Member State of OIML
Japan

National Institute of
Advanced Industrial Science
and Technology
AIST

OIML Certificate No.
R60/2000-JP1-11.01
Revision 1

OIML CERTIFICATE OF CONFORMITY

Issuing authority

Name:	National Metrology Institute of Japan / National Institute of Advanced Industrial Science and Technology (NMIJ / AIST)
Address:	AIST Tsukuba Central 3-9, Tsukuba Ibaraki 305-8563, Japan
Person responsible:	Dr. Tamotsu Nomakuchi, President of AIST

Applicant

Name:	YAMATO SCALE CO., LTD.
Address:	5-22, Saenba-cho, Akashi, Hyogo, 673-8688, Japan

Manufacturer of the certified pattern

Name:	YAMATO SCALE CO., LTD.
Address:	5-22, Saenba-cho, Akashi, Hyogo, 673-8688, Japan

Identification of the certified pattern:

Compression load cell

Type:	DCC1-20T, DCC1-24T, DCC1-36T
Fraction:	Pi=0.7
Temperature range	-10 ℃ / 40 ℃

National Institute of
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OIML Certificate No.
R60/2000-JP1-11.01
Revision 1

Characteristics:

Model designation			DCC1-20T	DCC1-24T	DCC1-36T
Accuracy class	Class	-	C		
Maximum number of load cell verification intervals	n_{max}	-	6000 5000 4000 3000		
Humidity symbol			CH		
Minimum dead load	E_{min}	kg	0		
Maximum capacity	E_{max}	kg	20000	24000	36000
Safe load limit	E_{lim}	kg	$1.5*E_{max}$		
Minimum verification interval	v_{min}	kg	$E_{max}/12000$		
Apportionment factor	p_{LC}		0.7		
Ratio of minimum LC Verification interval $Y=Emax / vmin$	Y	-	12000		
Ratio of minimum dead load output return $Z=Emax/(2*DR)$	Z	-	6000 in the case of n_{max}=6000		
Maximum excitation voltage		V DC	15		
Cable detail		-	20m (maximum) 4 wire		

This certificate attests the conformity of the above-mentioned pattern (represented by the samples identified in the associated test report(s) with the requirements of the following Recommendation of the International Organization of Legal Metrology - OIML):

R60, edition 2000 (E)
For accuracy class C

This certificate relates only to the metrological and technical characteristics of the pattern of the instrument concerned, as covered by the relevant OIML International Recommendation.
This certificate does not bestow any form of legal international approval.
The conformity was established by tests described in the associated test report no. 11-09/R60:2000, that includes 26 pages.

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AIST

OIML Certificate No.
R60/2000-JP1-11.01
Revision 1

The Issuing Authority
NMIJ/AIST

Dr. T. Nomakuchi
President of AIST
2011-11-09

The CIML member

Dr. Y. Miki

2011-11-09

Important note: Apart from the mention of certificate's reference number and the name of the OIML Member State in which the certificate was issued, partial quotation of the certificate or the associated test report is not permitted, though they may be reproduced in full.

National Institute of Advanced Industrial Science and Technology
AIST

NMIJ

OIML MUTUAL ACCEPTANCE ARRANGEMENT

Evaluation Report

Load cells

Issuing Authority

Name : National Metrology Institute of Japan /National Institute of Advanced Industrial Science and Technology (NMIJ/AIST)

Address : AIST Tsukuba Central 3, Tsukuba Ibaraki 305-8563, Japan

Applicant : YAMATO SCALE CO., LTD.

Manufacturer : YAMATO SCALE CO., LTD.

Applied Type : DCC1-20T, DCC1-24T, DCC1-36T

Evaluation Report Number : 23-006

This report ensures the conformity of the applied type with the requirements of the OIML R60 (edition 2000), on the basis of evaluation of the attached test report (N° 11-09/R60:2000).

Evaluator :
Wataru Kaminaga
Legal Metrology Division
NMIJ/AIST
Signature :

W. Kaminaga

Date:

2011. 11. 07

Supervisor :
Shigeki Yamaguchi
Head of Legal Metrology Division
NMIJ/AIST
Signature :

Shigeki Yamaguchi

Date:

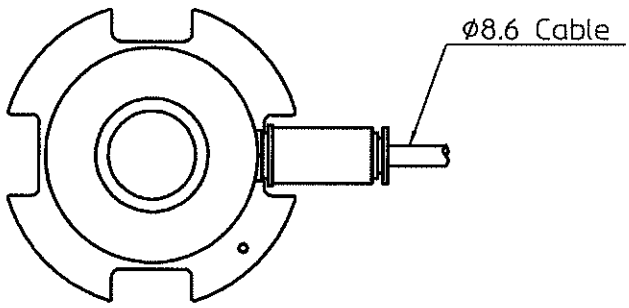
2011. 11. 07

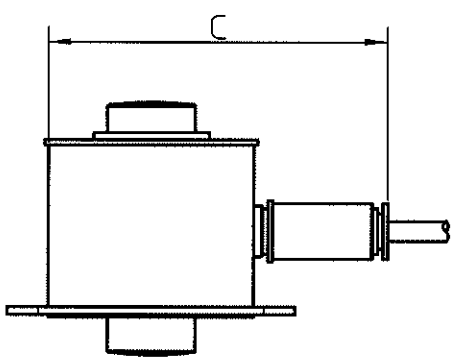
Description

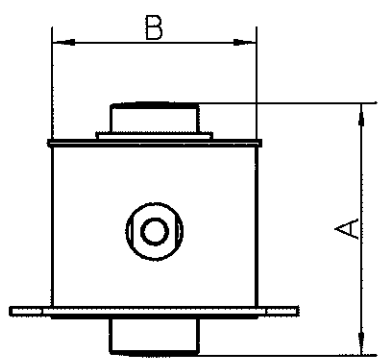
Technical data

Model designation			DCC1-20T	DCC1-24T	DCC1-36T
Accuracy class	Class	-	C		
Maximum number of load cell verification intervals	n_{max}	-	6000 5000 4000 3000		
Humidity symbol			CH		
Minimum dead load	E_{min}	kg	0		
Maximum capacity	E_{max}	kg	20000	24000	36000
Safe load limit	E_{lim}	kg	$1.5*E_{max}$		
Minimum verification interval	v_{min}	kg	$E_{max}/12000$		
Apportionment factor	p_{LC}		0.7		
Ratio of minimum LC Verification interval $Y=Emax / vmin$	Y	-	12000		
Ratio of minimum dead load output return $Z=Emax/(2*DR)$	Z	-	6000 in the case of n_{max}=6000		
Maximum excitation voltage		V DC	15		
Cable detail		-	20m (maximum) 4 wire		

Type	DCC1 Series





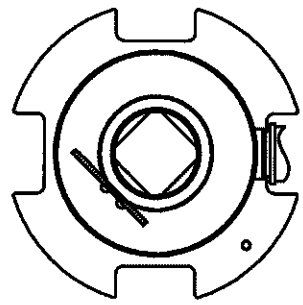


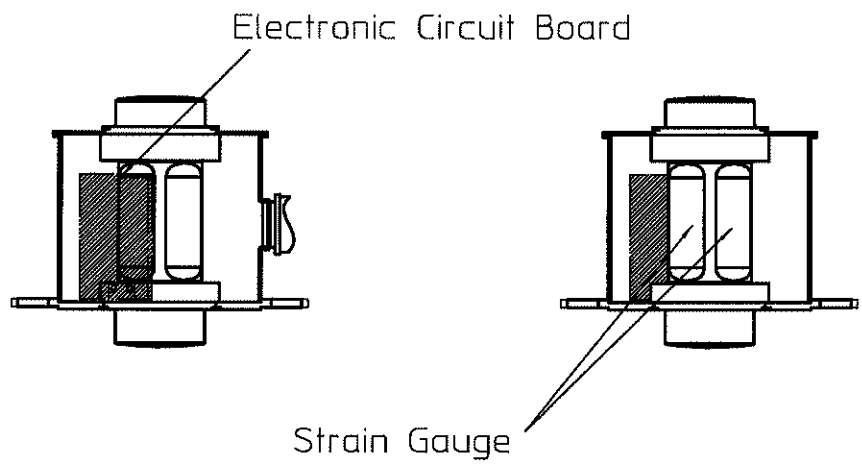
	A	B	C
DCC1-20T	100	82	135.5
DCC1-24T	100	82	135.5
DCC1-36T	120	82	135.5

