



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 26-560

Serial number 14 F 87585
15 C 93571
15 F 93018

Model	EABC 26-560
Ordering No	6151658420
Square Drive / Female Hex	Square drive
Torque range ft lb	3.7 – 19
Torque range Nm	5 – 26
CS distance mm	-
Weight kg	1.65
Weight lb	3.64
Length mm	496
Speed r/min	560
Height mm	45.7
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

Hersteller: **BLM, Mailand (Italien)**
Typ: **3860/4**
Ser.-Nr.: **3860SKY.103**
Zelle 2 : **10-50 N·m, dynamisch**
Rückführung: **EN2530**
Software: **QS – Torque (32 Bit)**
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 :	5 - 26 N•m
Testing torque / 30% hard/soft joint	11.30 N•m
Testing torque / 80% hard/soft joint	21.80 N•m
Testing torque / 100% hard/soft joint	26.00 N•m
Speed 1 step	560 rpm
Speed 2 step	50 rpm
Angle threshold / 30%	5.65 Nm
Angle threshold / 80%	10.90 Nm
Angle threshold / 100%	13.00 Nm
Switching torque / 30%	5.085 Nm
Switching torque / 80%	9.81 Nm
Switching torque / 100%	11.70 Nm
Angle strategy 40°	5.2 N•m (15.60) N•m
Angle strategy 180°	5.2 N•m (20.80) 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°	
EABC 26-560		Test torque	11,30 Nm		21,80 Nm		26,00 Nm	
		Speed 1st stage	560 rpm					
		Speed 2st stage	50 rpm					
		Start angle measurement	5,65 Nm		10,90 Nm		13,00 Nm	
	15E91479	cm	2,89	3,10	2,44	4,08	2,55	3,53
		cmk	2,69	2,94	2,29	3,59	2,48	2,85
	15E92992	cm	3,11	3,46	2,99	3,18	2,79	4,30
		cmk	2,57	3,24	2,70	3,10	2,66	4,04
	15E93513	cm	3,14	2,96	2,84	2,79	2,98	3,14
		cmk	2,95	2,91	2,64	2,55	2,93	3,05

Min cm/cmk	cm	2,89	2,96	2,44	2,79	2,55	3,14
	cmk	2,57	2,91	2,29	2,55	2,48	2,85

		Range:	≥ 1,67	
Capability Index:		C_m	2,44	OK
Capability Index:		C_{mk}	2,29	OK

Ranges of tolerance for angle and torque

Tool type	Serial Nr.	Test data	60% from range		80% from range	
			40°		180°	
EABC 26-560		Test torque	15,60 Nm		20,80 Nm	
		Speed 1st stage	560 rpm			
		Start angle	5,20 Nm		5,20 Nm	
	15E91479	Torque	±	6,57%	±	6,24%
		Angle	±	1,3°	±	4,6°
	15E92992	Torque	±	6,26%	±	6,14%
		Angle	±	1,4°	±	4,4°
	15E93513	Torque	±	6,63%	±	6,63%
		Angle	±	1,1°	±	4,9°

Max Torque	Torque	Range:	7%	Range:	7%	40°
	1st:	±	6,63%	±	6,63%	OK
Max Angle	Angle	Range:	5°	Range:	10°	40°
	1st:	±	1,4°	±	4,9°	OK

CERTIFIKAT

Machine capability test

Certificate no.:

234083-01

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC26-560**

Serial - No. : **15E91479**

Torque range

of: **5 Nm**
to: **26 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	11,30 Nm
at 80%	==>	21,80 Nm
at 100%	==>	26,00 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:

2015-06-29

CERTIFIKAT

Machine capability tests

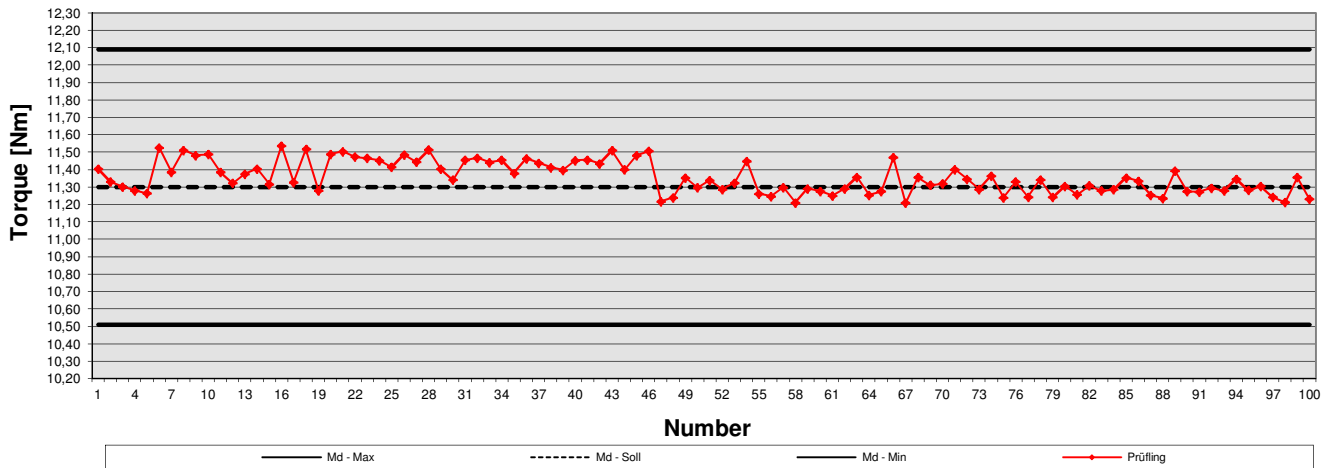


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E91479

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	12,09	11,30	10,51	+/- 7,00%

