Power Tools Central Service Workshop

Rózyniec 83C, 59-706 Gromadka,
Polen

Test report

Battery angle screwdriver – 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

September 2014
Power Tools Central Service Workshop
Rózyniec 83C, 59-706 Gromadka,
Polen

III. Testobject

Battery screw driver:
ELS7-360-A4S
Serial number 14 C 04421
14 C 04422
14 C 04423

Li-Ion 18 VDC 1,3 Ah 23,4 Wh
Serial number 00289-12-W16

ELIT Speed Module

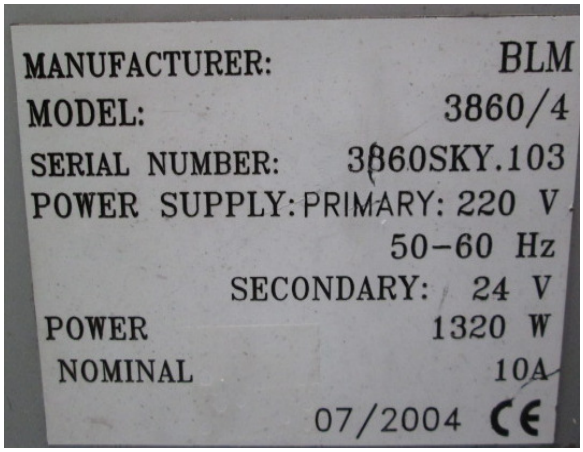
Model	ELS7-360-A4S
Ordering No	6151657250
Square Drive / Female Hex	Square drive
Torque range ft lb	13 – 62
Torque range Nm	1.5 – 7
CS distance mm	-
Weight kg	1.2
Weight lb	2.6
Length mm	460
Speed r/min	120 - 360
Height mm	45.5
Square drive in	¼

IV. Test condition

a. Mounting

b. Test equipment

Hersteller:	**BLM, Mailand (Italien)**
Typ:	**3860/4**
Ser.-Nr.:	**3860SKY.103**
Zelle 1 :	**1-10 N·m, dynamisch**
Ser.-Nr.:	**188.10.144**
Rückführung:	**EN1049**
Filterfrequenz:	**300 Hz**



c. Explanation of the test

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

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

d. Screw driver test conditions

Range of the screwdriver device :	1.5 - 7 N·m
Testing torque / 30% hard/soft joint	3.15 N·m
Testing torque / 80% hard/soft joint	5.90 N·m
Testing torque / 100% hard/soft joint	7 N·m
Speed 1 step	360 rpm
Series	6x 100 Joint/ results

e. Results

Desoutter / 1-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°
ELS7-360 A4S		Test torque		3,15 Nm		5,90 Nm		7 Nm	
		Speed 1st stage		360 rpm					
		Start angle measurement		1,575 Nm		2,95 Nm		3,5 Nm	
	14C04421		cm	2,79	3,30	3,27	4,93	3,99	6,67
			cmk	2,78	3,22	3,05	4,67	3,70	6,66
	14C04422		cm	2,20	3,34	2,42	4,48	2,85	4,65
			cmk	2,17	3,26	2,22	4,39	2,69	4,55
	14C04423		cm	2,37	3,06	2,93	3,87	3,23	4,49
			cmk	2,21	2,96	2,69	3,65	3,09	4,32

Power Tools Central Service Workshop
Rózyniec 83C, 59-706 Gromadka,

CERTIFIKAT

Machine capability test

Certificate no.: **207175-01**

Customer **Desoutter Industrial Tools**

Test object

Manufacturer: **Desoutter**
Tool type: **ELS7-360-A4S** Serial - No. : **14C04421**

Torque range

of: **1,5 Nm**
to: **7 Nm**

Number of screw tightenings			Torque to be achieved		
at 30%	==>	**100**	at 30%	==>	**3,15 Nm**
at 80%	==>	**100**	at 80%	==>	**5,90 Nm**
at 100%	==>	**100**	at 100%	==>	**7,00 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:

2014-10-29

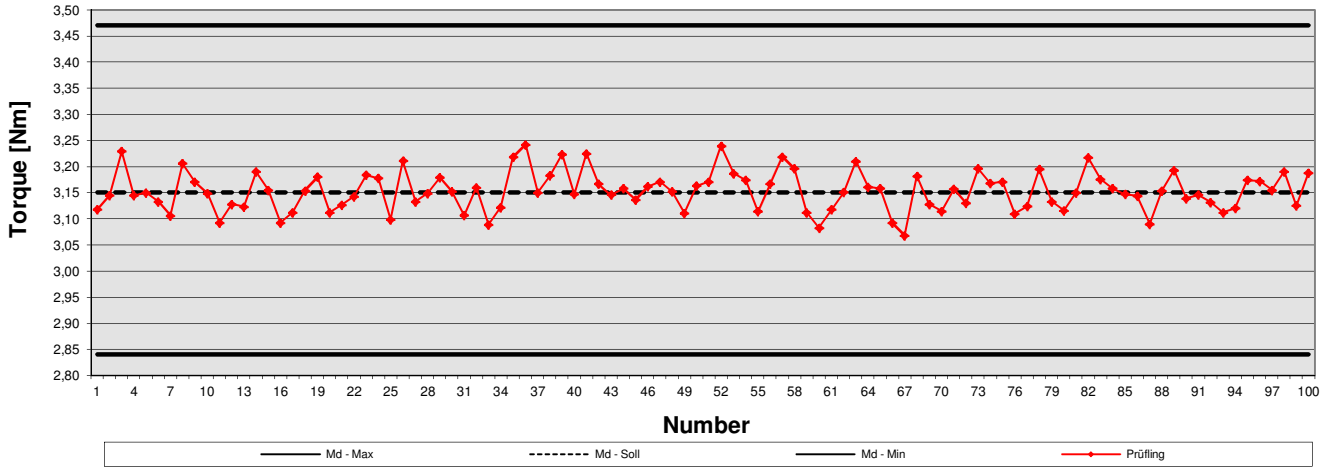
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04421

30% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	3,47	3,15	2,84	+/- 10,00%