Unit:mm

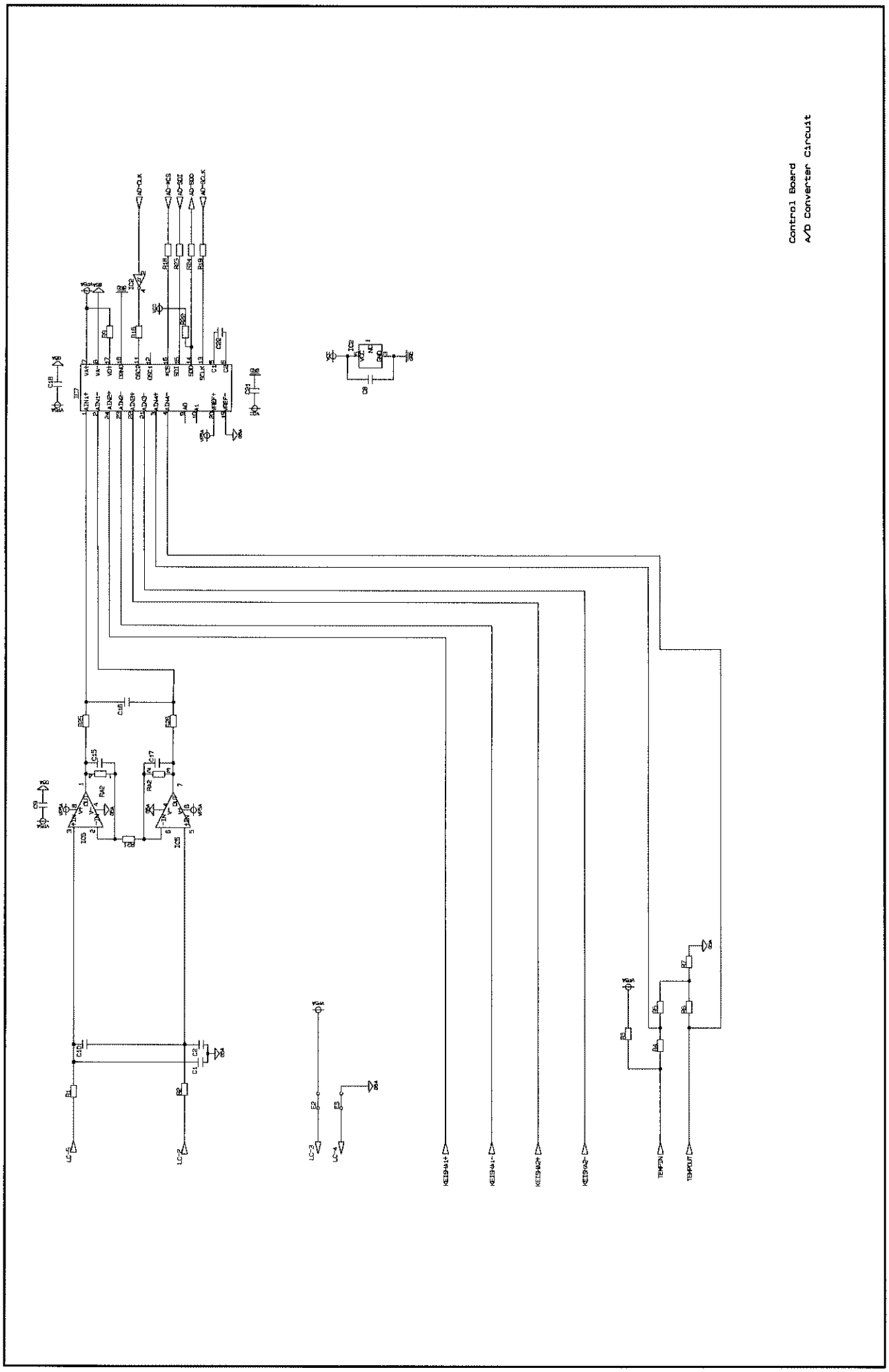
Type	DCC1 Series

Inside Structure

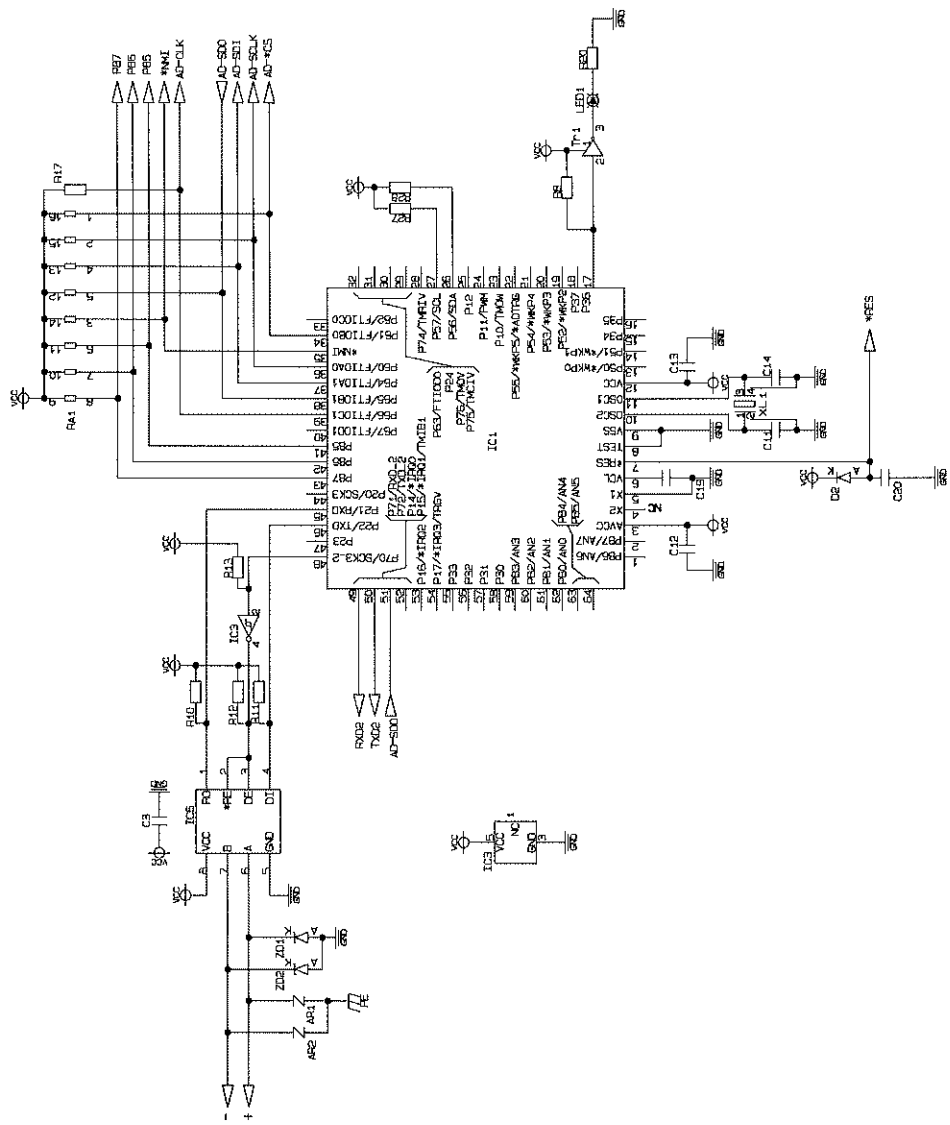




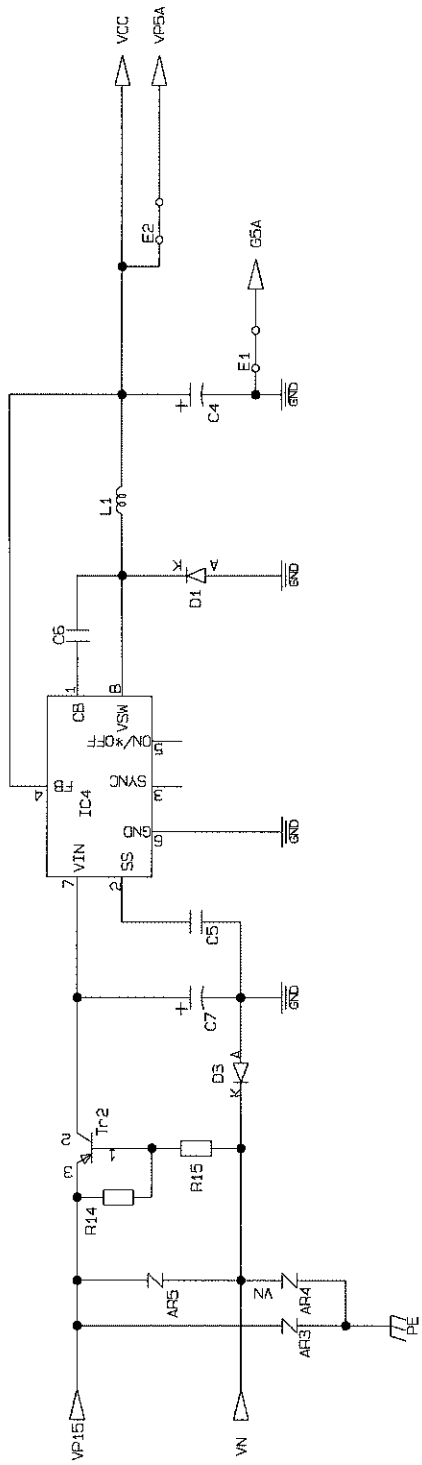
material : stainless steel


Control Board
A/D Converter Circuit

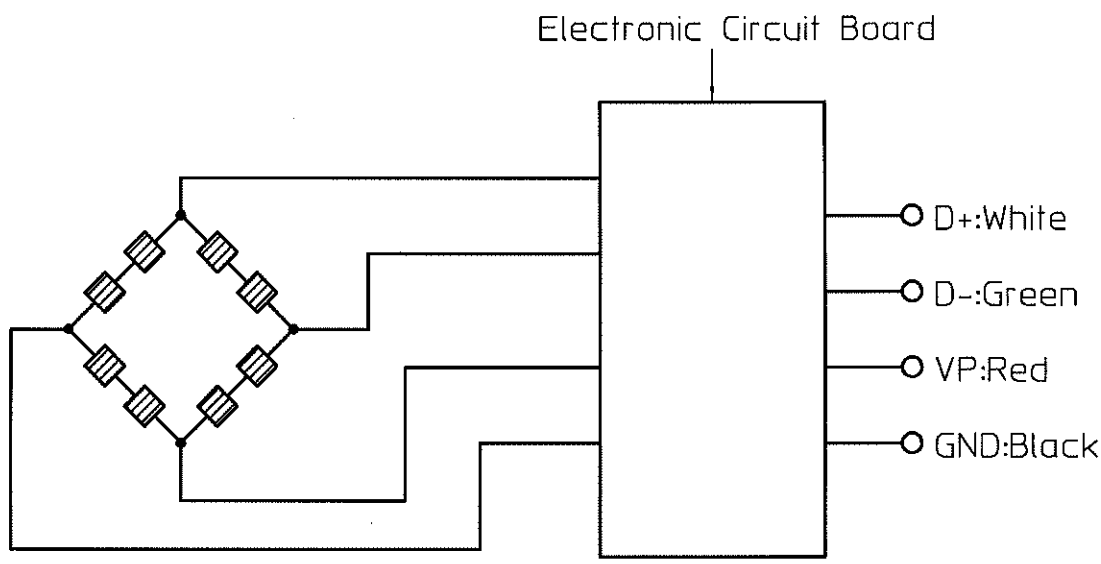
Control Board
CPU Circuit



Control Board
Power supply Circuit

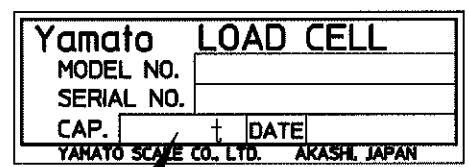


Type	DCC1 Series



Type	DCC1 Series

Name Plate



Emax

National Metrology Institute of Japan

Metrological regulation for load cells : Test report

Project number	:	LC-OIML-11-010
Test report number	:	11-09 / R60:2000
Issuing authority	:	National Metrology Institute of Japan /National Institute of Advanced Industrial Science and Technology (NMIJ/AIST) AIST Tsukuba Central 3 Tsukuba Ibaraki 305-8563, Japan
Applicant	:	YAMATO SCALE CO.,LTD.
Manufacturer	:	YAMATO SCALE CO.,LTD.
Date of application	:	2011.9.13
End of evaluation	:	2011.10.27
Date of issue	:	2011. 10. 31
Signature	:	Y. Koyano

Yasuhiro Koyano
Chief of Legal Weighing Metrology Section
Mechanical Metrology Division

OIML R60
Edition 2000(E)

Testing authority

Name: National Metrology Institute of Japan
Address: Central 3-1, 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8563, Japan
