



Test report

Battery angle nutrunner – homologation

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

III. Testobject

Battery nutrunner:
EABC 75-300

Serial number 14F87728
15F92945
15F93892

Model	EABC 75-300
Ordering No	6151658470
Square Drive / Female Hex	Square drive
Torque range ft lb	8.8 – 55
Torque range Nm	12 – 75
CS distance mm	-
Weight kg	2.94
Weight lb	6.48
Length mm	582
Speed r/min	300
Height mm	60.4
Square drive in	1/2

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

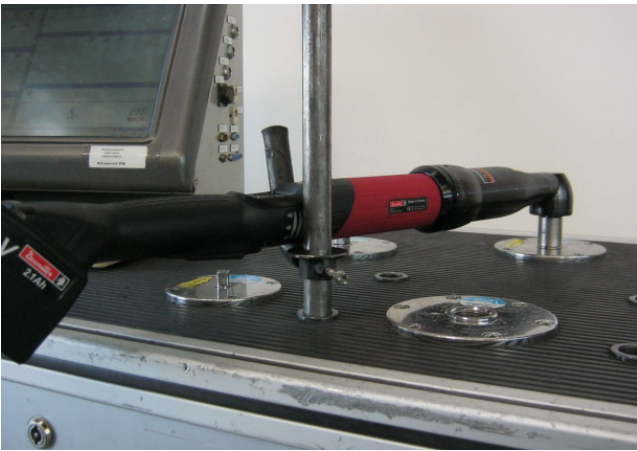


Controller CVI3 – Vision
Serial number: 27011100077



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
Cell 3 :	50-250 N·m, dynamisch
Calibration certificate:	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 :	12 – 75 Nm
Testing torque / 30% hard/soft joint	30.90 Nm
Testing torque / 80% hard/soft joint	62.40 Nm
Testing torque / 100% hard/soft joint	75.00 Nm
Speed 1 step	300 rpm
Speed 2 step	50 rpm
Angle threshold / 30%	15.45 Nm
Angle threshold / 80%	31.20 Nm
Angle threshold / 100%	37.50 Nm
Switching torque / 30%	13.905 Nm
Switching torque / 80%	28.08 Nm
Switching torque / 100%	33.75 Nm
Angle strategy 40°	15 Nm (45.00) Nm
Angle strategy 180°	15 Nm (60.00) Nm
Series	8 x 100 Joint/ results

e. Results

Reached Cm and Cmk values

Desouter / 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°
EABC75-300		Test torque	30,90 Nm		62,40 Nm		75,00 Nm	
		Speed 1st stage	300 rpm					
		Speed 2nd stage	50 rpm					
		Start angle measurement	15,45 Nm		31,20 Nm		37,50 Nm	
	14F87728	cm	2,35	3,22	2,96	4,12	2,83	4,79
		cmk	2,30	3,01	2,81	3,81	2,67	4,39
	15F92945	cm	2,51	3,54	2,43	4,60	3,90	4,46
		cmk	2,37	3,41	2,27	4,47	3,78	4,33
	15F93892	cm	2,13	4,93	3,46	4,66	5,03	4,86
		cmk	2,08	4,84	3,26	4,65	4,97	4,74

Min cm/cmk	cm	2,13	3,22	2,43	4,12	2,83	4,46
	cmk	2,08	3,01	2,27	3,81	2,67	4,33

	Range:	≥ 1,67	
Capability Index:	C_m	2,13	OK
Capability Index:	C_{mk}	2,08	OK

Ranges of tolerance for angle and torque

Tool type	Serial Nr.	Test data	60% from range		80% from range	
			40°		180°	
EABC75-300		Test torque	45,00 Nm		60,00 Nm	
		Speed 1st stage	300 rpm			
		Start angle	15,00 Nm		15,00 Nm	
	14F87728	Torque	±	3,54%	±	5,93%
		Angle	±	1,4°	±	5,5°
	15F92945	Torque	±	5,98%	±	5,89%
		Angle	±	1,7°	±	8,3°
	15F93892	Torque	±	6,01%	±	5,88%
		Angle	±	1,7°	±	5,8°

Max Torque	Torque	Range:	7%	Range:	7%	40°
	Ist:	±	6,01%	±	5,93%	OK
Max Angle	Angle	Range:	5°	Soll: ±	10°	40°
	Ist:	±	1,7°	±	8,3°	OK

CERTIFIKAT

Machine capability test

Certificate no.: **234088-01**

Customer **Desoutter Industrial Tools**

Test object

Manufacturer: **Desoutter**
Tool type: **EABC75-300** Serial - No. : **14F87728**

Torque range

of: **12 Nm**
to: **75 Nm**

<u>Number of screw tightenings</u>			<u>Torque to be achieved</u>		
at 30%	==>	100	at 30%	==>	30,90 Nm
at 80%	==>	100	at 80%	==>	62,40 Nm
at 100%	==>	100	at 100%	==>	75,00 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:

2015-08-24

CERTIFIKAT

Machine capability tests

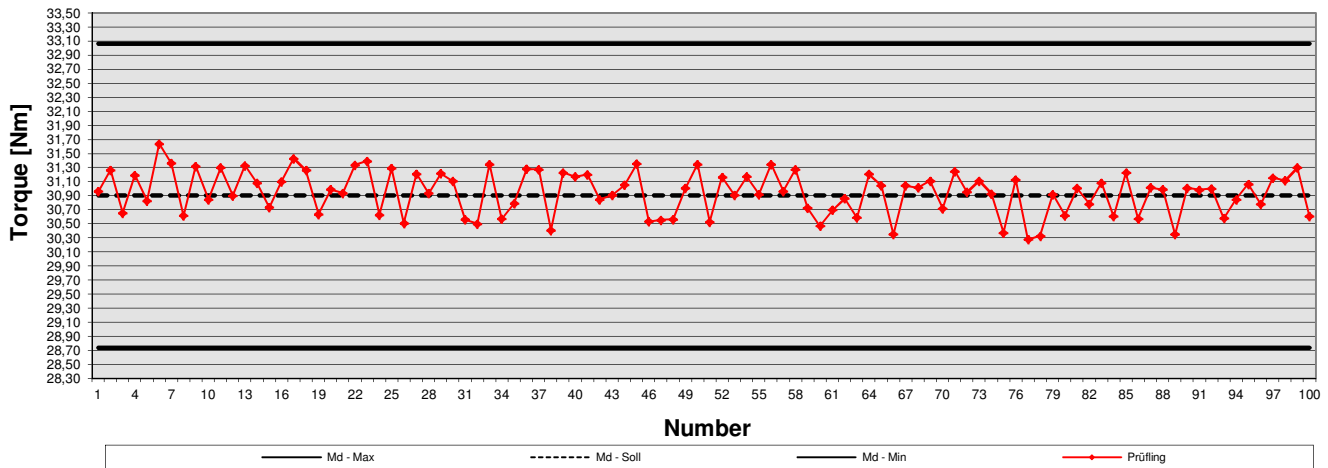


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 14F87728

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	33,06	30,90	28,74	+/- 7,00%