Hard joint 30°

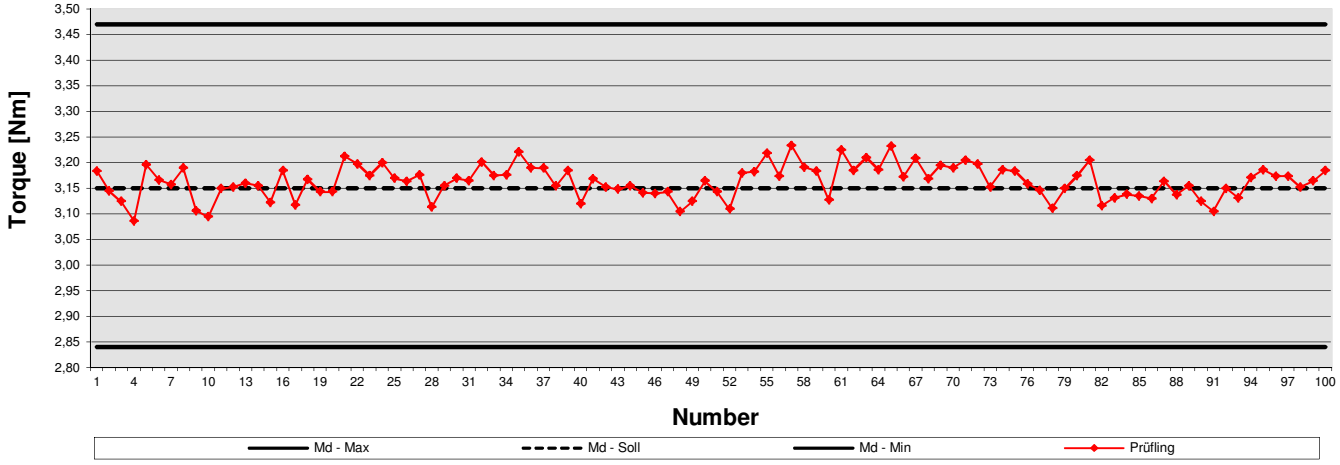


Statistics of the test piece

max. Torque	3,24	Nm	1 sig	0,038	Nm
min. Torque	3,07	Nm	6 sig	0,225	Nm
spread	0,17	Nm	+3 sig	3,27	Nm
Average	3,15	Nm	-3 sig	3,04	Nm

C_m = *2,79* C_{mk} = *2,78*

Soft joint 360°



Statistics of the test piece

max. Torque	3,23	Nm	1 sig	0,032	Nm
min. Torque	3,09	Nm	6 sig	0,191	Nm
spread	0,15	Nm	+3 sig	3,26	Nm
Average	3,16	Nm	-3 sig	3,07	Nm

C_m = *3,30* C_{mk} = *3,22*

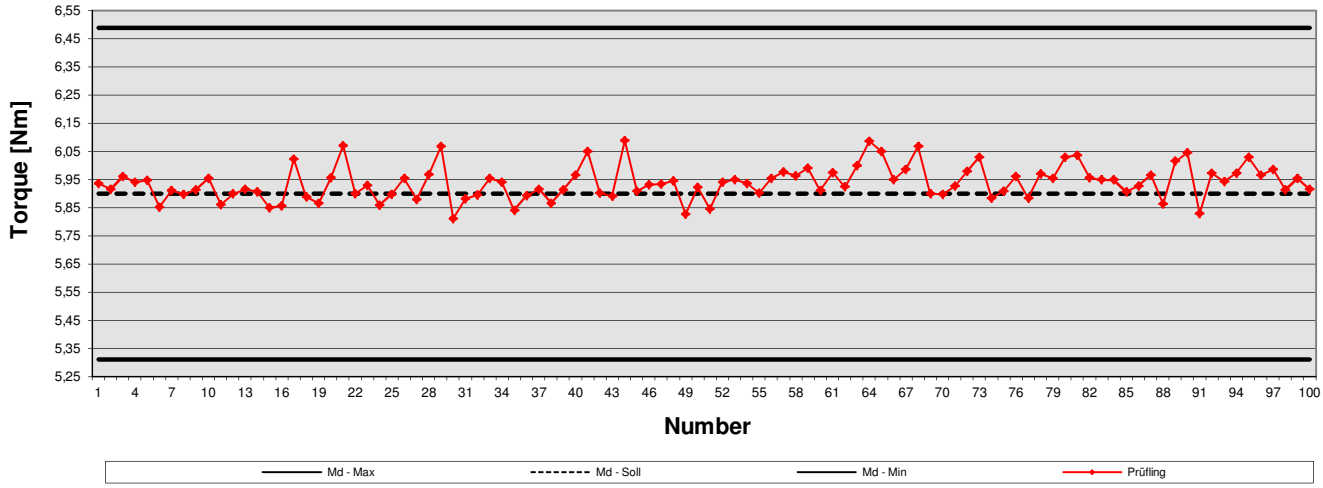
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04421

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	6,49	5,90	5,31	+/- 10,00%

Hard joint 30°

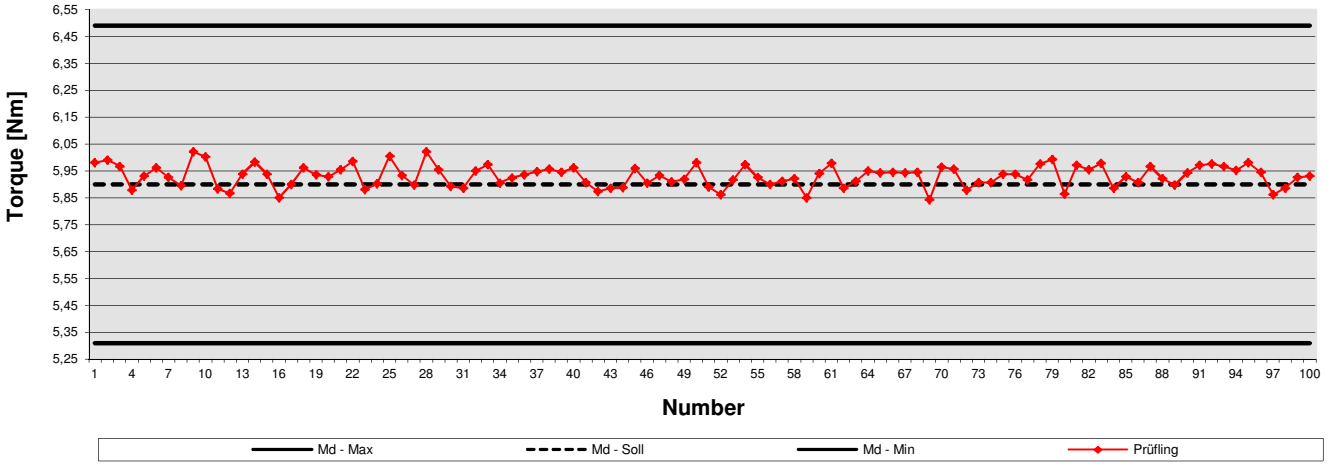


Statistics of the test piece

max. Torque	6,09	Nm	1 sig	0,060	Nm
min. Torque	5,81	Nm	6 sig	0,361	Nm
spread	0,28	Nm	+3 sig	6,12	Nm
Average	5,94	Nm	-3 sig	5,76	Nm

C_m = *3,27* C_{mk} = *3,05*

Soft joint 360°



Statistics of the test piece

max. Torque	6,02	Nm	1 sig	0,040	Nm
min. Torque	5,84	Nm	6 sig	0,239	Nm
spread	0,18	Nm	+3 sig	6,05	Nm
Average	5,93	Nm	-3 sig	5,81	Nm