Contact information: Telephone: +81 29 861 4389 Fax:+81 29 861 4341

Applicant/Manufacturer information

Application no.: 23-006
Application date: 2011.9.13
Model designation: DCC1-**T

Manufacturer: YAMATO SCALE CO.,LTD.
Address: 5-22 SAENBA-CHO, AKASHI, 673-8688 JAPAN

Applicant: YAMATO SCALE CO.,LTD.
Address: 5-22 SAENBA-CHO, AKASHI, 673-8688 JAPAN

Representative: AKIO HIROSE
(name, telephone) +81 78 918 5542

Instrument category: Load cell: Strain guage Documentation no.:

Information concerning the pattern

Accuracy class: [ ] A [ ] B [×] C [ ] D

Maximum number of load cell verification intervals (n_{max}): 6000

Direction of loading: (for load cell characterization, see 4.6.3)
[ ] Tension [ ] Beam (shear) [×] Compression
[ ] Universal [ ] Beam (bending)

Safe load limit (Lim): 30 t Apportionment factor, p_{LC} (see *Note*) 0.7

Limits of working temperature: (only if other than -10°C to +40°C, see 5.5.1.1)
Upper: °C Lower: °C

Power voltage: V_{min} 8 V V_{max} 15 V

or V: V [ ] AC [×] DC Recommended: [ ] AC [ ] DC

Humidity evaluation symbol:

NH	[ ] Yes	[×] No
SH	[ ] Yes	[×] No
CH or no markings	[×] Yes	[ ] No

Electronic load cell: [×] Yes [ ] No

Note: This value of p_{LC} is assumed to be 0.7 unless otherwise declared by the manufacturer.