Hard joint 30°



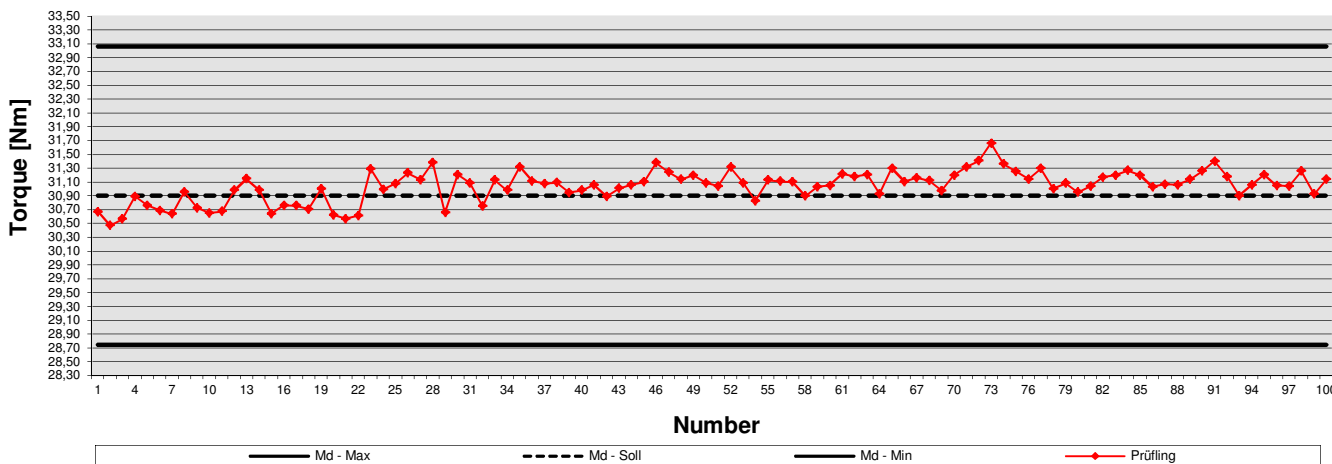
Statistics of the test piece

max. Torque	31,64 Nm		1 sig	0,306 Nm
min. Torque	30,28 Nm		6 sig	1,838 Nm
spread	1,36 Nm		+3 sig	31,86 Nm
Average	30,95 Nm		-3 sig	30,03 Nm

$$C_m = 2,35$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	31,66 Nm		1 sig	0,224 Nm
min. Torque	30,47 Nm		6 sig	1,343 Nm
spread	1,19 Nm		+3 sig	31,71 Nm
Average	31,04 Nm		-3 sig	30,37 Nm

$$C_m = 3,22$$

$$C_{mk} = 3,01$$

CERTIFIKAT

Machine capability tests

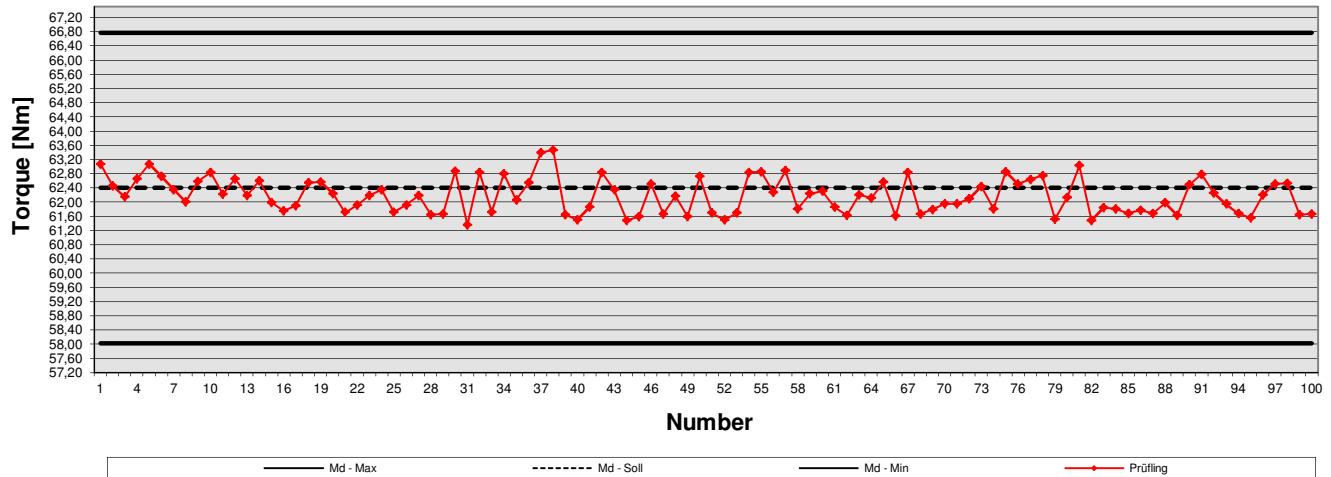


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 14F87728

80% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	66,77	62,40	58,03	+/- 7,00%

Hard joint 30°



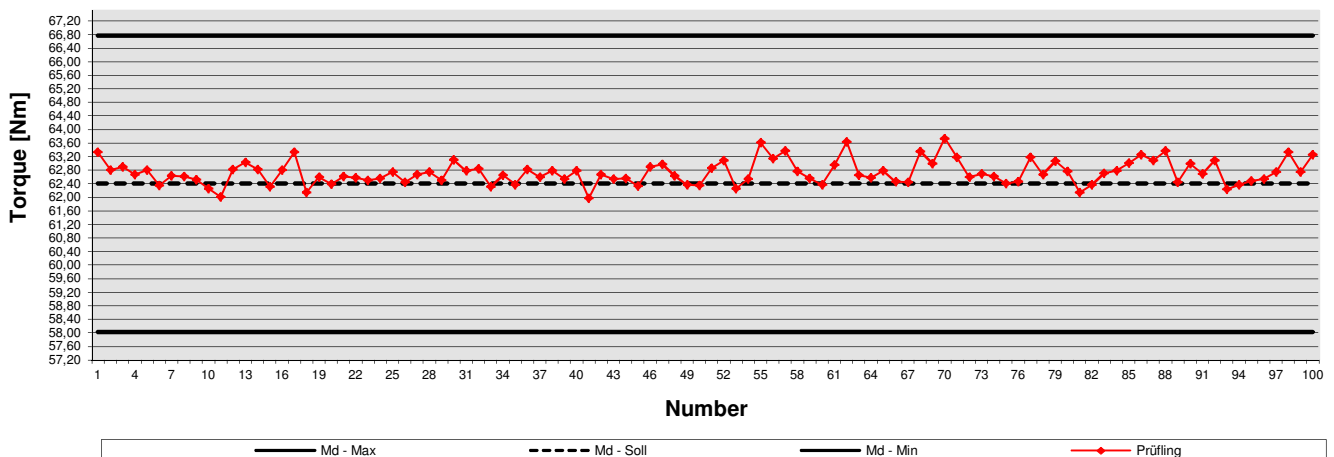
Statistics of the test piece

max. Torque	63,46 Nm	1 sig	0,492 Nm
min. Torque	61,36 Nm	6 sig	2,953 Nm
spread	2,10 Nm	+3 sig	63,66 Nm
Average	62,18 Nm	-3 sig	60,70 Nm