C_m = *4,93* C_{mk} = *4,67*

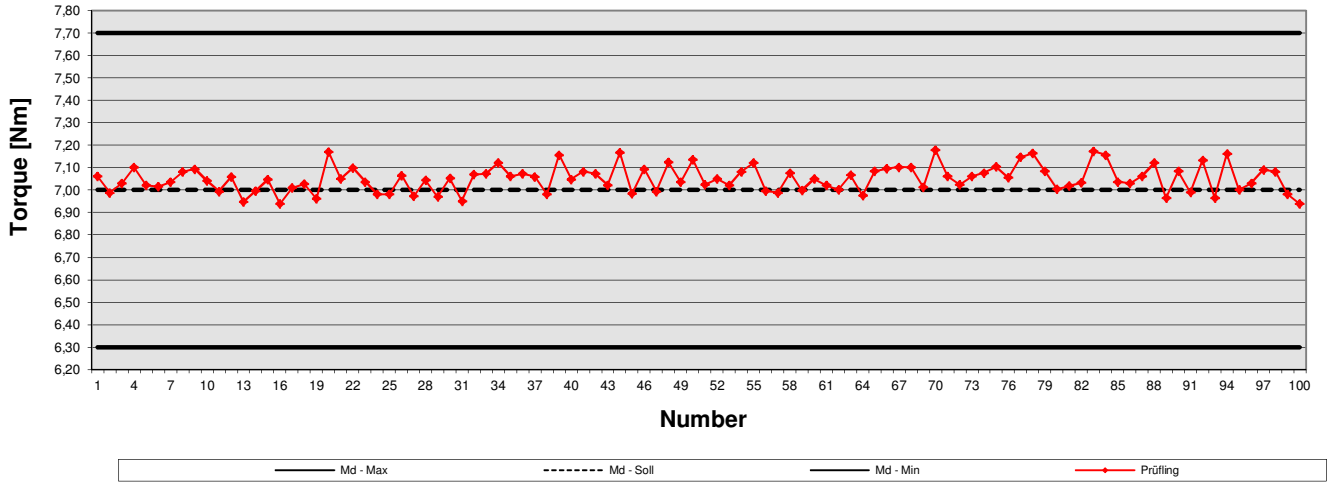
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04421

100% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	7,70	7,00	6,30	+/- 10,00%

Hard joint 30°

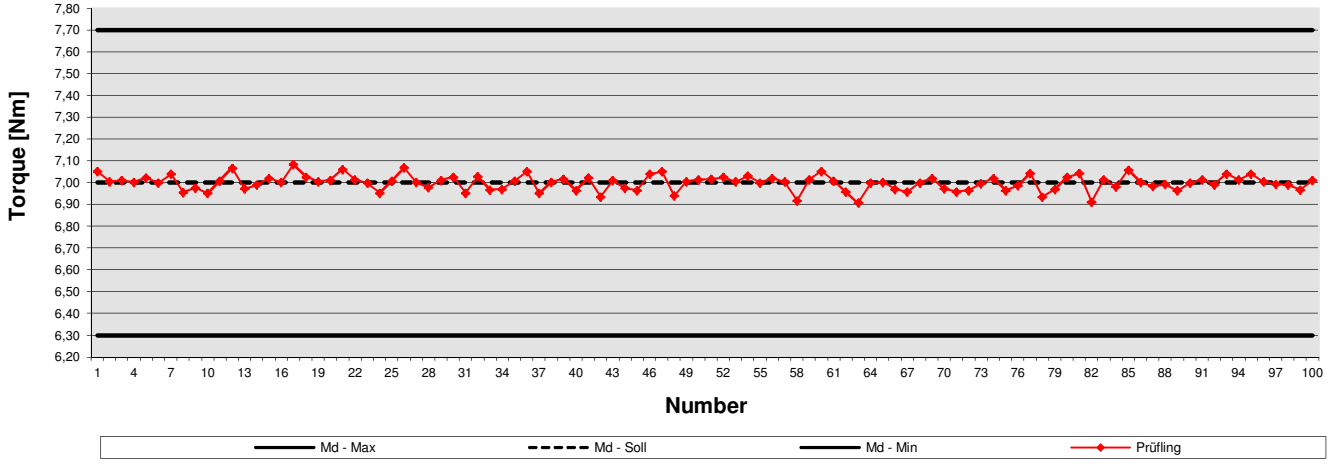


Statistics of the test piece

max. Torque	7,18	Nm	1 sig	0,059	Nm
min. Torque	6,94	Nm	6 sig	0,351	Nm
spread	0,24	Nm	+3 sig	7,23	Nm
Average	7,05	Nm	-3 sig	6,88	Nm

C_m = *3,99* C_{mk} = *3,70*

Soft joint 360°



Statistics of the test piece

max. Torque	7,08	Nm	1 sig	0,035	Nm
min. Torque	6,91	Nm	6 sig	0,210	Nm
spread	0,18	Nm	+3 sig	7,10	Nm
Average	7,00	Nm	-3 sig	6,89	Nm

C_m = *6,67* C_{mk} = *6,66*

CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter

Tool type: ELS7-360-A4S Serial - No. : 14C04421

Combined statistics for the test object (hard and soft joint)

[Md = 30%]

Number of tightenings	200	6 sigma	0,21 Nm
Average	3,15 Nm	Mean value offset	0,01 Nm
Sigma	0,03 Nm	Mean value offset %	0,31 %
Dispersion	0,17 Nm	comb. average torque	3,15 Nm
max. Torque	3,24 Nm	comb. torque variation	0,23 Nm
min. Torque	3,07 Nm	comb. torque variation %	7,15 %

$C_m = 3,02$ $C_{mk} = 3,01$

Combined statistics for the test object (hard and soft joint)

[Md = 80%]

Number of tightenings	200	6 sigma	0,31 Nm
Average	5,94 Nm	Mean value offset	0,01 Nm
Sigma	0,05 Nm	Mean value offset %	0,13 %
Dispersion	0,28 Nm	comb. average torque	5,94 Nm
max. Torque	6,09 Nm	comb. torque variation	0,36 Nm
min. Torque	5,81 Nm	comb. torque variation %	6,08 %

$C_m = 3,86$ $C_{mk} = 3,63$

Combined statistics for the test object (hard and soft joint)

[Md = 100%]

Number of tightenings	200	6 sigma	0,29 Nm
Average	7,02 Nm	Mean value offset	0,05 Nm
Sigma	0,05 Nm	Mean value offset %	0,73 %
Dispersion	0,27 Nm	comb. average torque	7,05 Nm
max. Torque	7,18 Nm	comb. torque variation	0,35 Nm
min. Torque	6,91 Nm	comb. torque variation %	4,98 %

$C_m = 4,85$ $C_{mk} = 4,68$

Power Tools Central Service Workshop
Rózyniec 83C, 59-706 Gromadka,

CERTIFIKAT

Machine capability test

Certificate no.: **207175-02**

Customer **Desoutter Industrial Tools**

Test object

Manufacturer: **Desoutter**
Tool type: **ELS7-360-A4S** Serial - No. : **14C04422**