Information concerning the pattern (continued)

Application No: 23-006

Specify other conditions that must be observed to obtain the specified performance (for example, electrical characteristics of the load cell):

Various designs within model range:

Maximum capacity E_{max} (kg)	Minimum load cell verification v_{min} (kg)	Minimum dead load E_{min} (kg)	Maximum number of load cell intervals n_{max}	Minimum dead load output return DR (kg)
20000	1.666	0	6000	1.666
24000	2	0	6000	2
36000	3	0	6000	3

All values in this table are taken from documentation pages _____.

DR information required only when applicable.

Load cell(s) submitted:

Model designation	Serial number	E_{max}(kg)
DCC1-20T	24071009	20000

Secondary equipment (specify load adapters, etc.):

Remarks:

General information concerning test conditions

Ref.:A3

Application no.: 23-006

Load cell model: DCC1-20T Serial no.: 24071009 E_{max}: 20000 kg

n_{max}: 6000 v_{min}: 1.666 kg DR (if applicable): 1.666 kg

Force-generating system - description: Load cell performance testing device
(see *Note*)

Minimum test load: 0 kg

Indicating instrument - description: YAMATO EDI-901

Environmental equipment - description: Walk-in type temperature & humidity chamber EBL-1

Temperature: 19.9 °C

Relative humidity: 42.7 ~ 43.0 %

Barometric pressure: 100.54 ~ 102.04 kPa

Test location: East 3B 01112

Acceleration of gravity at test location: 9.79949 m/sec^2

Evaluator: Fukuda

Note: Include information concerning accuracy (for example, accredited laboratory).

Summary of the test

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg n_{max}: 6000
v_{min}: 1.666 kg DR: 1.666 kg
Force-generating system: Load cell performance testing device p_{LC}: 0.7
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

No.	Test description	Passed	Failed	Report page	Remarks
D.2	Load cell errors (E_L)	×		10	
D.3	Repeatability errors (E_R)	×		11	
D.4	Temperature effects on MDLO (C_M)	×		12	
D.5	Creep (C_C)	×		13-16	
D.5	DR(C_{DR})	×		13-16	(see *Note 2*) DR= 1.50 kg
D.6	Barometric pressure effects (C_p)	×		17	
D.7	Humidity effects (CH or no mark) (C_{Hmin})	×		18	
D.7	Humidity effects (CH or no mark) (C_{Hmax})	×		18	
D.8	Humidity effects (SH)				NA
D.9	Marking requirements	See Page ***19***, Check that marked values are correct.			
D.10	Load cells equipped with electronics	×		20	
D.11	Warm-up time	×		21	
D.12	Power voltage variations	×		22	
D.13	Short time power reductions				NA
D.14	Bursts (electrical fast transients)				NA
D.15	Electrostatic discharge				NA
D.16	Electromagnetic susceptibility				NA
D.17	Span stability	×		23-26	

The following table checks the required calculations as per the General notes provisions of C.4:

Paragraph No.	Description	n_{max}		n_{max}-500		n_{max}-1000	
		Pass	Fail	Pass	Fail	Pass	Fail
C.4.2, C.4.3, C.4.5	Check all calculations using values of n at n_{max} and at lower than n_{max}	×		×		×	
C.4.4	Check that $v_{min} \leq \frac{D_{max}-D_{min}}{n_{max}}$	Pass		Fail			
		×					

Worst case figure for minimum dead load output return error (in mass units) = DR = 1.50 kg see *Note 3*

Notes: *1* Enter "NA" for "the test is not applicable".
2 Record error to accomodate OIML R76.
3 This DR value is used in association with OIML R 76.

Form D.1 (3 runs) Load test data (E_L)

Ref.: A.4.1.1 to A.4.1.11. Complete one sheet for each test temperature, one for each humidity (SH) test in A.4.6, and when applicable, one for each electronics power voltage in A.4.7.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/20	2011/9/20	
Temperature:	19.9	19.9	°C
Relative humidity:	42.9	43.0	%
Barometric pressure:	100.54	100.54	kPa
Indicator temperature:	27.0	27.0	°C

Electronics power voltage (when applicable): _____ V

Table D.1 (3 runs)

Test load (kg)	Run no. 1		Run no. 2		Run no. 3		Average indication (count)	Repeatability error (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time		
0	-3.0	14:21:17						
20000	19988.8	14:22:07						
0	-2.5	14:22:57						
20000	19989.0	14:23:48						
0	-2.5	14:24:38						
20000	19989.0	14:25:28						
0	-2.6	14:26:18						
0	-3.0	14:31:17	-3.0	14:44:56	-3.0	14:58:36	-3.00 *	0.00
1000	996.1	14:31:47	996.1	14:45:26	996.2	14:59:06	996.13	0.10
2000	1995.6	14:32:17	1995.6	14:45:56	1995.7	14:59:36	1995.63	0.10
4000	3994.8	14:32:57	3994.7	14:46:36	3994.8	15:00:16	3994.77	0.10
6000	5993.0	14:33:37	5993.0	14:47:16	5993.1	15:00:56	5993.03	0.10
8000	7992.7	14:34:17	7992.8	14:47:56	7992.9	15:01:36	7992.80	0.20
10000	9991.9	14:34:57	9992.0	14:48:36	9992.1	15:02:16	9992.00	0.20
12000	11991.1	14:35:37	11991.2	14:49:16	11991.3	15:02:56	11991.20	0.20
14000	13990.3	14:36:17	13990.2	14:49:56	13990.4	15:03:36	13990.30	0.20
16000	15989.3	14:36:57	15989.3	14:50:36	15989.5	15:04:16	15989.37	0.20
20000	19987.1	14:37:37	19987.1	14:51:16	19987.3	15:04:56	19987.17	0.20
16000	15989.2	14:38:17	15989.2	14:51:56	15989.4	15:05:36	15989.27	0.20
14000	13989.8	14:38:57	13989.8	14:52:36	13989.9	15:06:16	13989.83	0.10
12000	11990.5	14:39:37	11990.5	14:53:16	11990.6	15:06:56	11990.53	0.10
10000	9991.4	14:40:17	9991.4	14:53:56	9991.5	15:07:36	9991.43	0.10
8000	7992.3	14:40:57	7992.3	14:54:36	7992.4	15:08:16	7992.33	0.10
6000	5993.3	14:41:37	5993.3	14:55:16	5993.4	15:08:56	5993.33	0.10
4000	3994.4	14:42:17	3994.5	14:55:56	3994.5	15:09:36	3994.47	0.10
2000	1995.7	14:42:57	1995.7	14:56:36	1995.8	15:10:16	1995.73	0.10
1000	996.2	14:43:27	996.3	14:57:06	996.3	15:10:46	996.27	0.10
0	-2.9	14:43:57	-2.9	14:57:36	-2.8	15:11:16	-2.87	0.10

Notes: 1 * = Average initial minimum test load indication.
2 Absolute (not relative) time shall be recorded.