Hard joint 30°



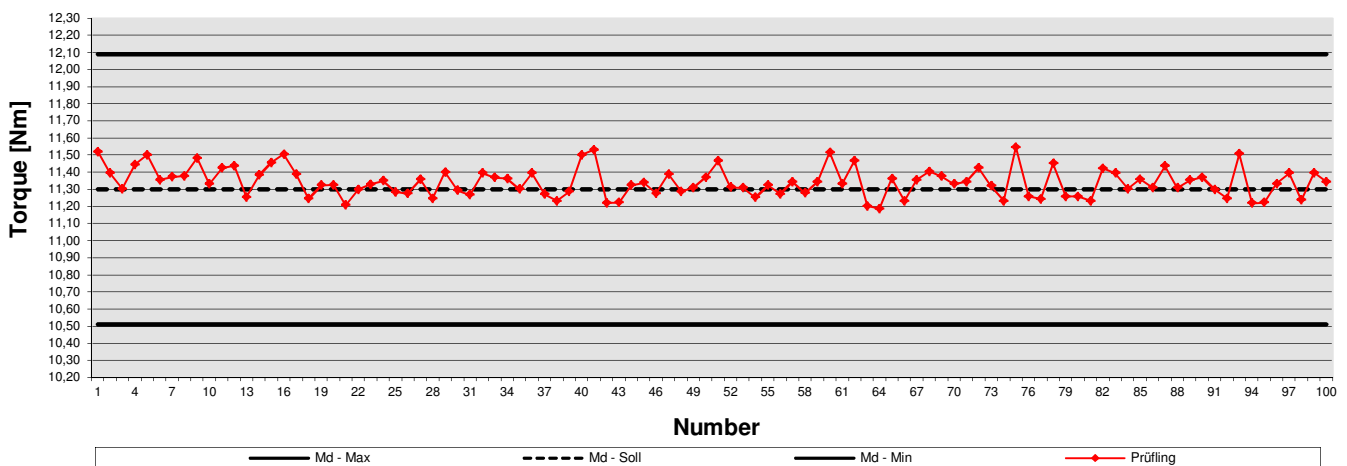
Statistics of the test piece

max. Torque	11,54 Nm	1 sig	0,091 Nm
min. Torque	11,21 Nm	6 sig	0,546 Nm
spread	0,33 Nm	+3 sig	11,63 Nm
Average	11,36 Nm	-3 sig	11,08 Nm

$$C_m = 2,89$$

$$C_{mk} = 2,69$$

Soft joint 360°



Statistics of the test piece

max. Torque	11,55 Nm	1 sig	0,085 Nm
min. Torque	11,19 Nm	6 sig	0,510 Nm
spread	0,36 Nm	+3 sig	11,60 Nm
Average	11,34 Nm	-3 sig	11,09 Nm

$$C_m = 3,10$$

$$C_{mk} = 2,94$$

CERTIFIKAT

Machine capability tests

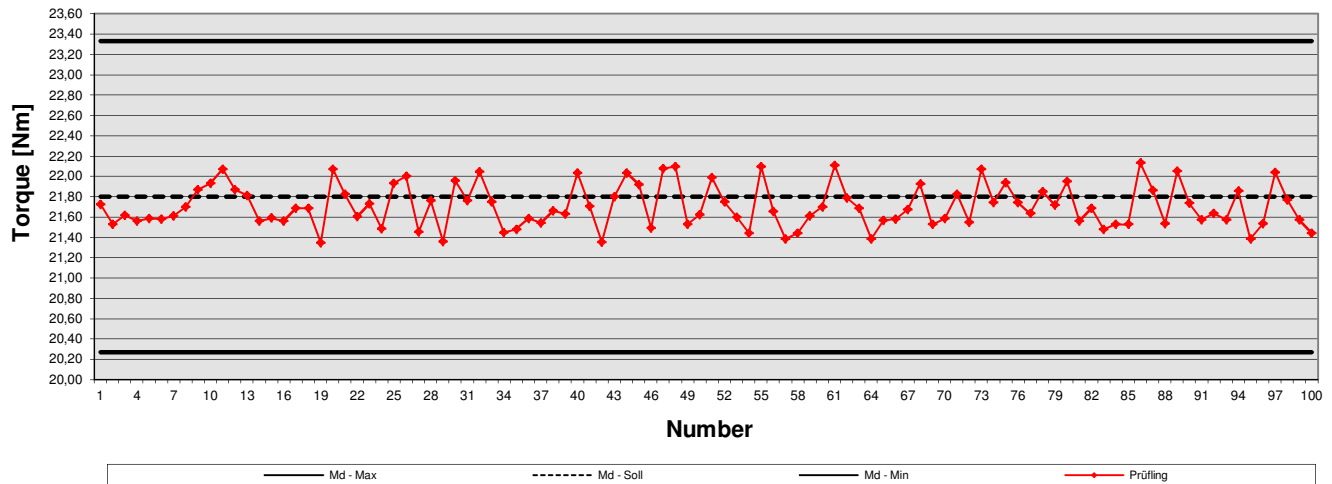


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E91479

80% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	23,33	21,80	20,27	+/- 7,00%

Hard joint 30°



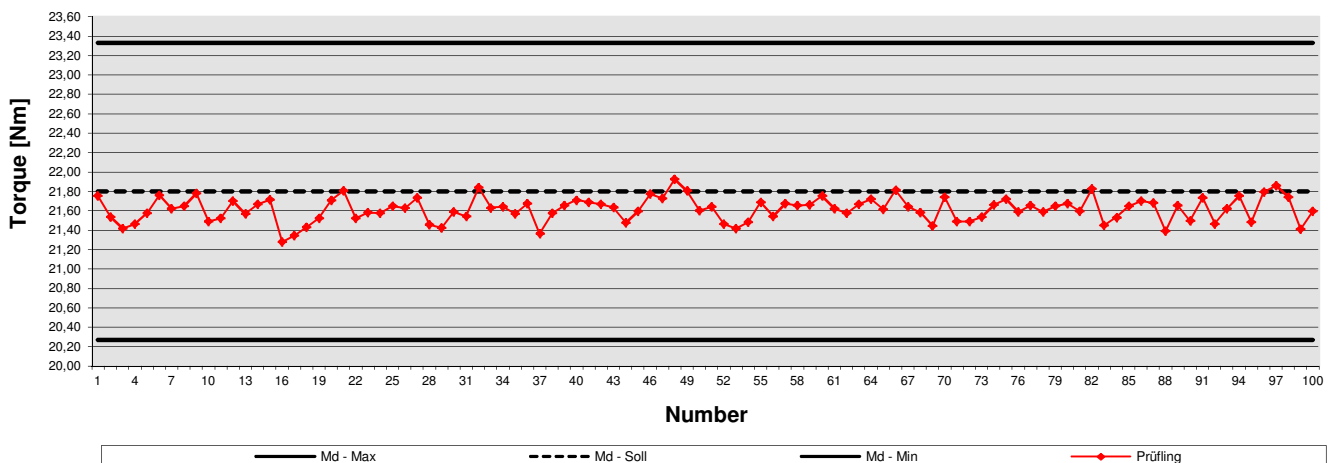
Statistics of the test piece

max. Torque	22,13 Nm	1 sig	0,209 Nm
min. Torque	21,35 Nm	6 sig	1,252 Nm
spread	0,79 Nm	+3 sig	22,33 Nm
Average	21,71 Nm	-3 sig	21,08 Nm