Torque range

of: **1,5 Nm**
to: **7 Nm**

Number of screw tightenings			Torque to be achieved		
at 30%	==>	**100**	at 30%	==>	**3,15 Nm**
at 80%	==>	**100**	at 80%	==>	**5,90 Nm**
at 100%	==>	**100**	at 100%	==>	**7,00 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:

2014-10-29

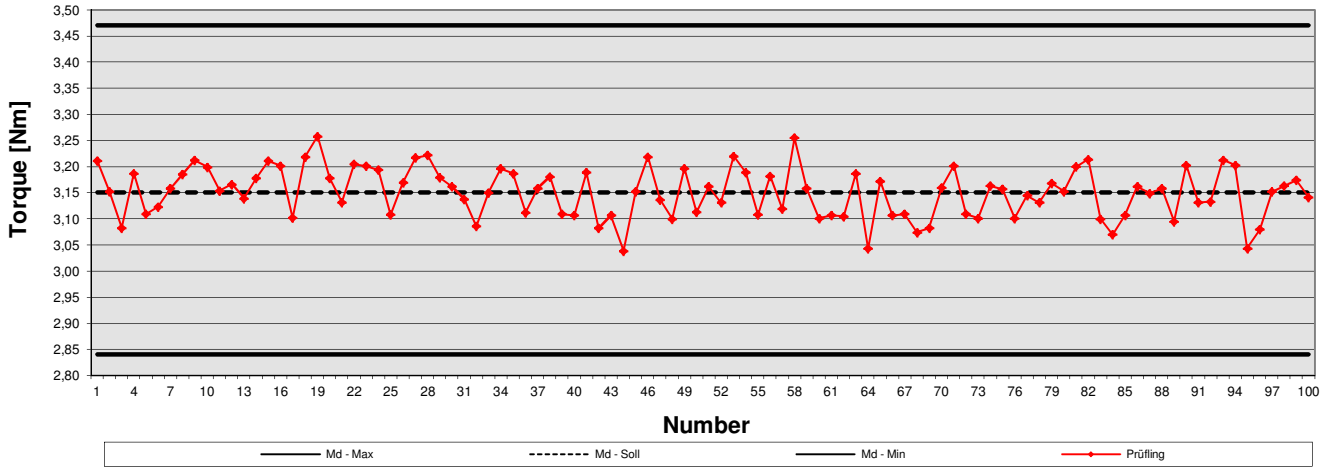
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04422

30% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	3,47	3,15	2,84	+/- 10,00%

Hard joint 30°

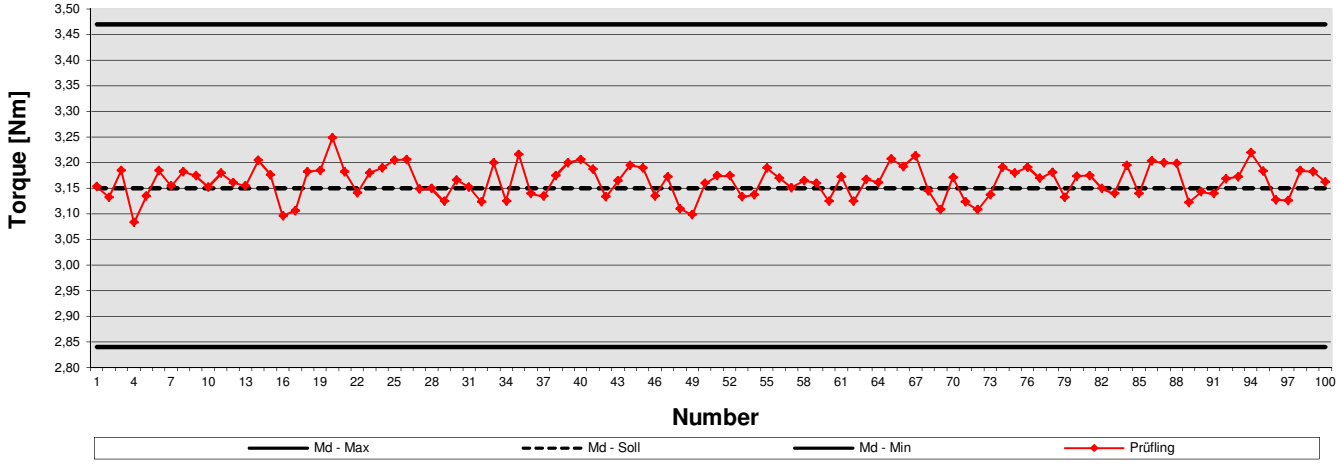


Statistics of the test piece

max. Torque	3,26	Nm	1 sig	0,048	Nm
min. Torque	3,04	Nm	6 sig	0,286	Nm
spread	0,22	Nm	+3 sig	3,29	Nm
Average	3,15	Nm	-3 sig	3,01	Nm

C_m = *2,20* C_{mk} = *2,17*

Soft joint 360°



Statistics of the test piece

max. Torque	3,25	Nm	1 sig	0,031	Nm
min. Torque	3,08	Nm	6 sig	0,189	Nm
spread	0,17	Nm	+3 sig	3,26	Nm
Average	3,16	Nm	-3 sig	3,07	Nm

C_m = *3,34* C_{mk} = *3,26*

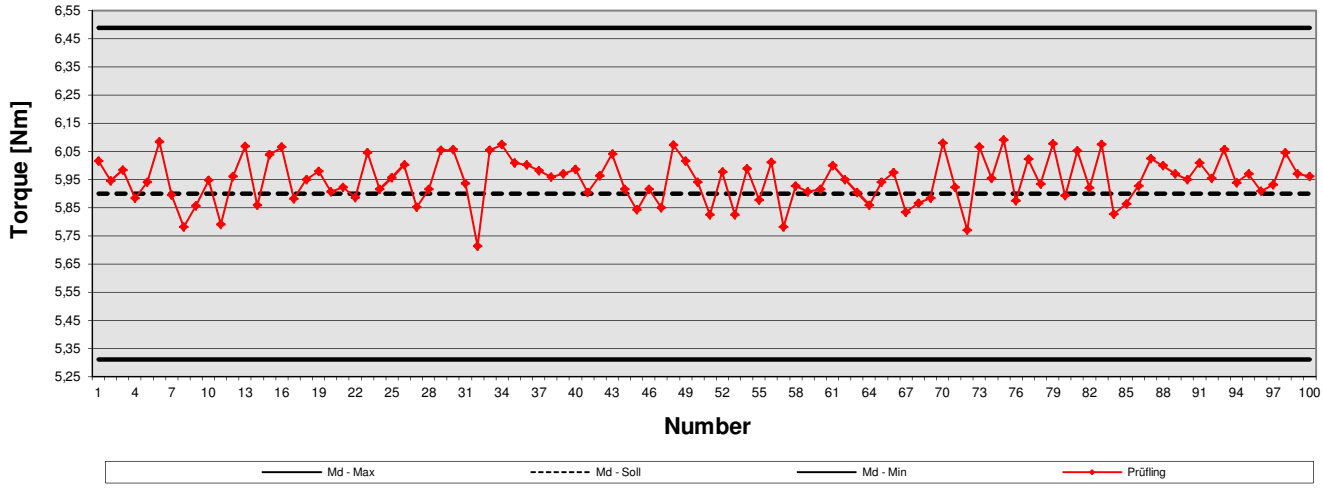
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04422