Form D.1 (3 runs) Load test data (E_L)

Ref.: A.4.1.1 to A.4.1.11. Complete one sheet for each test temperature, one for each humidity (SH) test in A.4.6, and when applicable, one for each electronics power voltage in A.4.7.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/21	2011/9/21	
Temperature:	40.1	40.1	°C
Relative humidity:	33.4	33.8	%
Barometric pressure:	99.87	99.82	kPa
Indicator temperature:	27.2	27.2	°C

Electronics power voltage (when applicable): _____ V

Table D.1 (3 runs)

Test load (kg)	Run no. 1		Run no. 2		Run no. 3		Average indication (count)	Repeatability error (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time		
0	-2.3	9:11:00						
20000	19989.4	9:11:51						
0	-1.6	9:12:41						
20000	19989.9	9:13:30						
0	-1.6	9:14:20						
20000	19990.1	9:15:10						
0	-1.6	9:16:01						
0	-1.9	9:21:00	-1.7	9:34:40	-1.6	9:48:20	-1.73 *	0.30
1000	997.4	9:21:30	997.5	9:35:10	997.6	9:48:50	997.50	0.20
2000	1996.8	9:22:00	1997.0	9:35:40	1997.0	9:49:20	1996.93	0.20
4000	3996.1	9:22:40	3996.2	9:36:20	3996.3	9:50:00	3996.20	0.20
6000	5994.5	9:23:20	5994.5	9:37:00	5994.7	9:50:40	5994.57	0.20
8000	7994.3	9:24:00	7994.3	9:37:40	7994.6	9:51:20	7994.40	0.30
10000	9993.6	9:24:40	9993.5	9:38:20	9993.8	9:52:00	9993.63	0.30
12000	11992.7	9:25:20	11992.7	9:39:00	11992.9	9:52:40	11992.77	0.20
14000	13991.8	9:26:00	13991.8	9:39:40	13992.0	9:53:20	13991.87	0.20
16000	15990.8	9:26:40	15990.8	9:40:20	15991.0	9:54:00	15990.87	0.20
20000	19988.3	9:27:20	19988.2	9:41:00	19988.5	9:54:40	19988.33	0.30
16000	15990.5	9:28:00	15990.5	9:41:40	15990.7	9:55:20	15990.57	0.20
14000	13991.1	9:28:40	13991.1	9:42:20	13991.3	9:56:00	13991.17	0.20
12000	11991.9	9:29:20	11991.9	9:43:00	11992.1	9:56:40	11991.97	0.20
10000	9992.8	9:30:00	9992.8	9:43:40	9993.0	9:57:20	9992.87	0.20
8000	7993.7	9:30:40	7993.7	9:44:20	7993.9	9:58:00	7993.77	0.20
6000	5994.6	9:31:20	5994.7	9:45:00	5994.8	9:58:40	5994.70	0.20
4000	3995.8	9:32:00	3995.8	9:45:40	3995.9	9:59:20	3995.83	0.10
2000	1997.0	9:32:40	1997.1	9:46:20	1997.1	10:00:00	1997.07	0.10
1000	997.5	9:33:10	997.5	9:46:50	997.6	10:00:30	997.53	0.10
0	-1.7	9:33:40	-1.6	9:47:20	-1.5	10:01:00	-1.60	0.20

Notes: 1 * = Average initial minimum test load indication.
2 Absolute (not relative) time shall be recorded.

Form D.1 (3 runs) Load test data (E_L)

Ref.: A.4.1.1 to A.4.1.11. Complete one sheet for each test temperature, one for each humidity (SH) test in A.4.6, and when applicable, one for each electronics power voltage in A.4.7.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/22	2011/9/22	
Temperature:	-10.4	-10.3	°C
Relative humidity:	52.1	53.0	%
Barometric pressure:	99.31	99.39	kPa
Indicator temperature:	26.1	26.1	°C

Electronics power voltage (when applicable): _____ V

Table D.1 (3 runs)

Test load (kg)	Run no. 1		Run no. 2		Run no. 3		Average indication (count)	Repeatability error (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time		
0	-1.3	9:15:00						
20000	19991.2	9:15:50						
0	0.1	9:16:41						
20000	19991.8	9:17:31						
0	0.1	9:18:22						
20000	19991.5	9:19:12						
0	0.2	9:20:02						
0	-0.6	9:25:03	-0.2	9:38:42	-0.1	9:52:21	-0.30 *	0.50
1000	998.8	9:25:33	999.2	9:39:12	999.3	9:52:51	999.10	0.50
2000	1998.1	9:26:03	1998.5	9:39:42	1998.6	9:53:21	1998.40	0.50
4000	3997.2	9:26:43	3997.5	9:40:22	3997.6	9:54:01	3997.43	0.40
6000	5995.5	9:27:23	5995.8	9:41:02	5995.9	9:54:41	5995.73	0.40
8000	7995.3	9:28:03	7995.6	9:41:42	7995.8	9:55:21	7995.57	0.50
10000	9994.6	9:28:43	9994.9	9:42:22	9995.0	9:56:01	9994.83	0.40
12000	11993.8	9:29:23	11994.2	9:43:02	11994.2	9:56:41	11994.07	0.40
14000	13993.2	9:30:03	13993.5	9:43:42	13993.5	9:57:21	13993.40	0.30
16000	15992.6	9:30:43	15992.8	9:44:22	15992.9	9:58:01	15992.77	0.30
20000	19991.0	9:31:23	19991.2	9:45:02	19991.2	9:58:41	19991.13	0.20
16000	15992.9	9:32:03	15993.0	9:45:42	15993.1	9:59:21	15993.00	0.20
14000	13993.3	9:32:43	13993.5	9:46:22	13993.6	10:00:01	13993.47	0.30
12000	11994.0	9:33:23	11994.2	9:47:02	11994.3	10:00:41	11994.17	0.30
10000	9994.9	9:34:03	9995.1	9:47:42	9995.1	10:01:21	9995.03	0.20
8000	7995.8	9:34:43	7995.9	9:48:22	7996.0	10:02:01	7995.90	0.20
6000	5996.7	9:35:23	5996.8	9:49:02	5996.9	10:02:41	5996.80	0.20
4000	3997.8	9:36:03	3998.0	9:49:42	3998.1	10:03:21	3997.97	0.30
2000	1999.1	9:36:43	1999.2	9:50:22	1999.3	10:04:01	1999.20	0.20
1000	999.6	9:37:13	999.7	9:50:52	999.8	10:04:31	999.70	0.20
0	0.0	9:37:43	0.1	9:51:22	0.1	10:05:01	0.07	0.10

Notes: *1* * = Average initial minimum test load indication.
2 Absolute (not relative) time shall be recorded.

Form D.1 (3 runs) Load test data (E_L)

Ref.: A.4.1.1 to A.4.1.11. Complete one sheet for each test temperature, one for each humidity (SH) test in A.4.6, and when applicable, one for each electronics power voltage in A.4.7.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/26	2011/9/26	
Temperature:	19.9	19.9	°C
Relative humidity:	42.9	42.7	%
Barometric pressure:	102.04	102.01	kPa
Indicator temperature:	26.2	26.1	°C

Electronics power voltage (when applicable): _____ V

Table D.1 (3 runs)