$$C_m = 2,44$$

$$C_{mk} = 2,29$$

Soft joint 360°



Statistics of the test piece

max. Torque	21,93 Nm	1 sig	0,125 Nm
min. Torque	21,28 Nm	6 sig	0,749 Nm
spread	0,65 Nm	+3 sig	21,99 Nm
Average	21,61 Nm	-3 sig	21,24 Nm

$$C_m = 4,08$$

$$C_{mk} = 3,59$$

CERTIFIKAT

Machine capability tests

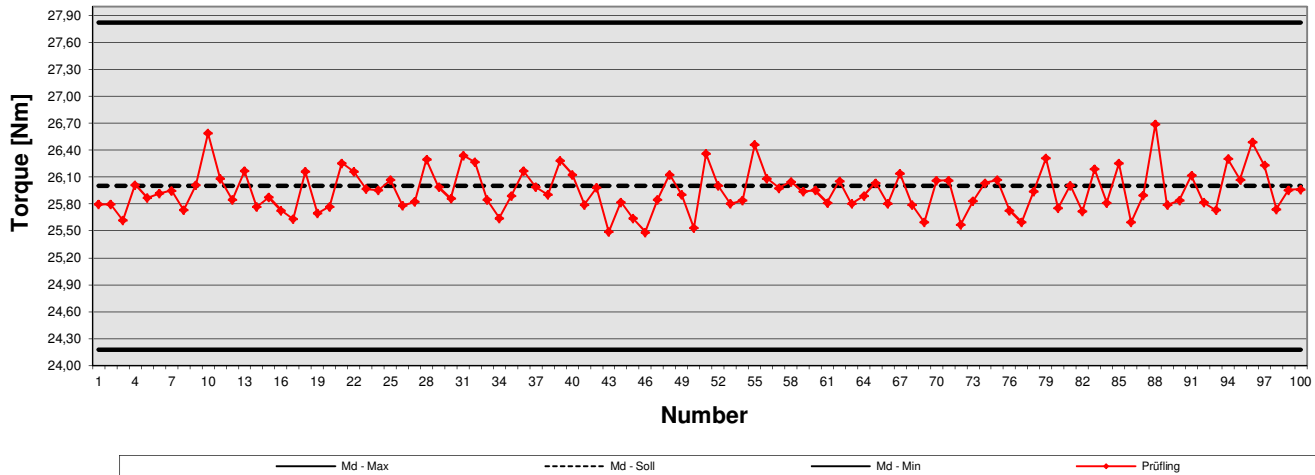


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E91479

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	27,82	26,00	24,18	+/- 7,00%

Hard joint 30°

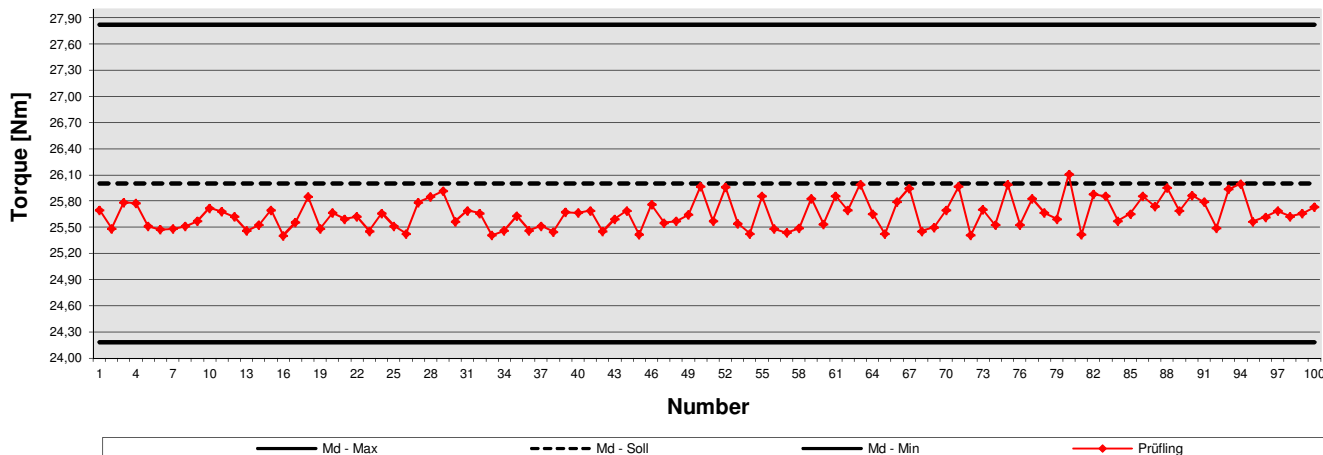


Statistics of the test piece			
max. Torque	26,69 Nm	1 sig	0,238 Nm
min. Torque	25,49 Nm	6 sig	1,426 Nm
spread	1,21 Nm	+3 sig	26,66 Nm
Average	25,95 Nm	-3 sig	25,24 Nm

$$C_m = 2,55$$

$$C_{mk} = 2,48$$

Soft joint 360°



Statistics of the test piece			
max. Torque	26,11 Nm	1 sig	0,172 Nm
min. Torque	25,41 Nm	6 sig	1,033 Nm
spread	0,70 Nm	+3 sig	26,17 Nm
Average	25,65 Nm	-3 sig	25,14 Nm

$$C_m = 3,53$$

$$C_{mk} = 2,85$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E91479

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

Number of tightenings	200	6 sigma	0,53 Nm
Average	11,36 Nm	Mean value offset	0,01 Nm
Sigma	0,09 Nm	Mean value offset %	0,13 %
Dispersion	0,36 Nm	comb. average torque	11,36 Nm
max. Torque	11,55 Nm	comb. torque variation	0,55 Nm
min. Torque	11,19 Nm	comb. torque variation %	4,81 %

$C_m = 3,00$

$C_{mk} = 2,79$

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

Number of tightenings	200	6 sigma	1,03 Nm
Average	21,66 Nm	Mean value offset	0,09 Nm
Sigma	0,17 Nm	Mean value offset %	0,42 %
Dispersion	0,85 Nm	comb. average torque	21,71 Nm
max. Torque	22,13 Nm	comb. torque variation	1,25 Nm
min. Torque	21,28 Nm	comb. torque variation %	5,77 %

$C_m = 2,97$

$C_{mk} = 2,70$

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

Number of tightenings	200	6 sigma	1,24 Nm
Average	25,80 Nm	Mean value offset	0,30 Nm
Sigma	0,21 Nm	Mean value offset %	1,14 %
Dispersion	1,29 Nm	comb. average torque	25,90 Nm
max. Torque	26,69 Nm	comb. torque variation	1,53 Nm
min. Torque	25,41 Nm	comb. torque variation %	5,89 %

$C_m = 2,93$

$C_{mk} = 2,61$

CERTIFIKAT

Machine capability test

Certificate no.:

234083-02

Customer

Desoutter Industrial Tools

Test object

Manufacturer: Desoutter

Tool type: EABC26-560

Serial - No. : 15E92992

Torque range

of: 5 Nm
to: 26 Nm

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	11,30 Nm
at 80%	==>	21,80 Nm
at 100%	==>	26,00 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:

2015-06-30

CERTIFIKAT

Machine capability tests

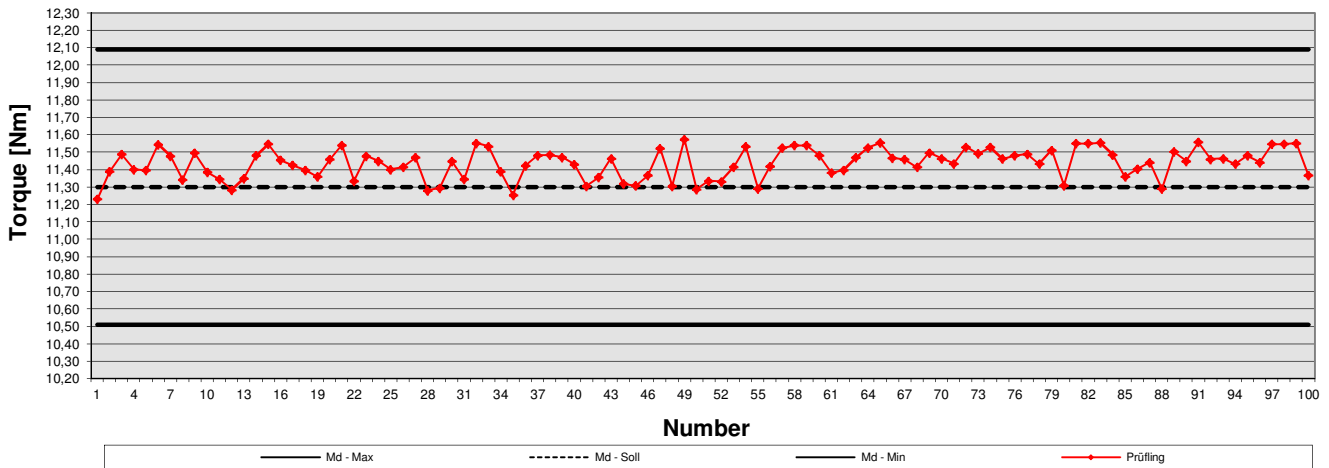


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E92992

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	12,09	11,30	10,51	+/- 7,00%

Hard joint 30°



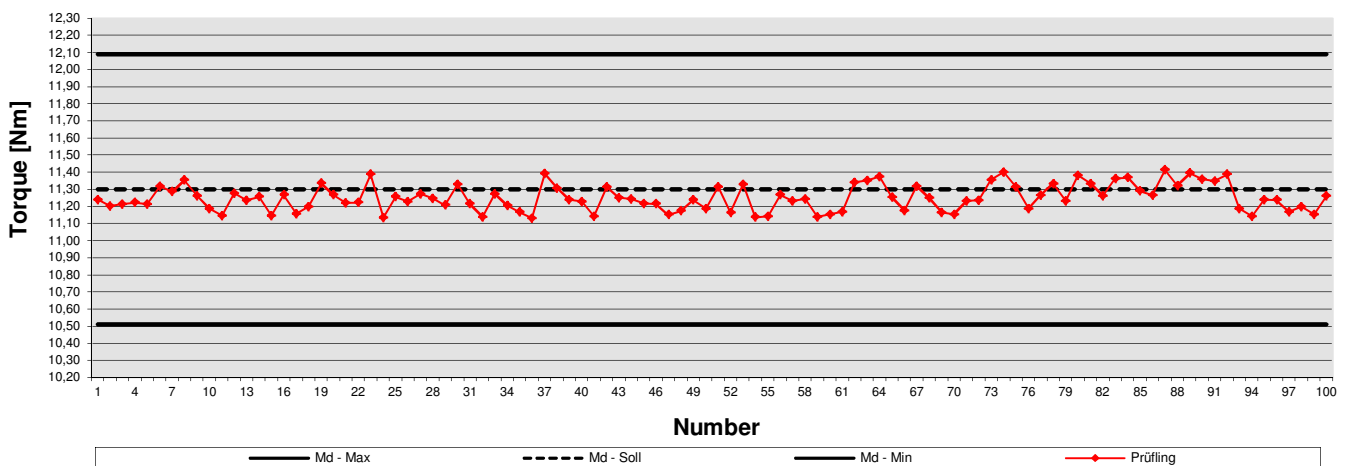
Statistics of the test piece

max. Torque	11,57 Nm	1 sig	0,085 Nm
min. Torque	11,23 Nm	6 sig	0,508 Nm
spread	0,34 Nm	+3 sig	11,69 Nm
Average	11,44 Nm	-3 sig	11,18 Nm

$$C_m = 3,11$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	11,41 Nm	1 sig	0,076 Nm
min. Torque	11,13 Nm	6 sig	0,457 Nm
spread	0,28 Nm	+3 sig	11,48 Nm
Average	11,25 Nm	-3 sig	11,02 Nm

$$C_m = 3,46$$

$$C_{mk} = 3,24$$

CERTIFIKAT

Machine capability tests

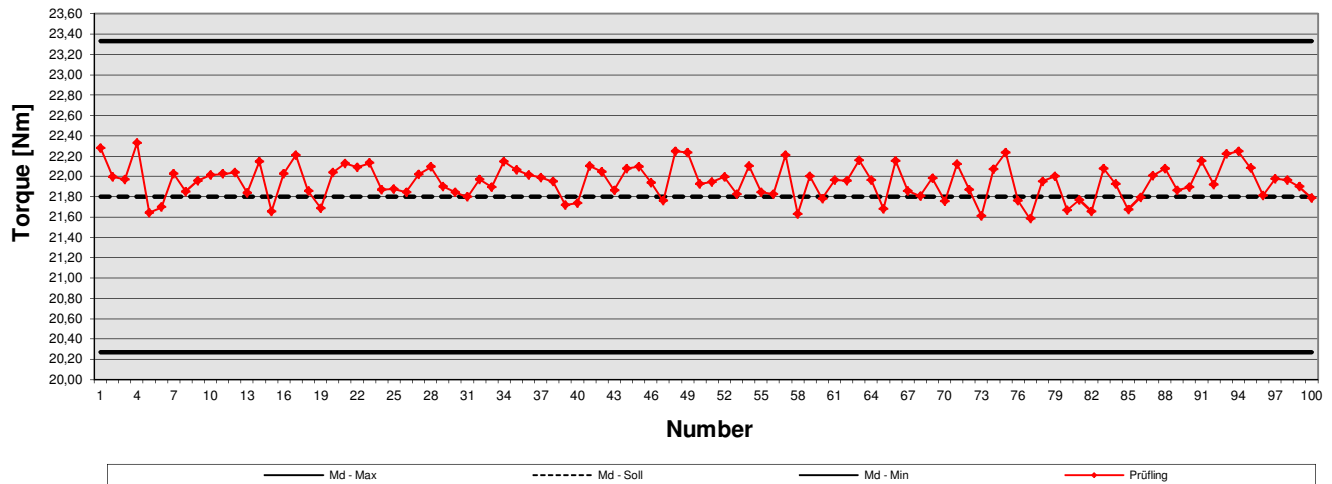


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E92992

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	23,33	21,80	20,27	+/- 7,00%

