,11$$

$$C_{mk} = 2,90$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC45-330

Serial - No. : 15E93524

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

Number of tightenings	200	6 sigma	1,01 Nm
Average	19,93 Nm	Mean value offset	0,06 Nm
Sigma	0,17 Nm	Mean value offset %	0,28 %
Dispersion	0,88 Nm	comb. average torque	19,96 Nm
max. Torque	20,39 Nm	comb. torque variation	1,07 Nm
min. Torque	19,52 Nm	comb. torque variation %	5,35 %

$$C_m = 2,75$$

$$C_{mk} = 2,49$$

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

Number of tightenings	200	6 sigma	1,81 Nm
Average	37,84 Nm	Mean value offset	0,26 Nm
Sigma	0,30 Nm	Mean value offset %	0,68 %
Dispersion	1,69 Nm	comb. average torque	37,96 Nm
max. Torque	38,75 Nm	comb. torque variation	2,19 Nm
min. Torque	37,06 Nm	comb. torque variation %	5,76 %

$$C_m = 2,92$$

$$C_{mk} = 2,88$$

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

Number of tightenings	200	6 sigma	2,09 Nm
Average	45,17 Nm	Mean value offset	0,08 Nm
Sigma	0,35 Nm	Mean value offset %	0,17 %
Dispersion	1,45 Nm	comb. average torque	45,14 Nm
max. Torque	45,80 Nm	comb. torque variation	2,17 Nm
min. Torque	44,35 Nm	comb. torque variation %	4,81 %

$$C_m = 3,01$$

$$C_{mk} = 2,84$$

a. Temperature

There was hardly no noticeable warming of the tool detected.

b. Battery lifetime

After amount of 206 tightening on soft joint and 736 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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