Test load (kg)	Run no. 1		Run no. 2		Run no. 3		Average indication (count)	Repeatability error (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time		
0	-4.1	9:11:38						
20000	19987.9	9:12:28						
0	-3.3	9:13:18						
20000	19987.8	9:14:08						
0	-3.3	9:14:58						
20000	19987.6	9:15:48						
0	-3.3	9:16:38						
0	-3.7	9:21:37	-3.5	9:35:16	-3.5	9:48:56	-3.57 *	0.20
1000	995.5	9:22:07	995.5	9:35:46	995.6	9:49:26	995.53	0.10
2000	1994.9	9:22:37	1995.0	9:36:16	1995.1	9:49:56	1995.00	0.20
4000	3994.1	9:23:17	3994.1	9:36:56	3994.2	9:50:36	3994.13	0.10
6000	5992.9	9:23:57	5993.0	9:37:36	5993.0	9:51:16	5992.97	0.10
8000	7992.1	9:24:37	7992.2	9:38:16	7992.3	9:51:56	7992.20	0.20
10000	9991.4	9:25:17	9991.4	9:38:56	9991.4	9:52:36	9991.40	0.00
12000	11990.5	9:25:57	11990.5	9:39:36	11990.7	9:53:16	11990.57	0.20
14000	13989.7	9:26:37	13989.7	9:40:16	13989.8	9:53:56	13989.73	0.10
16000	15988.8	9:27:17	15988.8	9:40:56	15988.9	9:54:36	15988.83	0.10
20000	19986.6	9:27:57	19986.6	9:41:36	19986.6	9:55:16	19986.60	0.00
16000	15988.7	9:28:37	15988.7	9:42:16	15988.8	9:55:56	15988.73	0.10
14000	13989.2	9:29:17	13989.2	9:42:56	13989.3	9:56:36	13989.23	0.10
12000	11990.0	9:29:57	11990.0	9:43:36	11990.0	9:57:16	11990.00	0.00
10000	9990.8	9:30:37	9990.9	9:44:16	9990.9	9:57:56	9990.87	0.10
8000	7991.7	9:31:17	7991.8	9:44:56	7991.8	9:58:36	7991.77	0.10
6000	5992.7	9:31:57	5992.7	9:45:36	5992.7	9:59:16	5992.70	0.00
4000	3993.8	9:32:37	3993.9	9:46:16	3994.0	9:59:56	3993.90	0.20
2000	1995.1	9:33:17	1995.2	9:46:56	1995.2	10:00:36	1995.17	0.10
1000	995.6	9:33:47	995.7	9:47:26	995.7	10:01:06	995.67	0.10
0	-3.5	9:34:17	-3.4	9:47:56	-3.4	10:01:36	-3.43	0.10

Notes: *1* * = Average initial minimum test load indication.
2 Absolute (not relative) time shall be recorded.

Form D.2 Load cell errors (E_L)calculation

Ref.: 5.1.1; A.4.1.12 to A.4.1.14; C.2.2.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/20	2011/9/26	
Test temperature:	19.9	19.9	℃
Relative humidity:	42.9	42.7	%
Barometric pressure:	100.54	102.01	kPa
Indicator temperature:	27.0	26.1	℃

Conversion factor, f: 3.33
75% test load (g, kg or t): 15000 kg
Reference indication at 75% test load: 14992.63

Table D.2

Test load (kg)	Reference indication (count)	19.9 ℃ (20℃) Indication (count)	19.9 ℃ (20℃) Error(E_L) (V)	40.1 ℃(40℃) Indication (count)	40.1 ℃(40℃) Error(E_L) (V)	-10.3 ℃(-10℃) Indication (count)	-10.3 ℃(-10℃) Error(E_L) (V)	19.9 ℃(20℃) Indication (count)	19.9 ℃(20℃) Error(E_L) (V)	mpe (V)
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
1000	999.52	999.13	-0.12	999.23	-0.09	999.40	-0.04	999.10	-0.13	0.35
2000	1999.04	1998.63	-0.12	1998.67	-0.11	1998.70	-0.10	1998.57	-0.14	0.70
4000	3998.09	3997.77	-0.10	3997.93	-0.05	3997.73	-0.11	3997.70	-0.12	0.70
6000	5997.13	5996.03	-0.33	5996.30	-0.25	5996.03	-0.33	5996.53	-0.18	0.70
8000	7996.18	7995.80	-0.11	7996.13	-0.01	7995.87	-0.09	7995.77	-0.12	0.70
10000	9995.22	9995.00	-0.07	9995.37	0.04	9995.13	-0.03	9994.97	-0.08	0.70
12000	11994.27	11994.20	-0.02	11994.50	0.07	11994.37	0.03	11994.13	-0.04	1.05
14000	13993.31	13993.30	0.00	13993.60	0.09	13993.70	0.12	13993.30	0.00	1.05
16000	15992.36	15992.37	0.00	15992.60	0.07	15993.07	0.21	15992.40	0.01	1.05
20000	19990.44	19990.17	-0.08	19990.07	-0.11	19991.43	0.30	19990.17	-0.08	1.05
16000	15992.36	15992.27	-0.03	15992.30	-0.02	15993.30	0.28	15992.30	-0.02	1.05
14000	13993.31	13992.83	-0.14	13992.90	-0.12	13993.77	0.14	13992.80	-0.15	1.05
12000	11994.27	11993.53	-0.22	11993.70	-0.17	11994.47	0.06	11993.57	-0.21	1.05
10000	9995.22	9994.43	-0.24	9994.60	-0.19	9995.33	0.03	9994.43	-0.24	0.70
8000	7996.18	7995.33	-0.25	7995.50	-0.20	7996.20	0.01	7995.33	-0.25	0.70
6000	5997.13	5996.33	-0.24	5996.43	-0.21	5997.10	-0.01	5996.27	-0.26	0.70
4000	3998.09	3997.47	-0.19	3997.57	-0.16	3998.27	0.05	3997.47	-0.19	0.70
2000	1999.04	1998.73	-0.09	1998.80	-0.07	1999.50	0.14	1998.73	-0.09	0.70
1000	999.52	999.27	-0.08	999.27	-0.08	1000.00	0.14	999.23	-0.09	0.35
0	0.00	0.13	0.04	0.13	0.04	0.37	0.11	0.13	0.04	0.35

Minimum test load, D_{min}: 0 kg PASS: × FAIL:

Notes:

1 Load/reference indications: if a 75% load point was not obtained, a straight line interpolation between the adjacent higher and lower load point indications is used (see 5.2.2 and calculation procedures in C.2.2).

2 Error, E_L: the difference between the test indication and the reference indication divided by the conversion factor, f.

3 Test load values are values above minimum test load, D_{min}.

Form D.3 Repeatability errors (E_R) calculation

Ref.: 5.4; A.4.1.13; C.2.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device Conversion factor, f: 3.33
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Table D.3

Test load	19.9 °C (20°C)		40.1 °C(40°C)		-10.3 °C(-10°C)		19.9 °C(20°C)		mpe
	Repeatability error	Repeatability error	Repeatability error	Repeatability error	Repeatability error	Repeatability error	Repeatability error	Repeatability error	
(kg)	(count)	(V)	(count)	(V)	(count)	(V)	(count)	(V)	(V)
0	0.00	0.00	0.30	0.09	0.50	0.15	0.20	0.06	0.35
1000	0.10	0.03	0.20	0.06	0.50	0.15	0.10	0.03	0.35
2000	0.10	0.03	0.20	0.06	0.50	0.15	0.20	0.06	0.70
4000	0.10	0.03	0.20	0.06	0.40	0.12	0.10	0.03	0.70
6000	0.10	0.03	0.20	0.06	0.40	0.12	0.10	0.03	0.70
8000	0.20	0.06	0.30	0.09	0.50	0.15	0.20	0.06	0.70
10000	0.20	0.06	0.30	0.09	0.40	0.12	0.00	0.00	0.70
12000	0.20	0.06	0.20	0.06	0.40	0.12	0.20	0.06	1.05
14000	0.20	0.06	0.20	0.06	0.30	0.09	0.10	0.03	1.05
16000	0.20	0.06	0.20	0.06	0.30	0.09	0.10	0.03	1.05
20000	0.20	0.06	0.30	0.09	0.20	0.06	0.00	0.00	1.05
16000	0.20	0.06	0.20	0.06	0.20	0.06	0.10	0.03	1.05
14000	0.10	0.03	0.20	0.06	0.30	0.09	0.10	0.03	1.05
12000	0.10	0.03	0.20	0.06	0.30	0.09	0.00	0.00	1.05
10000	0.10	0.03	0.20	0.06	0.20	0.06	0.10	0.03	0.70
8000	0.10	0.03	0.20	0.06	0.20	0.06	0.10	0.03	0.70
6000	0.10	0.03	0.20	0.06	0.20	0.06	0.00	0.00	0.70
4000	0.10	0.03	0.10	0.03	0.30	0.09	0.20	0.06	0.70
2000	0.10	0.03	0.10	0.03	0.20	0.06	0.10	0.03	0.70
1000	0.10	0.03	0.10	0.03	0.20	0.06	0.10	0.03	0.35
0	0.10	0.03	0.20	0.06	0.10	0.03	0.10	0.03	0.35