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	6,49	5,90	5,31	+/- 10,00%

Hard joint 30°

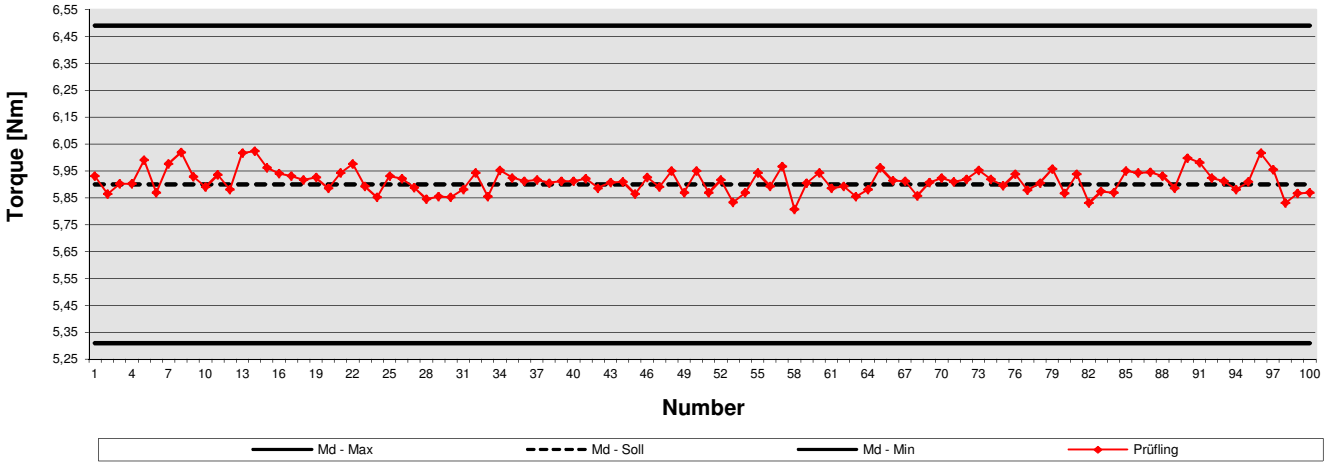


Statistics of the test piece

max. Torque	6,09	Nm	1 sig	0,081	Nm
min. Torque	5,71	Nm	6 sig	0,487	Nm
spread	0,38	Nm	+3 sig	6,19	Nm
Average	5,95	Nm	-3 sig	5,71	Nm

C_m = *2,42* C_{mk} = *2,22*

Soft joint 360°



Statistics of the test piece

max. Torque	6,03	Nm	1 sig	0,044	Nm
min. Torque	5,81	Nm	6 sig	0,263	Nm
spread	0,22	Nm	+3 sig	6,04	Nm
Average	5,91	Nm	-3 sig	5,78	Nm

C_m = *4,48* C_{mk} = *4,39*

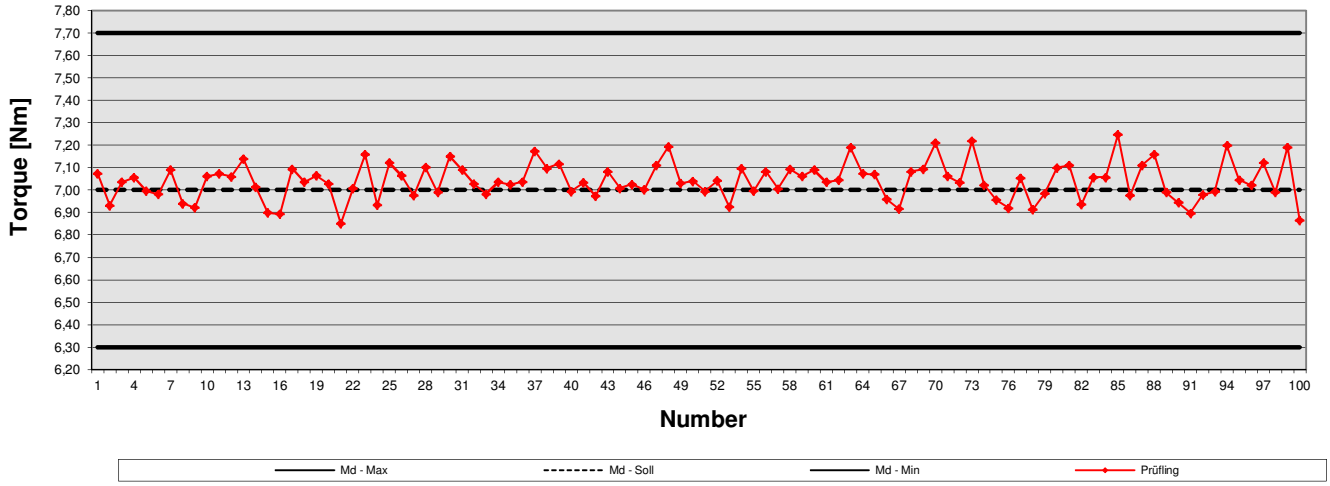
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04422

100% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	7,70	7,00	6,30	+/- 10,00%

Hard joint 30°

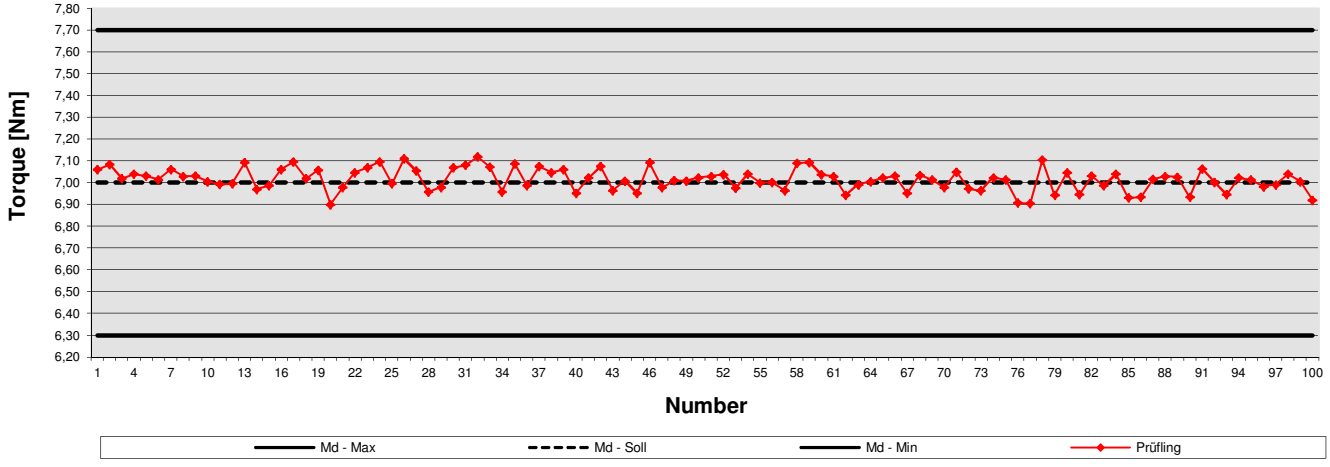


Statistics of the test piece

max. Torque	7,25	Nm	1 sig	0,082	Nm
min. Torque	6,85	Nm	6 sig	0,491	Nm
spread	0,40	Nm	+3 sig	7,29	Nm
Average	7,04	Nm	-3 sig	6,79	Nm