$$C_m = 2,96$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	63,74 Nm	1 sig	0,354 Nm
min. Torque	61,98 Nm	6 sig	2,124 Nm
spread	1,76 Nm	+3 sig	63,79 Nm
Average	62,73 Nm	-3 sig	61,67 Nm

$$C_m = 4,12$$

$$C_{mk} = 3,81$$

CERTIFIKAT

Machine capability tests

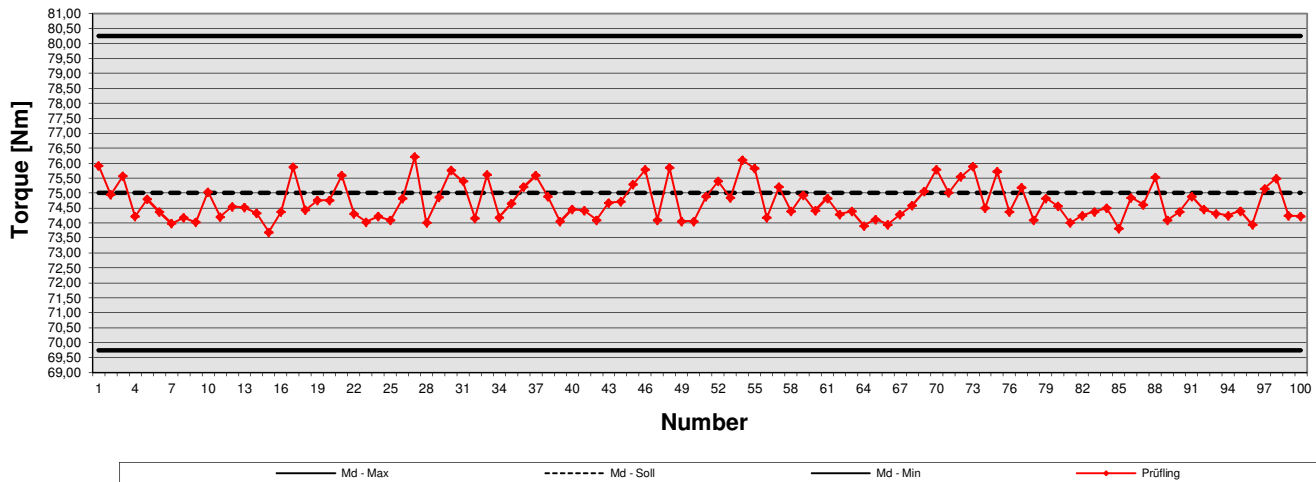


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 14F87728

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	80,25	75,00	69,75	+/- 7,00%

Hard joint 30°

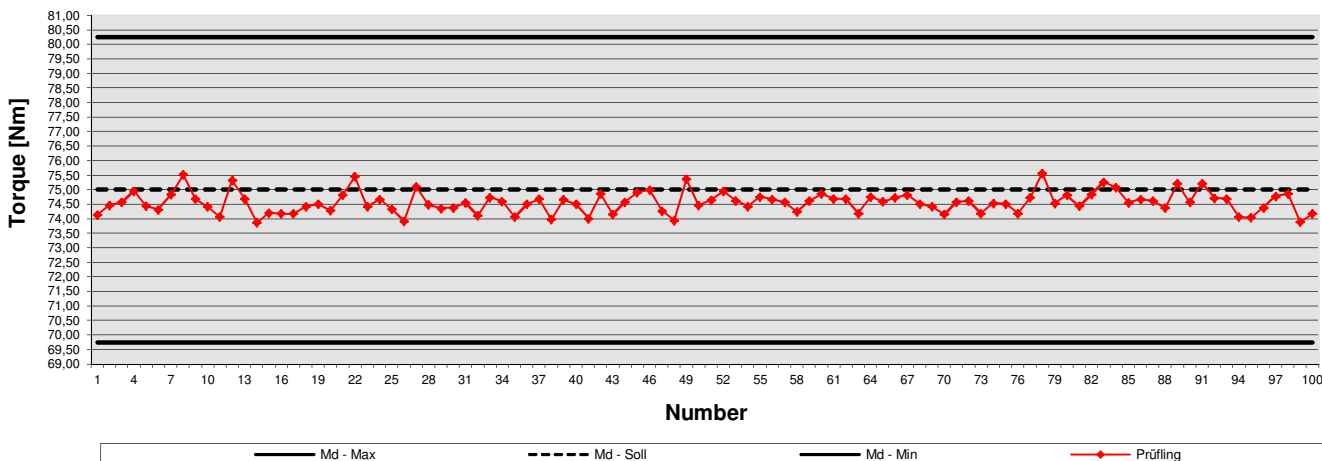


Statistics of the test piece			
max. Torque	76,21 Nm	1 sig	0,618 Nm
min. Torque	73,70 Nm	6 sig	3,709 Nm
spread	2,51 Nm	+3 sig	76,56 Nm
Average	74,71 Nm	-3 sig	72,85 Nm

$$C_m = 2,83$$

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

Soft joint 360°



Statistics of the test piece			
max. Torque	75,57 Nm	1 sig	0,365 Nm
min. Torque	73,87 Nm	6 sig	2,192 Nm
spread	1,70 Nm	+3 sig	75,66 Nm
Average	74,56 Nm	-3 sig	73,47 Nm

$$C_m = 4,79$$

$$C_{mk} = 4,39$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 14F87728

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

Number of tightenings	200	6 sigma	1,61 Nm
Average	30,95 Nm	Mean value offset	0,10 Nm
Sigma	0,27 Nm	Mean value offset %	0,31 %
Dispersion	1,38 Nm	comb. average torque	30,95 Nm
max. Torque	31,66 Nm	comb. torque variation	1,84 Nm
min. Torque	30,28 Nm	comb. torque variation %	5,94 %

$$C_m = 2,69$$

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

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

Number of tightenings	200	6 sigma	2,57 Nm
Average	62,45 Nm	Mean value offset	0,55 Nm
Sigma	0,43 Nm	Mean value offset %	0,88 %
Dispersion	2,38 Nm	comb. average torque	62,25 Nm
max. Torque	63,74 Nm	comb. torque variation	3,09 Nm
min. Torque	61,36 Nm	comb. torque variation %	4,96 %

$$C_m = 3,41$$

$$C_{mk} = 3,37$$

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

Number of tightenings	200	6 sigma	3,04 Nm
Average	74,63 Nm	Mean value offset	0,14 Nm
Sigma	0,51 Nm	Mean value offset %	0,19 %
Dispersion	2,51 Nm	comb. average torque	74,71 Nm
max. Torque	76,21 Nm	comb. torque variation	3,71 Nm
min. Torque	73,70 Nm	comb. torque variation %	4,96 %

$$C_m = 3,46$$

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

CERTIFIKAT

Machine capability test

Certificate no.:

234088-02

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC75-300**

Serial - No. : **15F92945**

Torque range

of: **12 Nm**
to: **75 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	30,90 Nm
at 80%	==>	62,40 Nm
at 100%	==>	75,00 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:

2015-08-25

CERTIFIKAT

Machine capability tests

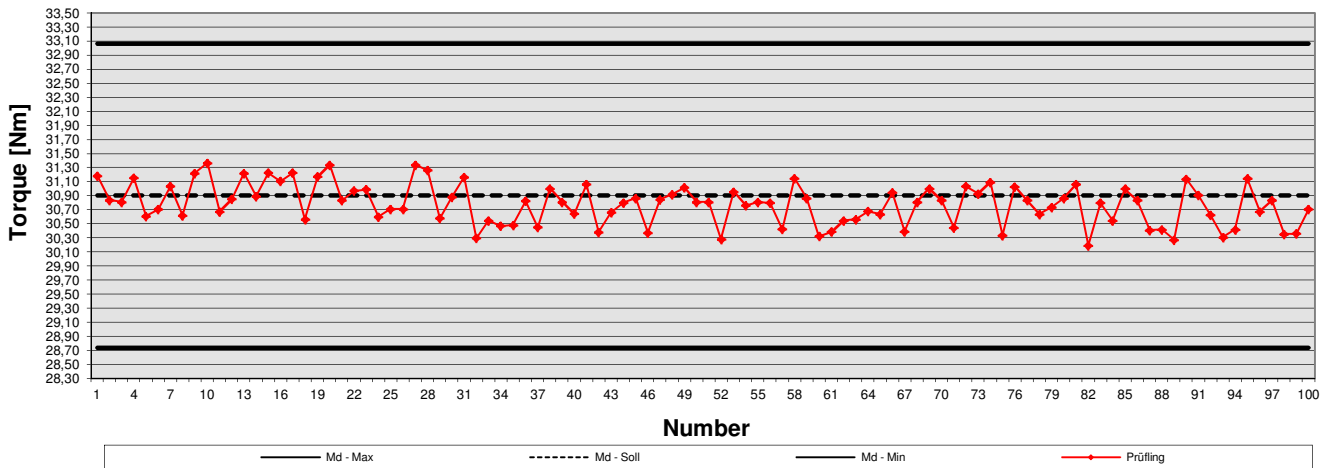


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F92945

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	33,06	30,90	28,74	+/- 7,00%

Hard joint 30°



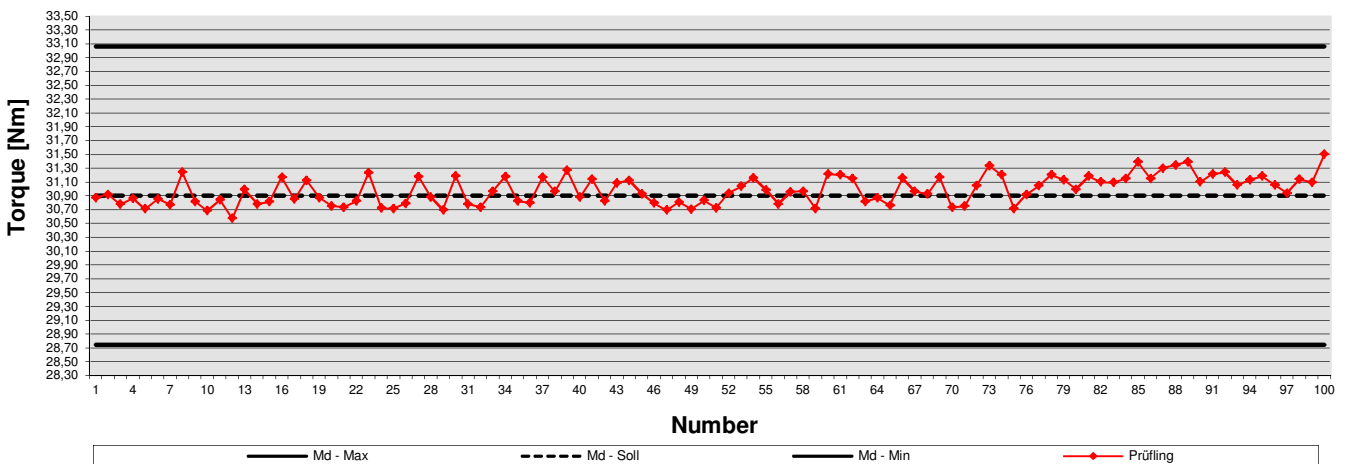
Statistics of the test piece

max. Torque	31,37 Nm	1 sig	0,287 Nm
min. Torque	30,19 Nm	6 sig	1,723 Nm
spread	1,18 Nm	+3 sig	31,64 Nm
Average	30,78 Nm	-3 sig	29,92 Nm

$$C_m = 2,51$$

$$C_{mk} = 2,37$$

Soft joint 360°



Statistics of the test piece

max. Torque	31,50 Nm	1 sig	0,203 Nm
min. Torque	30,57 Nm	6 sig	1,220 Nm
spread	0,93 Nm	+3 sig	31,59 Nm
Average	30,98 Nm	-3 sig	30,37 Nm