Hard joint 30°



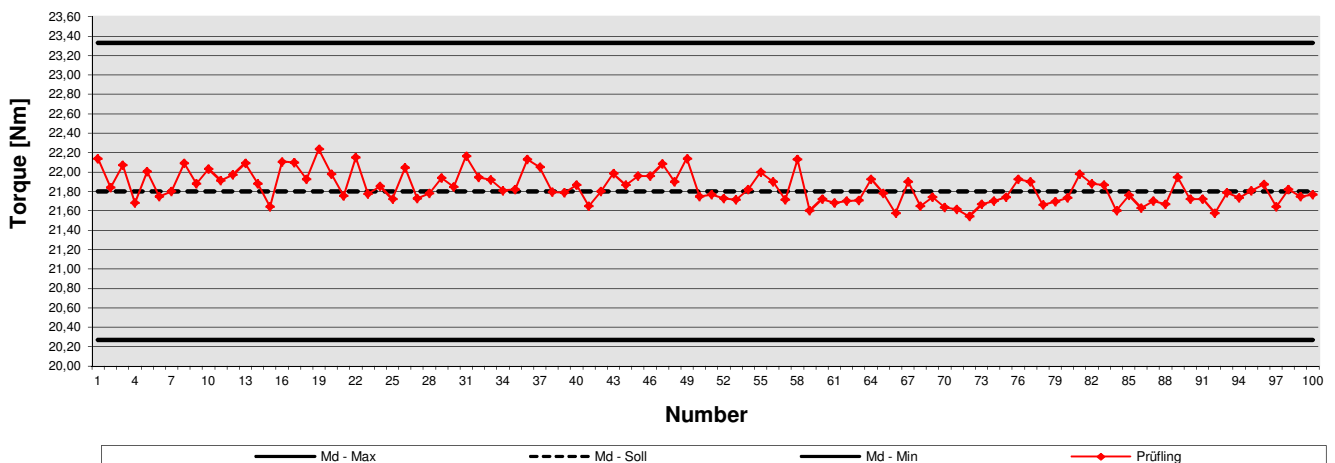
Statistics of the test piece

max. Torque	22,33 Nm	1 sig	0,171 Nm
min. Torque	21,58 Nm	6 sig	1,024 Nm
spread	0,75 Nm	+3 sig	22,46 Nm
Average	21,95 Nm	-3 sig	21,44 Nm

$$C_m = 2,99$$

$$C_{mk} = 2,70$$

Soft joint 360°



Statistics of the test piece

max. Torque	22,23 Nm	1 sig	0,160 Nm
min. Torque	21,54 Nm	6 sig	0,962 Nm
spread	0,69 Nm	+3 sig	22,32 Nm
Average	21,84 Nm	-3 sig	21,36 Nm

$$C_m = 3,18$$

$$C_{mk} = 3,10$$

CERTIFIKAT

Machine capability tests

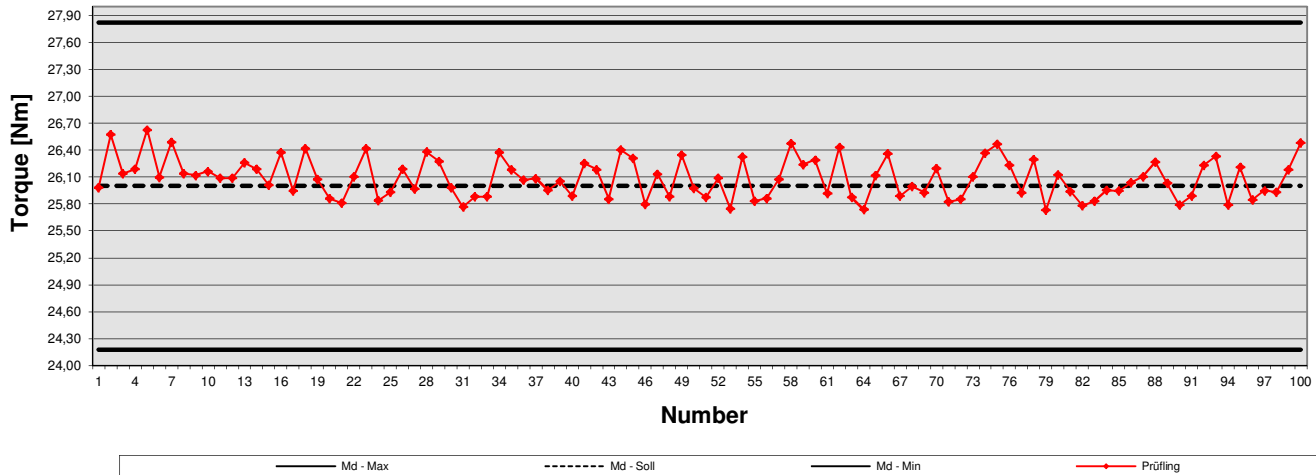


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E92992

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	27,82	26,00	24,18	+/- 7,00%