C_m = *2,85* C_{mk} = *2,69*

Soft joint 360°



Statistics of the test piece

max. Torque	7,12	Nm	1 sig	0,050	Nm
min. Torque	6,90	Nm	6 sig	0,301	Nm
spread	0,22	Nm	+3 sig	7,17	Nm
Average	7,02	Nm	-3 sig	6,86	Nm

C_m = *4,65* C_{mk} = *4,55*

CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter

Tool type: ELS7-360-A4S Serial - No. : 14C04422

Combined statistics for the test object (hard and soft joint)

[Md = 30%]

Number of tightenings	200	6 sigma	0,24 Nm
Average	3,15 Nm	Mean value offset	0,01 Nm
Sigma	0,04 Nm	Mean value offset %	0,38 %
Dispersion	0,22 Nm	comb. average torque	3,15 Nm
max. Torque	3,26 Nm	comb. torque variation	0,29 Nm
min. Torque	3,04 Nm	comb. torque variation %	9,09 %

$C_m = 2,60$ $C_{mk} = 2,56$

Combined statistics for the test object (hard and soft joint)

[Md = 80%]

Number of tightenings	200	6 sigma	0,39 Nm
Average	5,93 Nm	Mean value offset	0,04 Nm
Sigma	0,07 Nm	Mean value offset %	0,61 %
Dispersion	0,38 Nm	comb. average torque	5,95 Nm
max. Torque	6,09 Nm	comb. torque variation	0,49 Nm
min. Torque	5,71 Nm	comb. torque variation %	8,19 %

$C_m = 3,02$ $C_{mk} = 2,87$

Combined statistics for the test object (hard and soft joint)

[Md = 100%]

Number of tightenings	200	6 sigma	0,41 Nm
Average	7,03 Nm	Mean value offset	0,03 Nm
Sigma	0,07 Nm	Mean value offset %	0,36 %
Dispersion	0,40 Nm	comb. average torque	7,04 Nm
max. Torque	7,25 Nm	comb. torque variation	0,49 Nm
min. Torque	6,85 Nm	comb. torque variation %	6,97 %

$C_m = 3,45$ $C_{mk} = 3,31$

Power Tools Central Service Workshop
Rózyniec 83C, 59-706 Gromadka,

CERTIFIKAT

Machine capability test

Certificate no.: **207175-03**

Customer **Desoutter Industrial Tools**

Test object

Manufacturer: **Desoutter**
Tool type: **ELS7-360-A4S** Serial - No. : **14C04423**

Torque range

of: **1,5 Nm**
to: **7 Nm**

Number of screw tightenings			Torque to be achieved		
at 30%	==>	**100**	at 30%	==>	**3,15 Nm**
at 80%	==>	**100**	at 80%	==>	**5,90 Nm**
at 100%	==>	**100**	at 100%	==>	**7,00 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:

2014-10-30

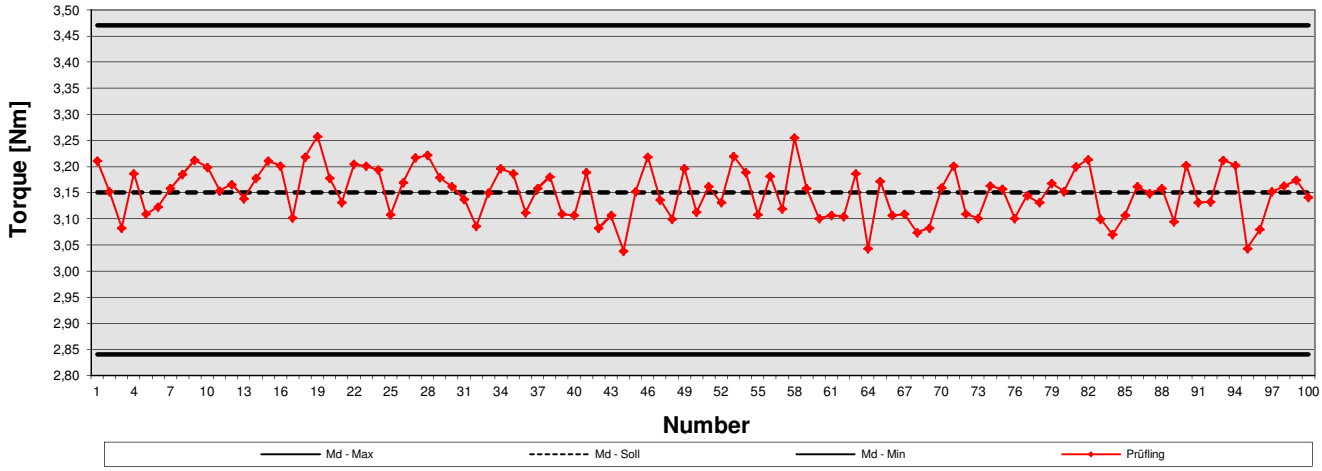
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04423

30% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	3,47	3,15	2,84	+/- 10,00%