$$C_m = 3,54$$

$$C_{mk} = 3,41$$

CERTIFIKAT

Machine capability tests

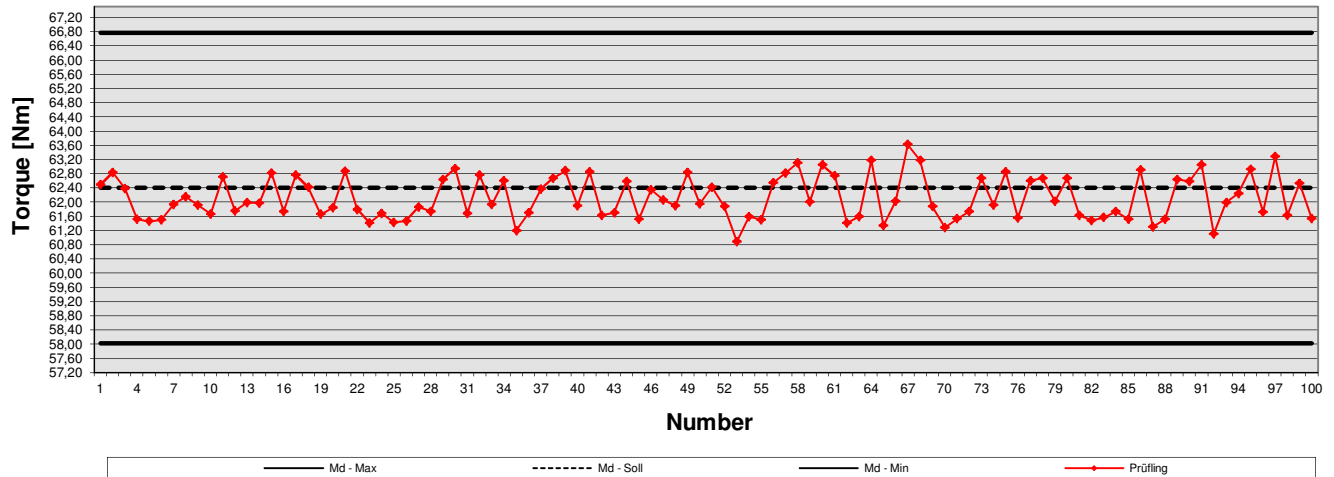


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F92945

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	66,77	62,40	58,03	+/- 7,00%

Hard joint 30°



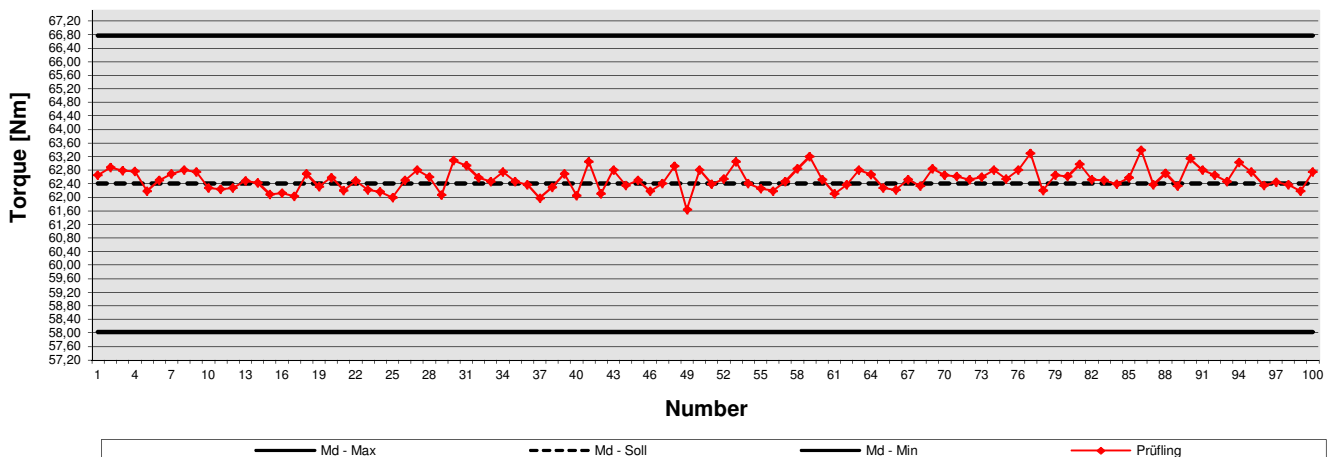
Statistics of the test piece

max. Torque	63,62 Nm	1 sig	0,600 Nm
min. Torque	60,89 Nm	6 sig	3,600 Nm
spread	2,73 Nm	+3 sig	63,92 Nm
Average	62,12 Nm	-3 sig	60,32 Nm

$$C_m = 2,43$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	63,40 Nm	1 sig	0,316 Nm
min. Torque	61,63 Nm	6 sig	1,898 Nm
spread	1,76 Nm	+3 sig	63,48 Nm
Average	62,53 Nm	-3 sig	61,58 Nm

$$C_m = 4,60$$

$$C_{mk} = 4,47$$

CERTIFIKAT

Machine capability tests

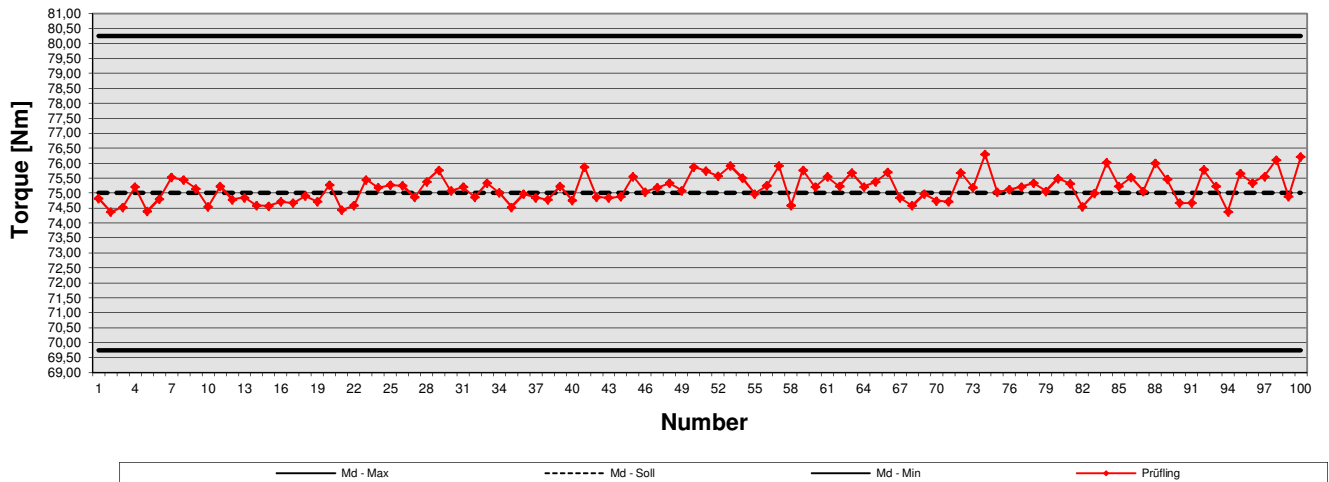


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F92945

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	80,25	75,00	69,75	+/- 7,00%