PASS: × FAIL:

Note: Error, E_R: the maximum difference between the three test indications divided by the conversion factor, f (classes C and D) or the maximum difference between the five test indications divided by the conversion factor, f (classes A and B).

D.4 Temperature effects on MDLO (C_M) calculation

Ref.: 5.5.1.3; A.4.1.14; C.2.4.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: Load cell performance testing device Conversion factor, f: 3.33
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Table D.4

Temperature °C	Indication (count)	Change (C_M) (V)	Change (v_{min}/5 °C)	mpc (v_{min}/5 °C)
19.9	-3.00			
40.1	-1.73	0.38	0.19	0.70
-10.3	-0.30	0.43	-0.09	0.70
19.9	-3.57	-0.98	-0.32	0.70

PASS: × FAIL:

Notes:
1 MDLO: minimum dead load output.
2 Indication: the average initial minimum test load indication obtained from Table D.1.
3 The maximum permissible change(mpc) allowed is: (v_{min}/5°C) for classesB, C, and D; (v_{min}/2°C) for class A.
4 Change, C_M(v): the difference between the observed indications, and the indications at the prior temperature, divided by the conversion factor, f.

Form D.5 Creep (Cc) and DR (C_{DR})

Ref.: 5.3.1, 5.3.2; A.4.2, A.4.3 Complete one sheet for each test temperature.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/20	2011/9/20	
Temperature:	19.9	19.9	°C
Relative humidity:	42.9	43.0	%
Barometric pressure:	100.53	100.54	kPa
Indicator temperature:	27.0	27.1	°C

Conversion factor, f: 3.33

Table D.5

	Test load (kg)	Indication (count)	Barometric pressure (kPa)	Time	Change (v)	mpc (v)	
Exercise cells	0						
These rows may be omitted for a load sequence as shown in Figure A.1	0						
	0						
	0						
(*) →	0	-3.1	100.53	16:11:06			←initial "no load" indication
Fill in time →	Record time of initial loading →			16:11:06			
(**) →	20000	19988.8	100.54	16:11:56	0.00	0.735	←initial "load" indication
	20000	19989.1	100.54	16:12:56	0.09	0.735	
	20000	19989.1	100.54	16:13:56	0.09	0.735	
	20000	19989.0	100.54	16:14:56	0.06	0.735	
	20000	19989.1	100.54	16:15:56	0.09	0.735	
Constant maximum test load, Dmax	20000	19989.1	100.54	16:16:56	0.09	0.735	
	20000	19989.1	100.54	16:17:56	0.09	0.735	
	20000	19989.1	100.53	16:18:56	0.09	0.735	
	20000	19989.2	100.53	16:19:56	0.12	0.735	
	20000	19989.3	100.53	16:20:56	0.15	0.735	
	20000	19989.3	100.53	16:21:56	0.15	0.735	
	20000	19989.4	100.54	16:26:56	0.18	0.735	
	20000	19989.4	100.54	16:31:56	0.18	0.735	
	20000	19989.5	100.55	16:36:56	0.21	0.735	
	20000	19989.5	100.54	16:41:56	0.21	0.735	
Fill in time →	Record time of initial unloading →			16:41:56			
(***) →	0	-2.6	100.54	16:42:47	0.15	0.500	←initial indication
These rows are for reference purposes only	0	-2.8	100.53	16:43:07	0.09	0.500	
	0	-2.9	100.54	16:43:27	0.06	0.500	
	0	-3.0	100.54	16:43:47	0.03	0.500	
	0	-3.0	100.54	16:44:07	0.03	0.500	
	0	-3.0	100.54	16:44:27	0.03	0.500	
	30-20 minute creep difference in units:				0.03	0.1575	

DR (v):	0.15	30 minute creep:	PASS:	×	FAIL:
actual time (s):	51	30-20 minute creep difference:	PASS:	×	FAIL:
specified time (s):	50	DR ≤ 0.5v:	PASS:	×	FAIL:
mpc for DR (v):	0.49	DR within manufacturer specified DR requirements:	PASS:	×	FAIL:

Notes:
1 Change (v) for creep: the observed indication minus the initial "load" indication (**) devided by the conversion factor, f.
2 Determine the difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes (see 5.3.1).
3 Change (v) for DR: the initial indication (***) minus the initial "no load" indication (*) divided by the conversion factor, f.
4 Absolute (not relative) time shall be recorded.

Form D.5 Creep (Cc) and DR (C_{DR})

Ref.: 5.3.1, 5.3.2; A.4.2, A.4.3 Complete one sheet for each test temperature.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/21	2011/9/21	
Temperature:	40.1	40.1	°C
Relative humidity:	34.1	33.9	%
Barometric pressure:	99.59	99.50	kPa
Indicator temperature:	27.1	27.1	°C

Conversion factor, f: 3.33

Table D.5

	Test load (kg)	Indication (count)	Barometric pressure (kPa)	Time	Change (v)	mpc (v)	
Exercise cells	0						
These rows may be omitted for a load sequence as shown in Figure A.1	0						
	0						
	0						
(*) →	0	-1.8	99.59	11:00:49			←initial "no load" indication
Fill in time →	Record time of initial loading →			11:00:49			
(**) →	20000	19989.5	99.58	11:01:39	0.00	0.735	←initial "load" indication
	20000	19989.7	99.57	11:02:39	0.06	0.735	
	20000	19989.7	99.57	11:03:39	0.06	0.735	
	20000	19989.6	99.58	11:04:39	0.03	0.735	
	20000	19989.8	99.58	11:05:39	0.09	0.735	
Constant maximum test load, Dmax	20000	19989.7	99.57	11:06:39	0.06	0.735	
	20000	19989.7	99.57	11:07:39	0.06	0.735	
	20000	19989.8	99.57	11:08:39	0.09	0.735	
	20000	19989.9	99.56	11:09:39	0.12	0.735	
	20000	19989.8	99.56	11:10:39	0.09	0.735	
	20000	19989.9	99.57	11:11:39	0.12	0.735	
	20000	19990.1	99.54	11:16:39	0.18	0.735	
	20000	19990.1	99.51	11:21:39	0.18	0.735	
	20000	19990.2	99.52	11:26:39	0.21	0.735	
	20000	19990.2	99.52	11:31:39	0.21	0.735	
Fill in time →	Record time of initial unloading →			11:31:39			
(***) →	0	-1.2	99.52	11:32:31	0.18	0.500	←initial indication
These rows are for reference purposes only	0	-1.4	99.51	11:32:51	0.12	0.500	
	0	-1.5	99.51	11:33:11	0.09	0.500	
	0	-1.5	99.52	11:33:31	0.09	0.500	
	0	-1.5	99.51	11:33:51	0.09	0.500	
	0	-1.5	99.51	11:34:11	0.09	0.500	
	30-20 minute creep difference in units:				0.03	0.1575	

DR (v):	0.18	30 minute creep:	PASS:	×	FAIL:
actual time (s):	52	30-20 minute creep difference:	PASS:	×	FAIL:
specified time (s):	50	DR ≤ 0.5v:	PASS:	×	FAIL:
mpc for DR (v):	0.48	DR within manufacturer specified DR requirements:	PASS:	×	FAIL:

Notes:
1 Change (v) for creep: the observed indication minus the initial "load" indication (**) devided by the conversion factor, f.
2 Determine the difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes (see 5.3.1).
3 Change (v) for DR: the initial indication (***) minus the initial "no load" indication (*) divided by the conversion factor, f.
4 Absolute (not relative) time shall be recorded.