Hard joint 30°

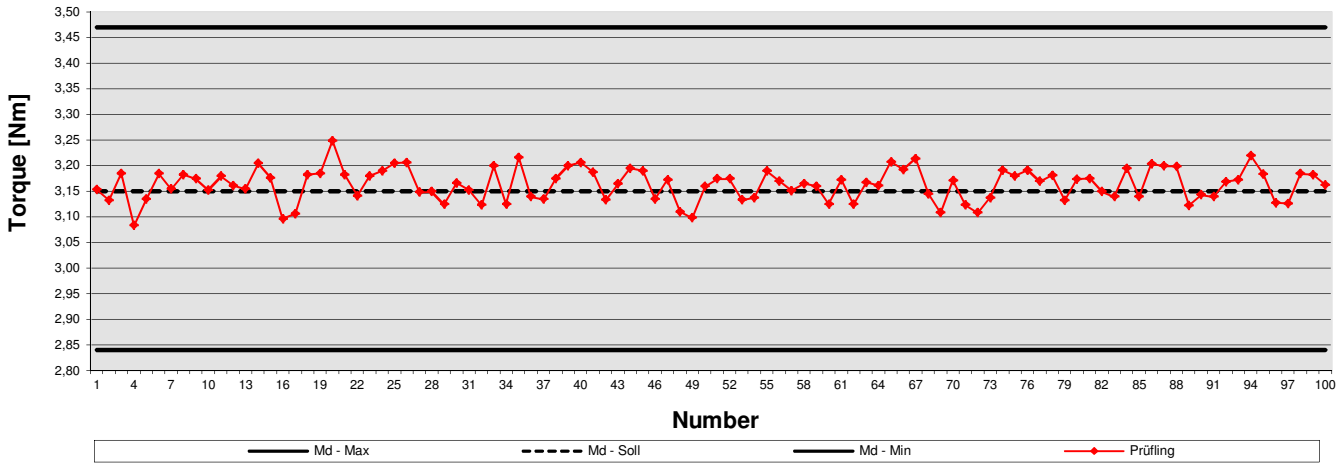


Statistics of the test piece

max. Torque	3,26	Nm	1 sig	0,048	Nm
min. Torque	3,04	Nm	6 sig	0,286	Nm
spread	0,22	Nm	+3 sig	3,29	Nm
Average	3,15	Nm	-3 sig	3,01	Nm

C_m = *2,20* C_{mk} = *2,17*

Soft joint 360°



Statistics of the test piece

max. Torque	3,25	Nm	1 sig	0,031	Nm
min. Torque	3,08	Nm	6 sig	0,189	Nm
spread	0,17	Nm	+3 sig	3,26	Nm
Average	3,16	Nm	-3 sig	3,07	Nm

C_m = *3,34* C_{mk} = *3,26*

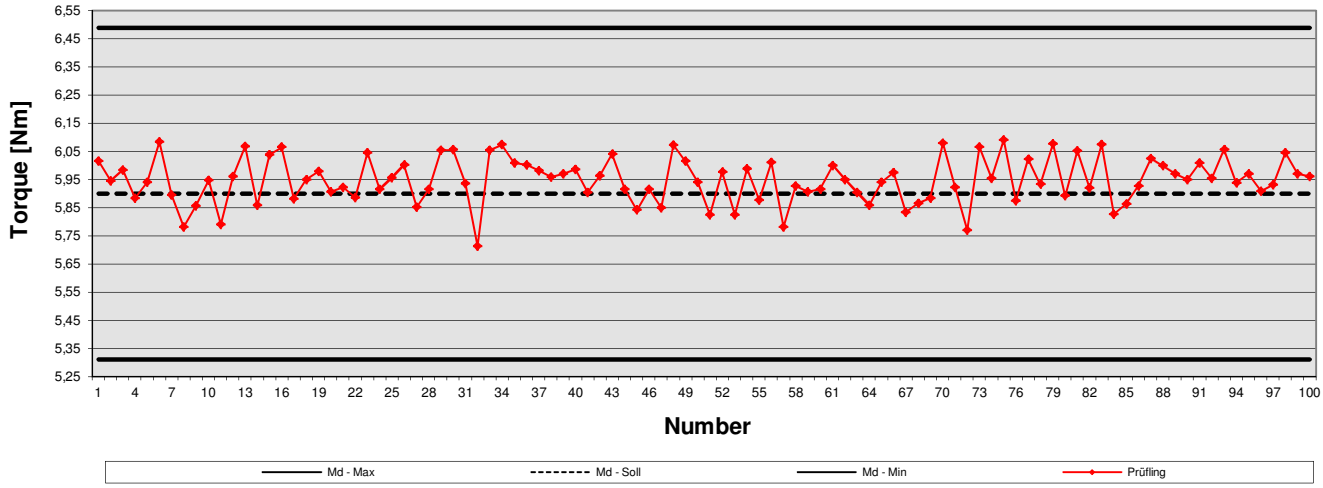
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04423

80% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	6,49	5,90	5,31	+/- 10,00%

Hard joint 30°



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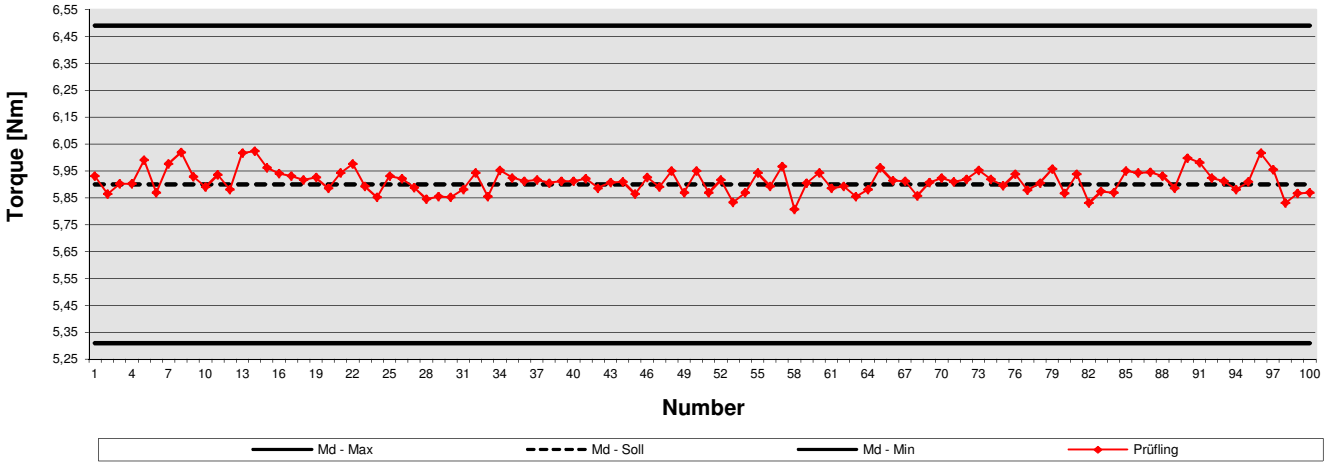
Average	5,95	Nm	-3 sig	5,71	Nm

C_m = *2,42* C_{mk} = *2,22*

Soft joint 360°



Statistics of the test piece

max. Torque	6,03	Nm	1 sig	0,044	Nm
min. Torque	5,81	Nm	6 sig	0,263	Nm
spread	0,22	Nm	+3 sig	6,04	Nm
Average	5,91	Nm	-3 sig	5,78	Nm