Hard joint 30°



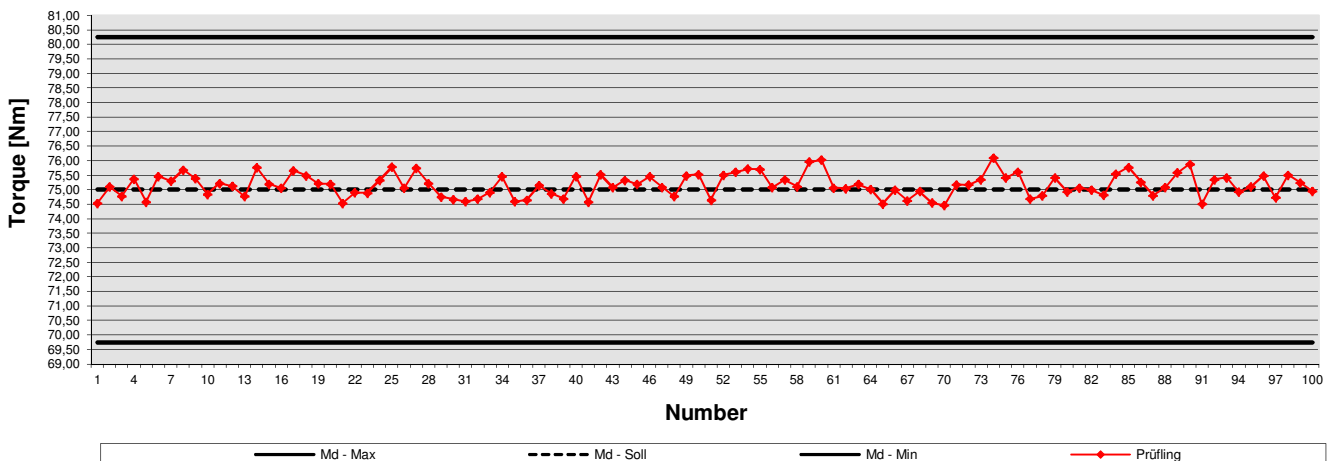
Statistics of the test piece

max. Torque	76,29 Nm		1 sig	0,448 Nm
min. Torque	74,38 Nm		6 sig	2,690 Nm
spread	1,92 Nm		+3 sig	76,51 Nm
Average	75,16 Nm		-3 sig	73,82 Nm

$$C_m = 3,90$$

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

Soft joint 360°



Statistics of the test piece

max. Torque	76,10 Nm		1 sig	0,393 Nm
min. Torque	74,46 Nm		6 sig	2,356 Nm
spread	1,64 Nm		+3 sig	76,33 Nm
Average	75,15 Nm		-3 sig	73,97 Nm

$$C_m = 4,46$$

$$C_{mk} = 4,33$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F92945

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

Number of tightenings	200	6 sigma	1,49 Nm
Average	30,78 Nm	Mean value offset	0,20 Nm
Sigma	0,25 Nm	Mean value offset %	0,65 %
Dispersion	1,31 Nm	comb. average torque	30,78 Nm
max. Torque	31,50 Nm	comb. torque variation	1,72 Nm
min. Torque	30,19 Nm	comb. torque variation %	5,60 %

$C_m = 2,90$

$C_{mk} = 2,73$

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

Number of tightenings	200	6 sigma	2,87 Nm
Average	62,32 Nm	Mean value offset	0,41 Nm
Sigma	0,48 Nm	Mean value offset %	0,66 %
Dispersion	2,73 Nm	comb. average torque	62,12 Nm
max. Torque	63,62 Nm	comb. torque variation	3,60 Nm
min. Torque	60,89 Nm	comb. torque variation %	5,80 %

$C_m = 3,04$

$C_{mk} = 2,99$

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

Number of tightenings	200	6 sigma	2,52 Nm
Average	75,16 Nm	Mean value offset	0,01 Nm
Sigma	0,42 Nm	Mean value offset %	0,02 %
Dispersion	1,92 Nm	comb. average torque	75,16 Nm
max. Torque	76,29 Nm	comb. torque variation	2,69 Nm
min. Torque	74,38 Nm	comb. torque variation %	3,58 %

$C_m = 4,16$

$C_{mk} = 4,03$

CERTIFIKAT

Machine capability test

Certificate no.:

234088-03

Customer

Desoutter Industrial Tools

Test object

Manufacturer: **Desoutter**

Tool type: **EABC75-300**

Serial - No. : **15F93892**

Torque range

of: **12 Nm**
to: **75 Nm**

Number of screw tightenings

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

Torque to be achieved

at 30%	==>	30,90 Nm
at 80%	==>	62,40 Nm
at 100%	==>	75,00 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:

2015-08-26

CERTIFIKAT

Machine capability tests

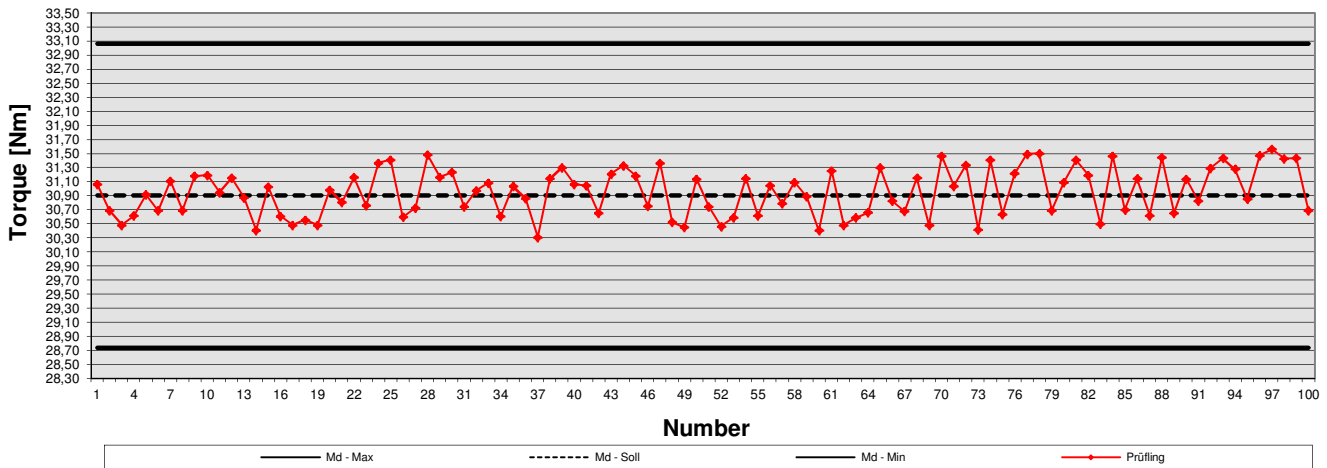


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F93892

30% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	33,06	30,90	28,74	+/- 7,00%