Hard joint 30°



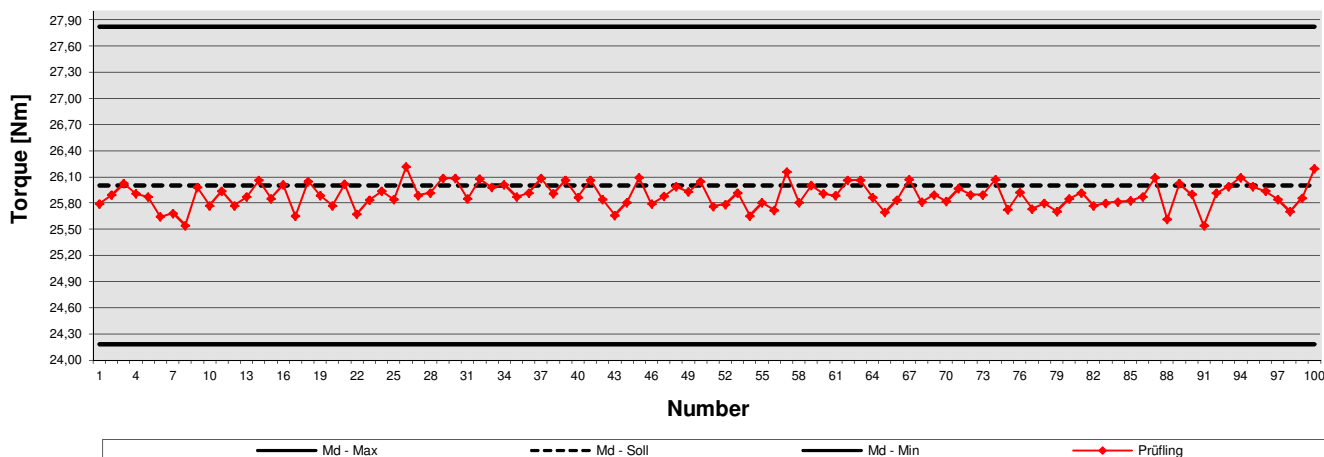
Statistics of the test piece

max. Torque	26,63 Nm	1 sig	0,217 Nm
min. Torque	25,73 Nm	6 sig	1,303 Nm
spread	0,89 Nm	+3 sig	26,74 Nm
Average	26,09 Nm	-3 sig	25,44 Nm

$$C_m = 2,79$$

$$C_{mk} = 2,66$$

Soft joint 360°



Statistics of the test piece

max. Torque	26,22 Nm	1 sig	0,141 Nm
min. Torque	25,54 Nm	6 sig	0,847 Nm
spread	0,67 Nm	+3 sig	26,31 Nm
Average	25,89 Nm	-3 sig	25,47 Nm

$$C_m = 4,30$$

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

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E92992

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

Number of tightenings	200	6 sigma	0,48 Nm
Average	11,44 Nm	Mean value offset	0,19 Nm
Sigma	0,08 Nm	Mean value offset %	1,64 %
Dispersion	0,44 Nm	comb. average torque	11,36 Nm
max. Torque	11,57 Nm	comb. torque variation	0,67 Nm
min. Torque	11,13 Nm	comb. torque variation %	5,89 %

$$C_m = 3,28$$

$$C_{mk} = 2,70$$

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

Number of tightenings	200	6 sigma	0,99 Nm
Average	21,89 Nm	Mean value offset	0,11 Nm
Sigma	0,17 Nm	Mean value offset %	0,50 %
Dispersion	0,79 Nm	comb. average torque	21,91 Nm
max. Torque	22,33 Nm	comb. torque variation	1,10 Nm
min. Torque	21,54 Nm	comb. torque variation %	5,03 %

$$C_m = 3,09$$

$$C_{mk} = 2,91$$

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

Number of tightenings	200	6 sigma	1,10 Nm
Average	25,99 Nm	Mean value offset	0,20 Nm
Sigma	0,18 Nm	Mean value offset %	0,76 %
Dispersion	1,09 Nm	comb. average torque	26,09 Nm
max. Torque	26,63 Nm	comb. torque variation	1,30 Nm
min. Torque	25,54 Nm	comb. torque variation %	4,99 %

$$C_m = 3,32$$

$$C_{mk} = 3,30$$

CERTIFIKAT

Machine capability test

Certificate no.:

234083-03

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC26-560**

Serial - No. : **15E93513**

Torque range

of: **5 Nm**
to: **26 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	11,30 Nm
at 80%	==>	21,80 Nm
at 100%	==>	26,00 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:

2015-07-01

CERTIFIKAT

Machine capability tests

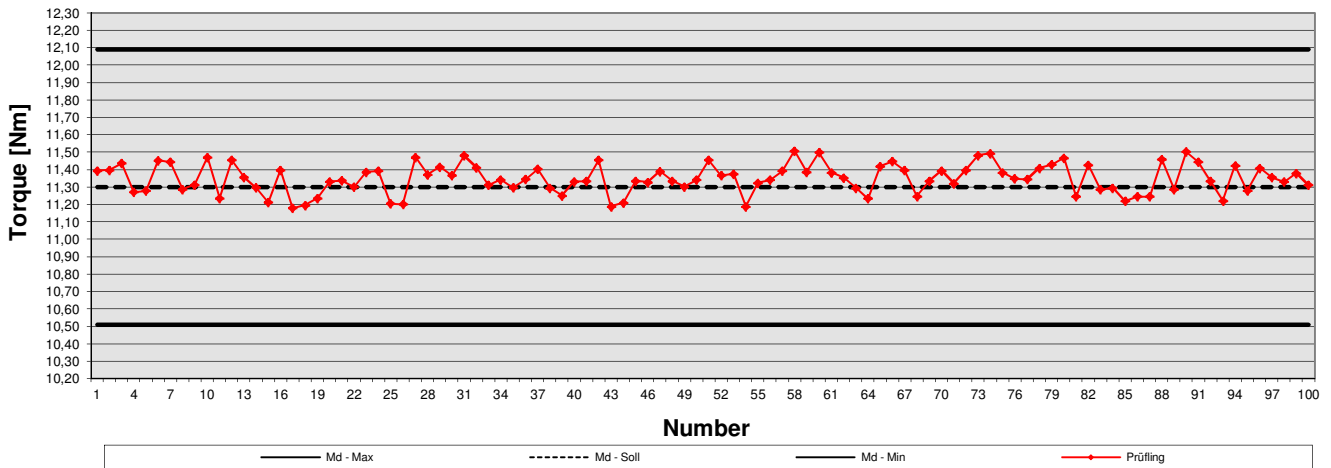


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E93513

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	12,09	11,30	10,51	+/- 7,00%

