

Test report: Machinery capability investigation  
from industry screwdriver



C. & E. FEIN GmbH  
Schwäbisch Gmünd  
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Maschine typ :  Date :

Model variant :

Manufacturer :



Stage of development

MCI - Typ :

Number of steps :

Test bench - ID :

Screw connection class :

Fitting tolerance :

1	2	3	4	5	6
5,0%	10,0%	12,0%	15,0%	20,0%	25,0%

Torque range :  $M_{min} =$   Nm  $M_{max} =$   Nm

Idle speed :  $n =$   min<sup>-1</sup> Weight incl. Battery :  $m =$   kg

Battery voltage :  $U =$   V Sound pressure level :  $L_{pA} =$   dB(A)

Battery capacity :  $Q =$   mAh Undervoltage detection :

Torque range investigation : Testing machine :  Stück

$30\% \rightarrow M_{30\%} = M_{min} + 30\% \times (M_{max} - M_{min}) = 3,10$  Nm  
 $80\% \rightarrow M_{80\%} = M_{min} + 80\% \times (M_{max} - M_{min}) = 6,60$  Nm  
 $M_{max} = 100\% \rightarrow M_{100\%} = M_{min} + 100\% \times (M_{max} - M_{min}) = 8,00$  Nm

Information on all 3 test items

Load level		30%		80%		100%	
Test torque	$M_d =$	3,10		6,60		8,00	
Joints		hard	soft	hard	soft	hard	soft
		30°	360°	30°	360°	30°	360°
$c_{m min} =$		3,563	6,458	6,875	8,462	8,081	7,843
$c_{mk min} =$		3,115	6,167	6,719	8,282	7,978	7,814

		Name :	Date :
Carried out by	:	M. Mueck	04.09.2019
Test report prepared by	:	M. Burkhardt	08.10.2019

<b>Testbench Measuring</b>		MCS for FEIN-Project : 0		<b>Homologation</b>		Date: 08.10.2019	
<b>ASM 18-8PC</b>		ScrewdriverType ASM		Accuracy-Class 10,0%		Class : 2	
		Variant : 18-8PC		M <sub>range</sub> = 1,00 up to 8,00 Nm		n <sub>given</sub> = 600 rpm U = 18,00 V	
						cycles: 100	

MCS	M <sub>d</sub> [Nm]	Angle [°]	M <sub>q</sub> [Nm]	ΔM <sub>q,12</sub> [Nm]	s [Nm]	C <sub>m</sub> [1]	C <sub>m,k</sub> [1]	n [min <sup>-1</sup> ]	Remarks	
1	3,10	360°	3,114		0,016	6,458	6,167	581	2019-07.029785	
1	3,10	30°	3,061	0,053	0,029	3,563	3,115	593		30%
1	6,60	360°	6,626		0,017	12,941	12,431	611		80%
1	6,60	30°	6,615	0,011	0,032	6,875	6,719	599		
1	8,00	360°	7,919		0,024	11,111	9,986	597		100%
1	8,00	30°	7,918	0,001	0,030	8,889	7,978	591		
2	3,10	360°	3,070		0,012	8,611	7,778	606	2019-07.029786	
2	3,10	30°	3,068	0,002	0,026	3,974	3,564	601		30%
2	6,60	360°	6,580		0,024	9,167	8,889	600		80%
2	6,60	30°	6,634	0,054	0,031	7,097	6,731	587		
2	8,00	360°	8,003		0,034	7,843	7,814	603		100%
2	8,00	30°	7,991	0,012	0,028	9,524	9,417	610		
3	3,10	360°	3,122		0,009	11,481	10,667	610	2019-07.029787	
3	3,10	30°	3,121	0,001	0,020	5,167	4,817	603		30%
3	6,60	360°	6,614		0,026	8,462	8,282	609		80%
3	6,60	30°	6,603	0,011	0,032	6,875	6,844	593		
3	8,00	360°	8,025		0,021	12,698	12,302	607		100%
3	8,00	30°	8,009	0,016	0,033	8,081	7,990	599		

Start of measurement: 09:00  
End of measurement: 16:00

**Homologation** : 3 Machines out of a series, each 30%, 80% and 100% the torque-ranges.  
Waitingtime between Load changes 2 sec.  
Series of measurement per machine, Nominal Torque and Screwinghardness each 100 Load changes (LW).  
Measurment based on VDI 2647 February 2013

C<sub>m min</sub> = 3,563 C<sub>m q</sub> = 8,268 C<sub>m max</sub> = 12,941 s<sub>cm</sub> = 2,601

C<sub>m,k min</sub> = 3,115 C<sub>m,k q</sub> = 7,860 C<sub>m,k max</sub> = 12,431 n<sub>MFLU</sub> = 18

Name: #WERT!