Hard joint 30°



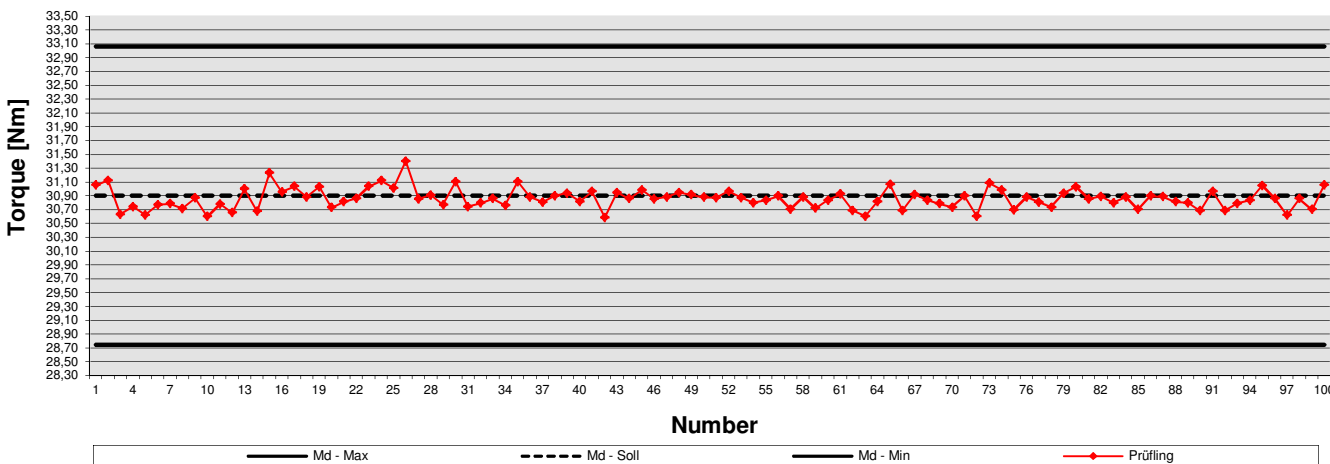
Statistics of the test piece

max. Torque	31,56 Nm	1 sig	0,337 Nm
min. Torque	30,31 Nm	6 sig	2,024 Nm
spread	1,25 Nm	+3 sig	31,97 Nm
Average	30,96 Nm	-3 sig	29,95 Nm

$$C_m = 2,13$$

$$C_{mk} = 2,08$$

Soft joint 360°



Statistics of the test piece

max. Torque	31,40 Nm	1 sig	0,146 Nm
min. Torque	30,59 Nm	6 sig	0,877 Nm
spread	0,82 Nm	+3 sig	31,30 Nm
Average	30,86 Nm	-3 sig	30,42 Nm

$$C_m = 4,93$$

$$C_{mk} = 4,84$$

CERTIFIKAT

Machine capability tests

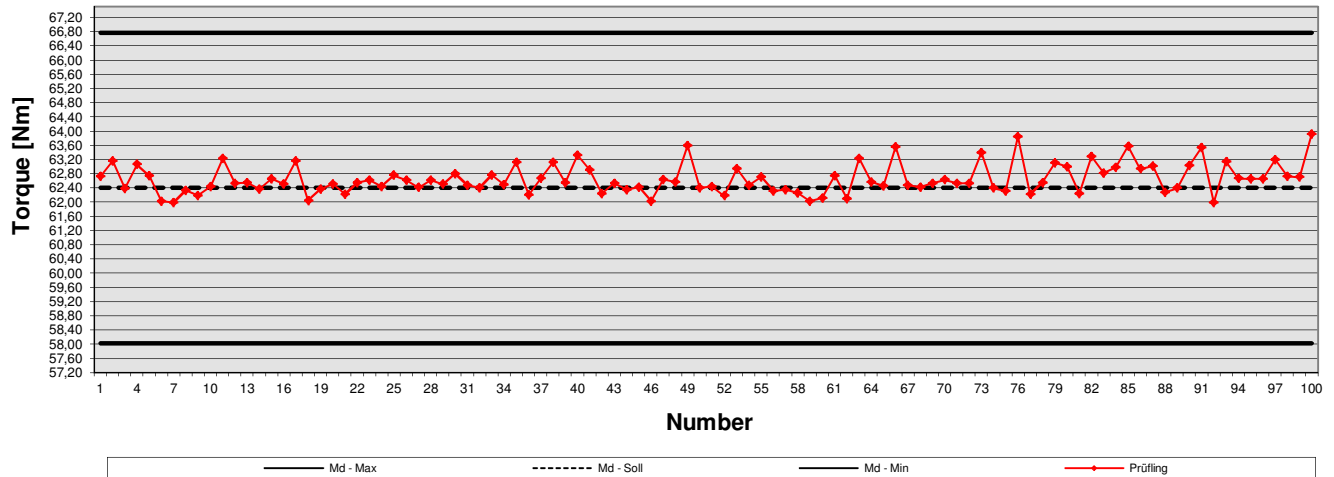


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F93892

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	66,77	62,40	58,03	+/- 7,00%

Hard joint 30°



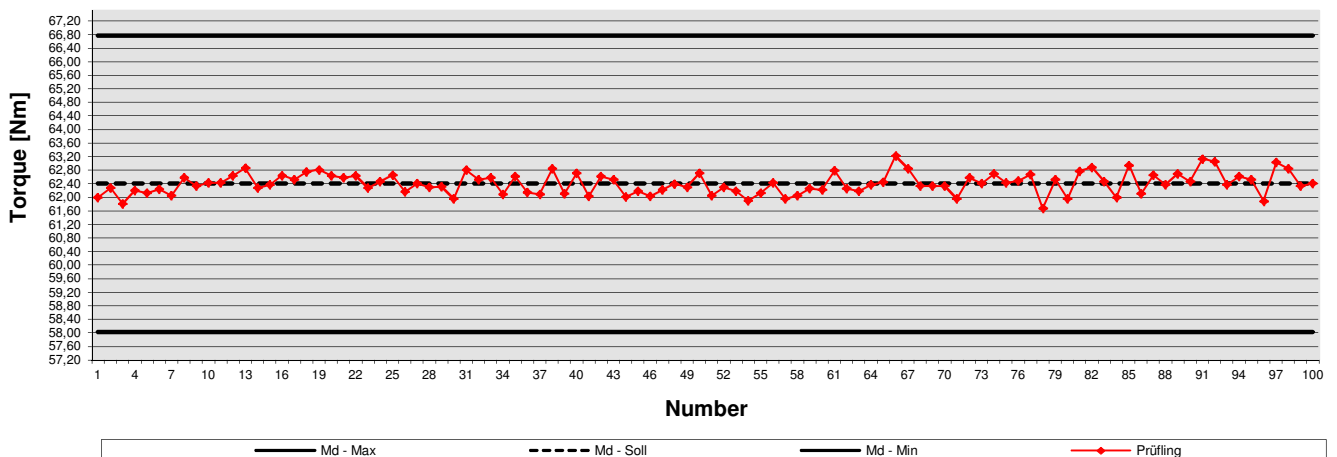
Statistics of the test piece

max. Torque	63,92 Nm	1 sig	0,421 Nm
min. Torque	61,99 Nm	6 sig	2,524 Nm
spread	1,94 Nm	+3 sig	63,92 Nm
Average	62,66 Nm	-3 sig	61,39 Nm

$$C_m = 3,46$$

$$C_{mk} = 3,26$$

Soft joint 360°



Statistics of the test piece

max. Torque	63,23 Nm	1 sig	0,313 Nm
min. Torque	61,67 Nm	6 sig	1,875 Nm
spread	1,55 Nm	+3 sig	63,34 Nm
Average	62,41 Nm	-3 sig	61,47 Nm