Hard joint 30°



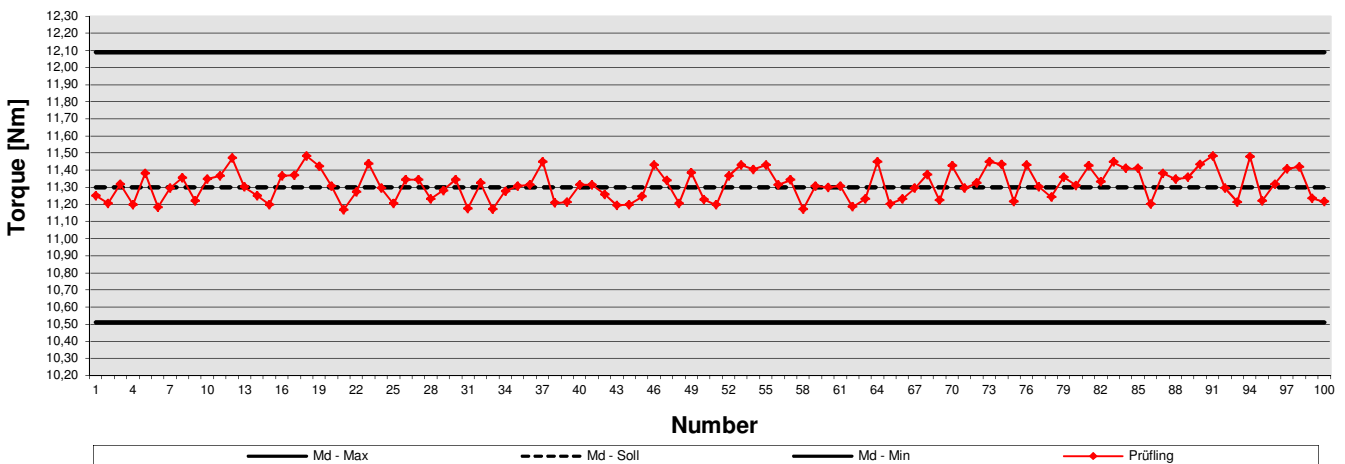
Statistics of the test piece

max. Torque	11,51 Nm	1 sig	0,084 Nm
min. Torque	11,18 Nm	6 sig	0,503 Nm
spread	0,33 Nm	+3 sig	11,60 Nm
Average	11,35 Nm	-3 sig	11,10 Nm

$$C_m = 3,14$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	11,48 Nm	1 sig	0,089 Nm
min. Torque	11,17 Nm	6 sig	0,534 Nm
spread	0,31 Nm	+3 sig	11,58 Nm
Average	11,31 Nm	-3 sig	11,05 Nm

$$C_m = 2,96$$

$$C_{mk} = 2,91$$

CERTIFIKAT

Machine capability tests

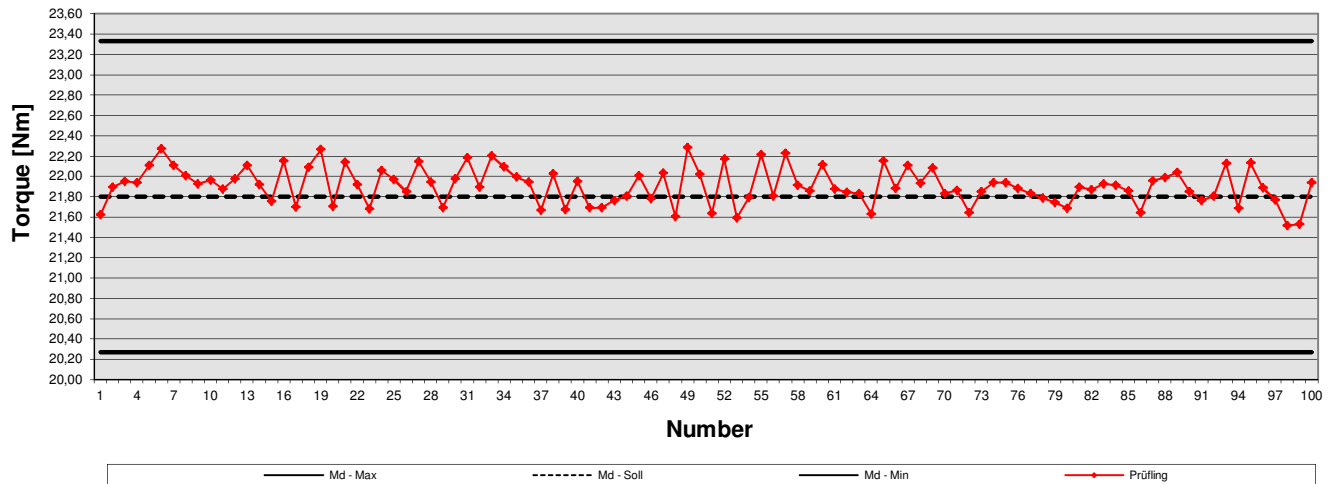


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E93513

80% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	23,33	21,80	20,27	+/- 7,00%

Hard joint 30°



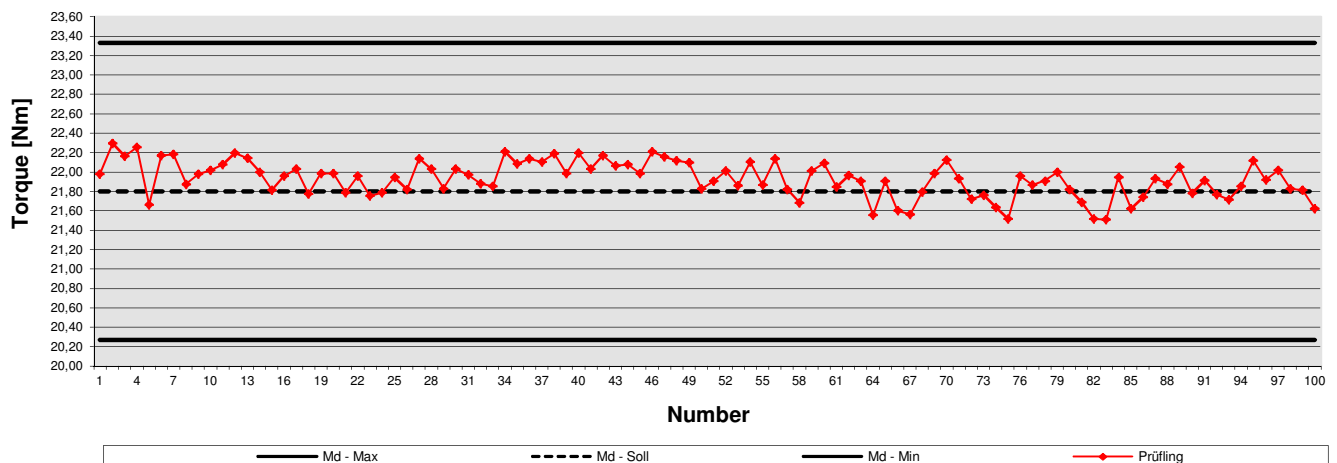
Statistics of the test piece

max. Torque	22,28 Nm	1 sig	0,180 Nm
min. Torque	21,51 Nm	6 sig	1,077 Nm
spread	0,77 Nm	+3 sig	22,45 Nm
Average	21,91 Nm	-3 sig	21,37 Nm

$$C_m = 2,84$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	22,29 Nm	1 sig	0,183 Nm
min. Torque	21,51 Nm	6 sig	1,096 Nm
spread	0,79 Nm	+3 sig	22,48 Nm
Average	21,93 Nm	-3 sig	21,38 Nm

