

Applicant	Mennens Dongen Postbus 260 5100AG DONGEN NEDERLAND
Investigated	Tension testing machine for chains  manufacturer : J.G. de Haan - Musselkanaal type : 13500 identification : 39388 kind of drive : Electric hydraulic capacity : 13500
Range(s)	The calibration has been executed up to and including 13500 kN
Test method	Comparison of the load indication with calibration standards in accordance with the procedures laid down in EN-ISO 7500-1.
Ambient Temp.	(30.0 ± 0.5)°C
Test Date	The test was performed on July 20th 2010.
Conclusion	The accuracy of the load indication meet the requirements according to EN 818-1 and ISO 1834, with a lower limit of 400 kN.
Result	The result is shown on the next page(s).
Traceability	The measurements have been executed using standards that are traceable to primary and/or (inter)national standards.
Location	Workshop of the applicant.
Indication	Electronic Egeay compression load cell no. 13 – 13500 kN MPA no. 2879 with a Siemens siwarex U amplifier and a personal computer with force indication on the monitor.
Adjustments	The investigation has been executed without any adjustment.

NMi Netherland B.V.  
July 22th 2010



R.J.T.C. Diepstraten  
General manager



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Deviations

$q_{\max} = 0.6\%$  of  $F_A$   
 $b_{\max} = 0.6\%$  of  $F_A$   
 $F_{0,\max} = 0.0\%$  of  $F_N$

Resolution

$a \leq 0.25\%$  of the lower limit

Uncertainty

Force  $0.25\%$  of  $F_{Wi}$ ;  
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of  $k = 2$ , which provides a confidence level of approximately  $95\%$ .  
The standard uncertainty has been determined in accordance with EA-4/02.

Parameters Siemens  
Siwarex module

Zero point 2423 digits  
13500 kN = 60484 digits  
The force indication is linearized in the application software and is archived by Mennens Dongen.

## SYMBOLS AND DEFINITIONS FOR THE CALIBRATION OF TENSILE AND COMPRESSION TESTING MACHINES

$F_N$	Maximum capacity of a measuring range of the force indicator of the testing machine in N
$F_A$	Force reading on the indicator with increasing test force in N
$F_C$	True force indicated by the calibration device in mV/V
$F_W$	True force calculated from $F_C$ in N
$F_A^1, F_C^1, F_W^1$	As $F_A, F_C$ and $F_W$ with decreasing force
$F_{Amax}, F_{Amin}$	Highest and lowest values of $F_A$
$F_{Wmax}, F_{Wmin}$	Highest and lowest values of $F_W$
$F_{A0}$	Residual indication on the force indicator after removal of the force
$A_{Ad}$	Force indication after 15 min. unloaded (drift of electronic measuring equipment)
$A_r$	Resolution of the force indicator in N (smallest possible value to be estimated)
$q$	Relative accuracy error of the indicated force $\frac{F_A - F_W}{F_W} \times 100\%$
$b$	Relative repeatability error $\frac{F_{Wmax} - F_{Wmin}}{F_W} \times 100\%$
$u$	Relative repeatability error $\frac{F_W - F_{W1}}{F_W} \times 100\%$ (the reversibility error is only determined on request)
$a$	Resolution at the lower limit of the range $\frac{A_r}{F_W} \times 100\%$
$r$	Resolution $\frac{A_r}{F_N} \times 100\%$
$f_0$	Relative error at zero $\frac{F_{A0}}{F_N} \times 100\%$
$f_d$	Drift of zero within 15 min $\frac{F_{Ad}}{F_N} \times 100\%$

## REQUIREMENTS FOR CALIBRATION OF UNIAXIAL TESTING MACHINES

Tensile testing machines for metals according to EN-ISO 7500-1

Class of testing machine	Maximum permissible value in each range in %				
	q	b	u	a	$f_0$
0.5	± 0.5	0.5	0.75	0.25	± 0.05
1	± 1.0	1.0	1.5	0.5	± 0.1
2	± 2.0	2.0	3.0	1.0	± 0.2
3	± 3.0	3.0	4.5	1.5	± 0.3

Tensile testing machines for chains according to EN 818-1

Tensile testing machines for chains according to ISO 1834;

maximum permissible error  $q \pm 1.5\%$



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Range 13500 kN

Table 1.

$\bar{F}_A$ kN	$F_{W,1}$ kN	$F_{W,2}$ kN	$F_{W,3}$ kN	$\bar{F}_W$ kN	$q$ %	$b$ %
4.0000				0		
400.00	400.52	398.75	398.21	399.16	0.2	0.6
800.00	794.13	794.44	797.83	795.46	0.6	0.5
1200.0	1200.3	1193.1	1193.1	1195.5	0.4	0.6
1600.0	1601.0	1597.2	1596.8	1598.3	0.1	0.3
2000.0	2005.7	2008.2	2008.0	2007.3	-0.4	0.1
2400.0	2409.2	2405.8	2406.1	2407.0	-0.3	0.1
2800.0	2807.0	2805.3	2806.1	2806.1	-0.2	0.1
3200.0	3206.5	3204.1	3204.4	3205.0	-0.2	0.1
3600.0	3605.5	3602.6	3602.7	3603.6	-0.1	0.1
4000.0	4001.8	4000.5	4001.1	4001.1	0.0	0.0
5000.0	5012.5	5021.6	5011.7	5015.3	-0.3	0.2
6000.0	5999.2	6000.3	6000.4	6000.0	0.0	0.0
7000.0	7001.2	7004.2	7000.0	7001.8	0.0	0.1
8000.0	7998.8	8000.7	7995.6	7998.4	0.0	0.1
9000.0	8999.7	9002.4	8995.5	8999.2	0.0	0.1
10000	9997.8	10010	9995.6	10001	0.0	0.1
11000	11000	10988	10987	10992	0.1	0.1
12000	11988	11987	11987	11987	0.1	0.0
13000	12990	12993	12997	12993	0.1	0.0
13460	13448	13451	13442	13447	0.1	0.1