C_m = *4,48* C_{mk} = *4,39*

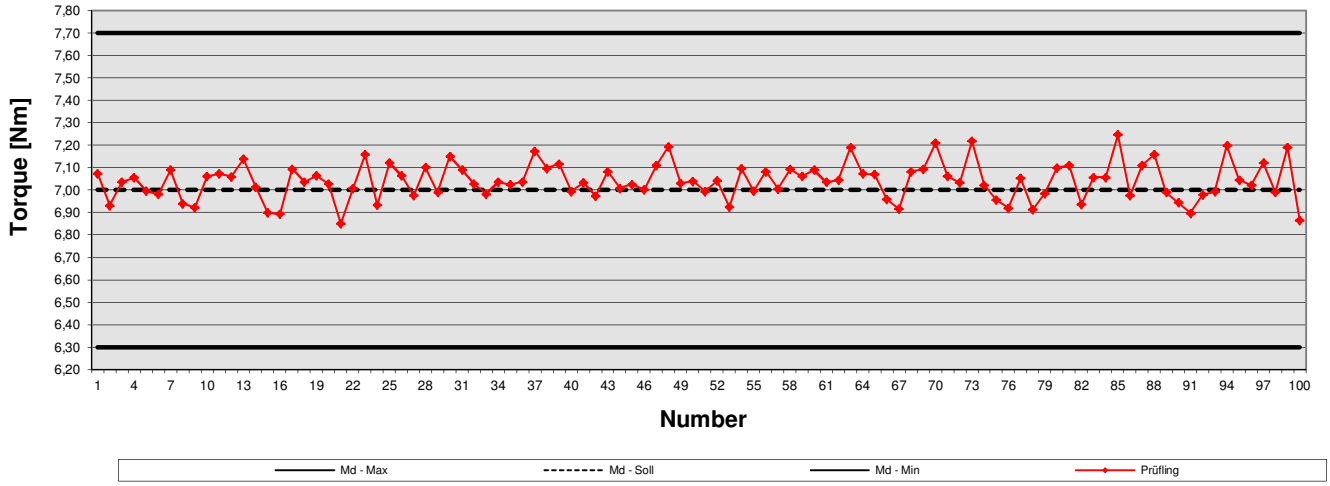
CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter
Tool type: ELS7-360-A4S Serial - No. : 14C04423

100% of the torque	USL (N·m)	Target (N·m)	LSL(N·m)	Tolerance [%]
	7,70	7,00	6,30	+/- 10,00%

Hard joint 30°

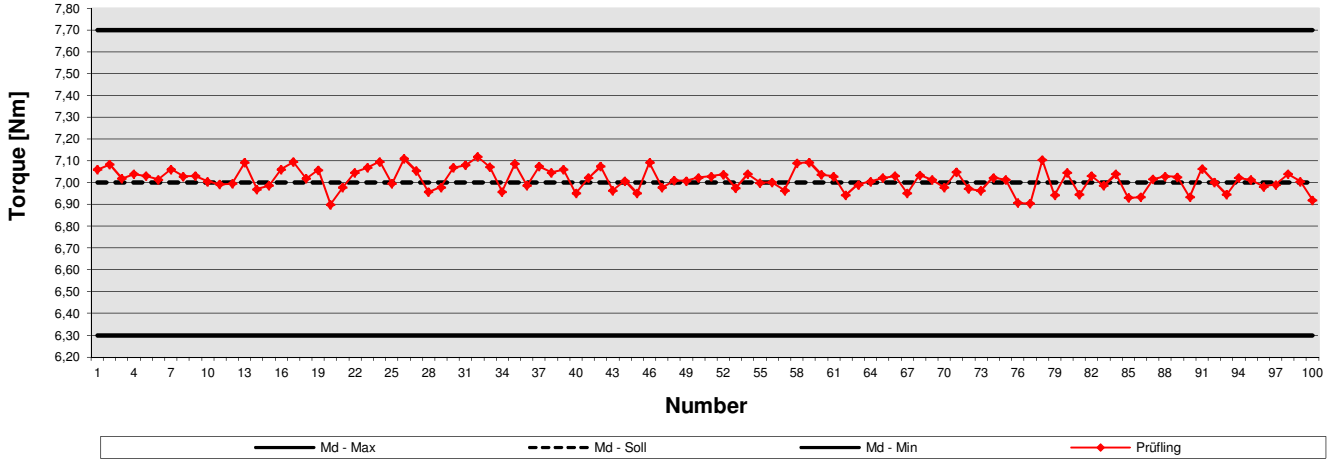


Statistics of the test piece

max. Torque	7,25	Nm	1 sig	0,082	Nm
min. Torque	6,85	Nm	6 sig	0,491	Nm
spread	0,40	Nm	+3 sig	7,29	Nm
Average	7,04	Nm	-3 sig	6,79	Nm

C_m = *2,85* C_{mk} = *2,69*

Soft joint 360°



Statistics of the test piece

max. Torque	7,12	Nm	1 sig	0,050	Nm
min. Torque	6,90	Nm	6 sig	0,301	Nm
spread	0,22	Nm	+3 sig	7,17	Nm
Average	7,02	Nm	-3 sig	6,86	Nm

C_m = *4,65* C_{mk} = *4,55*

CERTIFIKAT

Machine capability tests

Manufacturer: Desoutter

Tool type: ELS7-360-A4S Serial - No. : 14C04423

Combined statistics for the test object (hard and soft joint)

[Md = 30%]

Number of tightenings	200	6 sigma	0,24 Nm
Average	3,15 Nm	Mean value offset	0,01 Nm
Sigma	0,04 Nm	Mean value offset %	0,38 %
Dispersion	0,22 Nm	comb. average torque	3,15 Nm
max. Torque	3,26 Nm	comb. torque variation	0,29 Nm
min. Torque	3,04 Nm	comb. torque variation %	9,09 %

$C_m = 2,60$ $C_{mk} = 2,56$

Combined statistics for the test object (hard and soft joint)

[Md = 80%]

Number of tightenings	200	6 sigma	0,39 Nm
Average	5,93 Nm	Mean value offset	0,04 Nm
Sigma	0,07 Nm	Mean value offset %	0,61 %
Dispersion	0,38 Nm	comb. average torque	5,95 Nm
max. Torque	6,09 Nm	comb. torque variation	0,49 Nm
min. Torque	5,71 Nm	comb. torque variation %	8,19 %

$C_m = 3,02$ $C_{mk} = 2,87$

Combined statistics for the test object (hard and soft joint)

[Md = 100%]

Number of tightenings	200	6 sigma	0,41 Nm
Average	7,03 Nm	Mean value offset	0,03 Nm
Sigma	0,07 Nm	Mean value offset %	0,36 %
Dispersion	0,40 Nm	comb. average torque	7,04 Nm
max. Torque	7,25 Nm	comb. torque variation	0,49 Nm
min. Torque	6,85 Nm	comb. torque variation %	6,97 %

$C_m = 3,45$ $C_{mk} = 3,31$

a. Temperature

There was hardly no noticeable warming of the tool detected.

b. Battery lifetime

After amount of 503 tightening on soft joint and 1394 tightening on hard joint the screwdriver indicates a renewing of the battery load/ battery change.

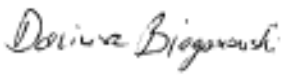
V. Comments

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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