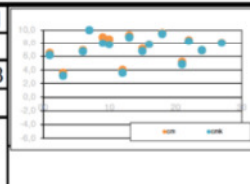
Project: 0 : ASM 18-8PC



C. & E. FEIN GmbH  
Schwäbisch Gmünd

Stage of Development :

Series



C<sub>m min</sub> = C<sub>m</sub> - Minimum Value  
C<sub>m,k min</sub> = C<sub>m,k</sub> - Minimum Value  
C<sub>m q</sub> = C<sub>m</sub> - Mid Value  
C<sub>m,k q</sub> = C<sub>m,k</sub> - Mid Value  
C<sub>m max</sub> = C<sub>m</sub> - Maximum Value  
C<sub>m,k max</sub> = C<sub>m,k</sub> - Maximum Value  
S<sub>cm</sub> = C<sub>m</sub> - Standard deviation  
S<sub>cm,k</sub> = C<sub>m,k</sub> - Standard deviation  
n<sub>MCS</sub> = No. of Machine Capability Study (MCS)  
v = CORREKTION VALUE

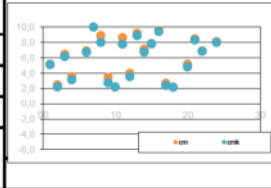
<b>Testbench Measuring</b>		MCA for FEIN-Project : 0		<b>Homologation</b>		Date: 18.10.2019	
ASM 18-8PC		ScrewdriverType ASM	Accuracy-Class 10,0%	Class : 2	$f_{mess} = 300$ Hz	$M_{min}$	$M_{max}$
Variant : 18-8PC				$M_{range} =$	1,00 up to	8,00	Nm
				$n_{given} = 600$ rpm	U = 18,00	V	
						cycles:	100

MCS	$M_d$ [Nm]	Angle [°]	$M_q$ [Nm]	$\Delta M_{q_{1/2}}$ [Nm]	s [Nm]	$C_m$ [1]	$C_{mk}$ [1]	n [min <sup>-1</sup> ]	Remarks		
1	1,00	360°	1,000		0,007	5,128	5,128	605	2019-07.029785	0%	
1	1,00	30°	0,990	0,010	0,014	2,469	2,222	605			
1	3,10	360°	3,114		0,016	6,458	6,167	581		30%	
1	3,10	30°	3,061	0,053	0,029	3,563	3,115	593			
1	6,60	360°	6,626		0,017	12,941	12,431	611		80%	
1	6,60	30°	6,615	0,011	0,032	6,875	6,719	599			
1	8,00	360°	7,919		0,024	11,111	9,986	597		100%	
1	8,00	30°	7,918	0,001	0,030	8,889	7,978	591			
2	1,00	360°	0,980		0,010	3,436	2,749	607		2019-07.029786	0%
2	1,00	30°	1,000	0,020	0,015	2,222	2,222	611			
2	3,10	360°	3,070		0,012	8,611	7,778	606			30%
2	3,10	30°	3,068	0,002	0,026	3,974	3,564	601			
2	6,60	360°	6,580		0,024	9,167	8,889	600	80%		
2	6,60	30°	6,634	0,054	0,031	7,097	6,731	587			
2	8,00	360°	8,003		0,034	7,843	7,814	603	100%		
2	8,00	30°	7,991	0,012	0,028	9,524	9,417	610			
3	1,00	360°	0,990		0,013	2,667	2,400	603	2019-07.029787		0%
3	1,00	30°	1,000	0,010	0,016	2,151	2,151	608			
3	3,10	360°	3,122		0,009	11,481	10,667	610			30%
3	3,10	30°	3,121	0,001	0,020	5,167	4,817	603			
3	6,60	360°	6,614		0,026	8,462	8,282	609		80%	
3	6,60	30°	6,603	0,011	0,032	6,875	6,844	593			
3	8,00	360°	8,025		0,021	12,698	12,302	607		100%	
3	8,00	30°	8,009	0,016	0,033	8,081	7,990	599			

Start of measurement: 09:00  
End of measurement: 16:00

**Homologation** : 3 Machines out of a series, each 0%, 30%, 80% and 100% the torque-ranges.  
Waitingtime between Load cycles 2 sec.  
Series of measurements per machine, nominal torque and screw joint density per 100 load cycles (LW).  
Measurement based on VDI 2647 February 2013

$C_{m \min} = 2,151$	$C_{m \ q} = 6,954$	$C_{m \ max} = 12,941$	$s_{cm} = 3,243$
$C_{mk \ min} = 2,151$	$C_{mk \ q} = 6,598$	$C_{mk \ max} = 12,431$	$\rho_{MFU} = 24$



- $C_{m \ min}$  =  $C_m$  - Minimum Value
- $C_{m \ q}$  =  $C_m$  - Minimum Value
- $C_{m \ max}$  =  $C_m$  - Mid Value
- $C_{mk \ min}$  =  $C_m$  - Mid Value
- $C_{mk \ q}$  =  $C_m$  - Maximum Value
- $C_{mk \ max}$  =  $C_m$  - Maximum Value
- $s_{cm}$  =  $C_m$  - Standard deviation
- $\rho_{MFU}$  =  $C_{mk}$  - Standard deviation correction value

Name: M. Mueck	Project:
C. & E. FEIN GmbH Schwäbisch Gmünd	Development Status : Series