$$C_m = 4,66$$

$$C_{mk} = 4,65$$

CERTIFIKAT

Machine capability tests

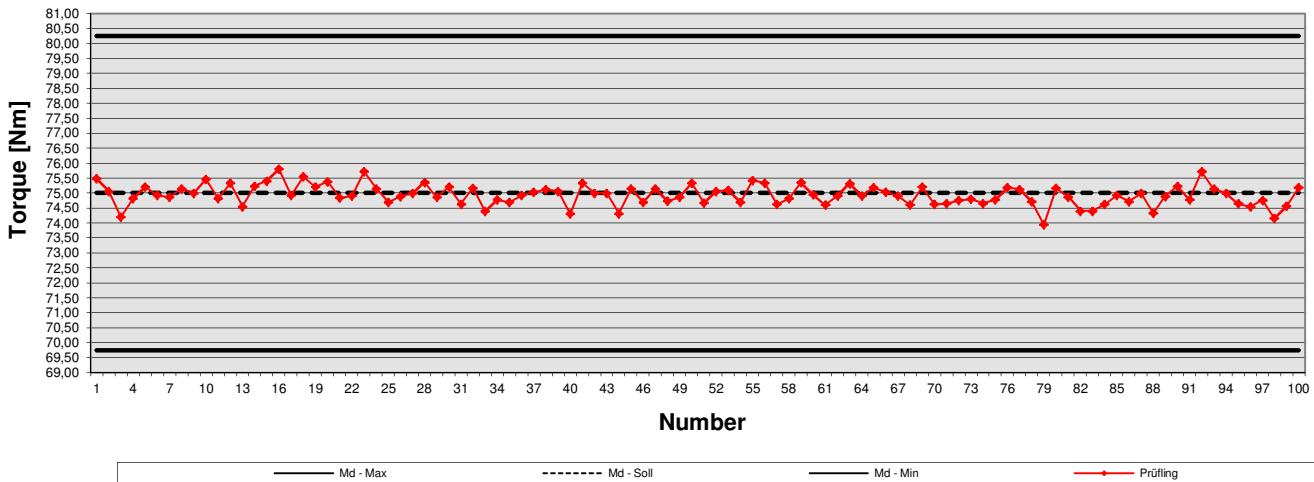


Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F93892

100% of the torque	USL (N·m)	Target (N·m)	LSL (N·m)	Tolerance [%]
	80,25	75,00	69,75	+/- 7,00%

Hard joint 30°



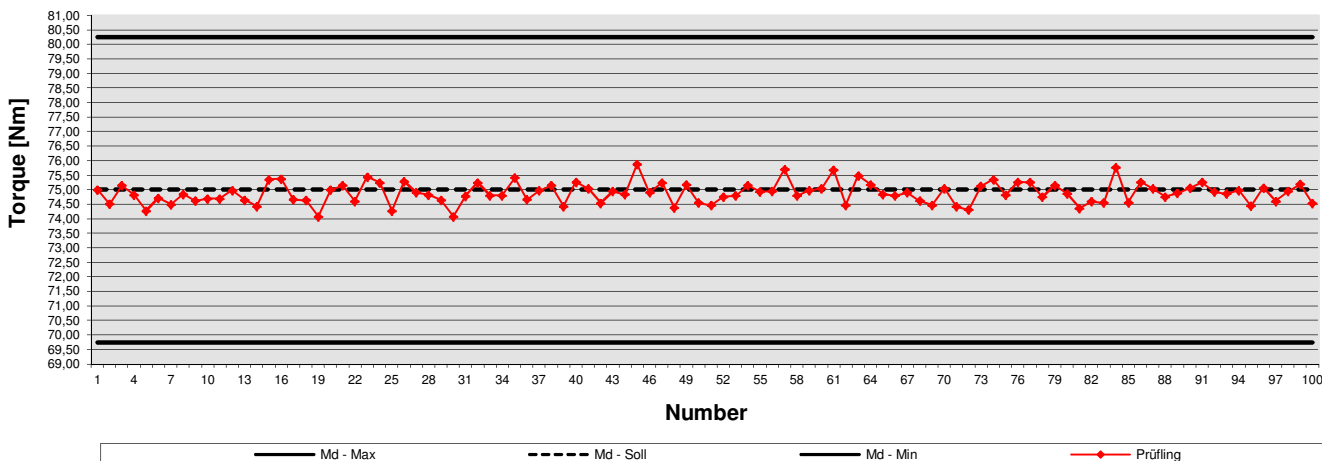
Statistics of the test piece

max. Torque	75,80 Nm	1 sig	0,348 Nm
min. Torque	73,95 Nm	6 sig	2,088 Nm
spread	1,86 Nm	+3 sig	75,98 Nm
Average	74,94 Nm	-3 sig	73,89 Nm

$$C_m = 5,03$$

$$C_{mk} = 4,97$$

Soft joint 360°



Statistics of the test piece

max. Torque	75,88 Nm	1 sig	0,360 Nm
min. Torque	74,08 Nm	6 sig	2,163 Nm
spread	1,80 Nm	+3 sig	75,96 Nm
Average	74,88 Nm	-3 sig	73,80 Nm

$$C_m = 4,86$$

$$C_{mk} = 4,74$$

CERTIFIKAT

Machine capability tests



Manufacturer: Desoutter
Tool type: EABC75-300

Serial - No. : 15F93892

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

Number of tightenings	200	6 sigma	1,56 Nm
Average	30,96 Nm	Mean value offset	0,10 Nm
Sigma	0,26 Nm	Mean value offset %	0,31 %
Dispersion	1,25 Nm	comb. average torque	30,96 Nm
max. Torque	31,56 Nm	comb. torque variation	2,02 Nm
min. Torque	30,31 Nm	comb. torque variation %	6,54 %

$$C_m = 2,78$$

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

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

Number of tightenings	200	6 sigma	2,22 Nm
Average	62,53 Nm	Mean value offset	0,25 Nm
Sigma	0,37 Nm	Mean value offset %	0,40 %
Dispersion	2,25 Nm	comb. average torque	62,66 Nm
max. Torque	63,92 Nm	comb. torque variation	2,52 Nm
min. Torque	61,67 Nm	comb. torque variation %	4,03 %

$$C_m = 3,94$$

$$C_{mk} = 3,82$$

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

Number of tightenings	200	6 sigma	2,12 Nm
Average	74,91 Nm	Mean value offset	0,06 Nm
Sigma	0,35 Nm	Mean value offset %	0,07 %
Dispersion	1,94 Nm	comb. average torque	74,89 Nm
max. Torque	75,88 Nm	comb. torque variation	2,18 Nm
min. Torque	73,95 Nm	comb. torque variation %	2,91 %

$$C_m = 4,95$$

$$C_{mk} = 4,86$$

a. Temperature

There was hardly no noticeable warming of the tool detected.

b. Battery lifetime

After amount of 114 tightening on soft joint and 541 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



Dariusz Bieganski

dariusz.bieganski@desouttertools.com