$$C_m = 2,79$$

$$C_{mk} = 2,55$$

CERTIFIKAT

Machine capability tests

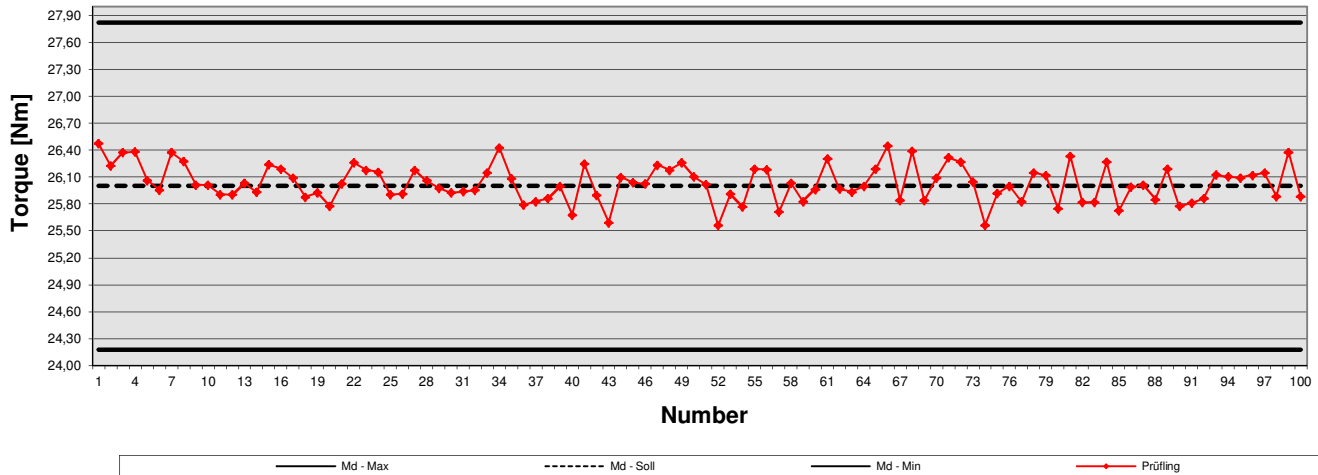


Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E93513

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	27,82	26,00	24,18	+/- 7,00%

Hard joint 30°



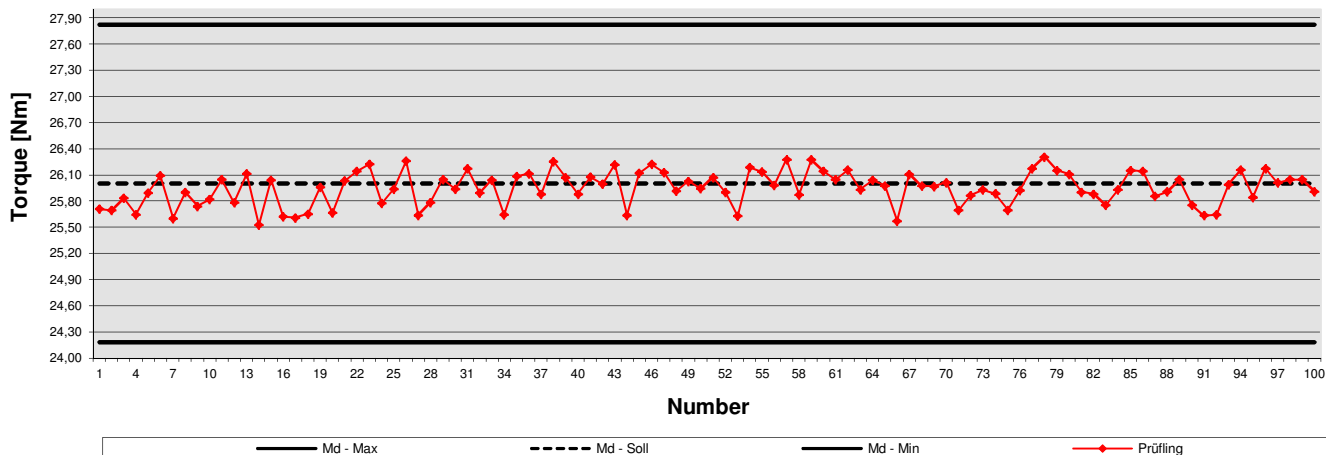
Statistics of the test piece

max. Torque	26,47 Nm		1 sig	0,203 Nm
min. Torque	25,56 Nm		6 sig	1,220 Nm
spread	0,91 Nm		+3 sig	26,64 Nm
Average	26,03 Nm		-3 sig	25,42 Nm

$$C_m = 2,98$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	26,31 Nm		1 sig	0,193 Nm
min. Torque	25,53 Nm		6 sig	1,159 Nm
spread	0,78 Nm		+3 sig	26,53 Nm
Average	25,95 Nm		-3 sig	25,37 Nm

$$C_m = 3,14$$

$$C_{mk} = 3,05$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC26-560

Serial - No. : 15E93513

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

Number of tightenings	200	6 sigma	0,52 Nm
Average	11,35 Nm	Mean value offset	0,04 Nm
Sigma	0,09 Nm	Mean value offset %	0,32 %
Dispersion	0,34 Nm	comb. average torque	11,32 Nm
max. Torque	11,51 Nm	comb. torque variation	0,55 Nm
min. Torque	11,17 Nm	comb. torque variation %	4,89 %

$C_m = 3,05$

$C_{mk} = 2,87$

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

Number of tightenings	200	6 sigma	1,08 Nm
Average	21,92 Nm	Mean value offset	0,02 Nm
Sigma	0,18 Nm	Mean value offset %	0,10 %
Dispersion	0,79 Nm	comb. average torque	21,92 Nm
max. Torque	22,29 Nm	comb. torque variation	1,11 Nm
min. Torque	21,51 Nm	comb. torque variation %	5,06 %

$C_m = 2,82$

$C_{mk} = 2,60$

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

Number of tightenings	200	6 sigma	1,19 Nm
Average	25,99 Nm	Mean value offset	0,08 Nm
Sigma	0,20 Nm	Mean value offset %	0,32 %
Dispersion	0,95 Nm	comb. average torque	26,01 Nm
max. Torque	26,47 Nm	comb. torque variation	1,27 Nm
min. Torque	25,53 Nm	comb. torque variation %	4,90 %

$C_m = 3,07$

$C_{mk} = 3,05$

a. Temperature

There was hardly no noticeable warming of the tool detected.

b. Battery lifetime

After amount of 278 tightening on soft joint and 846 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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