Form D.5 Creep (Cc) and DR (CDR)

Ref.: 5.3.1, 5.3.2; A.4.2, A.4.3 Complete one sheet for each test temperature.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/22	2011/9/22	
Temperature:	-10.3	-10.3	°C
Relative humidity:	53.7	54.2	%
Barometric pressure:	99.44	99.43	kPa
Indicator temperature:	26.1	26.1	°C

Conversion factor, f: 3.33

Table D.5

	Test load (kg)	Indication (count)	Barometric pressure (kPa)	Time	Change (v)	mpc (v)	
Exercise cells	0						
These rows may be omitted for a load sequence as shown in Figure A.1	0						
	0						
	0						
(*) →	0	-0.8	99.44	11:04:50			←initial "no load" indication
Fill in time →	Record time of initial loading →			11:04:50			
(**) →	20000	19991.3	99.44	11:05:40	0.00	0.735	←initial "load" indication
	20000	19992.2	99.44	11:06:40	0.27	0.735	
	20000	19992.4	99.44	11:07:40	0.33	0.735	
	20000	19992.6	99.44	11:08:40	0.39	0.735	
	20000	19992.7	99.44	11:09:40	0.42	0.735	
Constant maximum test load, Dmax	20000	19992.8	99.44	11:10:40	0.45	0.735	
	20000	19992.9	99.44	11:11:40	0.48	0.735	
	20000	19992.9	99.44	11:12:40	0.48	0.735	
	20000	19993.1	99.43	11:13:40	0.54	0.735	
	20000	19993.1	99.43	11:14:40	0.54	0.735	
	20000	19993.1	99.43	11:15:40	0.54	0.735	
	20000	19993.3	99.42	11:20:40	0.60	0.735	
	20000	19993.4	99.42	11:25:40	0.63	0.735	
	20000	19993.5	99.42	11:30:40	0.66	0.735	
	20000	19993.5	99.42	11:35:40	0.66	0.735	
Fill in time →	Record time of initial unloading →			11:35:40			
(***) →	0	0.7	99.43	11:36:32	0.45	0.500	←initial indication
These rows are for reference purposes only	0	0.5	99.43	11:36:52	0.39	0.500	
	0	0.3	99.43	11:37:12	0.33	0.500	
	0	0.1	99.43	11:37:32	0.27	0.500	
	0	0.1	99.43	11:37:52	0.27	0.500	
	0	0.0	99.43	11:38:12	0.24	0.500	
	30-20 minute creep difference in units:				0.03	0.1575	

DR (v):	0.45	30 minute creep:	PASS:	×	FAIL:
actual time (s):	52	30-20 minute creep difference:	PASS:	×	FAIL:
specified time (s):	50	DR ≤ 0.5v:	PASS:	×	FAIL:
mpc for DR (v):	0.48	DR within manufacturer specified DR requirements:	PASS:	×	FAIL:

Notes:
1 Change (v) for creep: the observed indication minus the initial "load" indication (**) devided by the conversion factor, f.
2 Determine the difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes (see 5.3.1).
3 Change (v) for DR: the initial indication (***) minus the initial "no load" indication (*) divided by the conversion factor, f.
4 Absolute (not relative) time shall be recorded.

Form D.5 Creep (Cc) and DR (C_{DR})

Ref.: 5.3.1, 5.3.2; A.4.2, A.4.3 Complete one sheet for each test temperature.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/9/26	2011/9/26	
Temperature:	19.9	19.9	°C
Relative humidity:	42.7	42.9	%
Barometric pressure:	101.96	101.89	kPa
Indicator temperature:	26.1	26.2	°C

Conversion factor, f: 3.33

Table D.5

	Test load (kg)	Indication (count)	Barometric pressure (kPa)	Time	Change (v)	mpc (v)	
Exercise cells	0						
These rows may be omitted for a load sequence as shown in Figure A.1	0						
	0						
	0						
(*) →	0	-3.7	101.96	11:01:26			←initial "no load" indicatio
Fill in time →	Record time of initial loading →			11:01:26			
(**) →	20000	19988.1	101.95	11:02:17	0.00	0.735	←initial "load" indication
	20000	19988.3	101.94	11:03:17	0.06	0.735	
	20000	19988.3	101.93	11:04:17	0.06	0.735	
	20000	19988.3	101.92	11:05:17	0.06	0.735	
	20000	19988.3	101.91	11:06:17	0.06	0.735	
Constant maximum test load, Dmax	20000	19988.4	101.91	11:07:17	0.09	0.735	
	20000	19988.4	101.92	11:08:17	0.09	0.735	
	20000	19988.5	101.93	11:09:17	0.12	0.735	
	20000	19988.5	101.93	11:10:17	0.12	0.735	
	20000	19988.5	101.94	11:11:17	0.12	0.735	
	20000	19988.6	101.94	11:12:17	0.15	0.735	
	20000	19988.6	101.93	11:17:17	0.15	0.735	
	20000	19988.7	101.91	11:22:17	0.18	0.735	
	20000	19988.8	101.89	11:27:18	0.21	0.735	
	20000	19988.8	101.90	11:32:18	0.21	0.735	
Fill in time →	Record time of initial unloading →			11:32:18			
(***) →	0	-3.1	101.90	11:33:10	0.18	0.500	←initial indication
These rows are for reference purposes only	0	-3.4	101.90	11:33:30	0.09	0.500	
	0	-3.4	101.90	11:33:50	0.09	0.500	
	0	-3.5	101.90	11:34:10	0.06	0.500	
	0	-3.5	101.90	11:34:30	0.06	0.500	
	0	-3.5	101.90	11:34:50	0.06	0.500	
	30-20 minute creep difference in units:				0.03	0.1575	

DR (v):	0.18	30 minute creep:	PASS:	×	FAIL:	
actual time (s):	51	30-20 minute creep difference:	PASS:	×	FAIL:	
specified time (s):	50	DR ≤ 0.5v:	PASS:	×	FAIL:	
mpc for DR (v):	0.49	DR within manufacturer specified DR requirements:	PASS:	×	FAIL:	

Notes:
1 Change (v) for creep: the observed indication minus the initial "load" indication (**) devided by the conversion factor, f.
2 Determine the difference between the reading obtained at 20 minutes and the reading obtained at 30 minutes (see 5.3.1).
3 Change (v) for DR: the initial indication (***) minus the initial "no load" indication (*) divided by the conversion factor, f.
4 Absolute (not relative) time shall be recorded.

Form D.6 Barometric pressure effects (Cp)

Ref.: 5.5.2; A.4.4.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: —
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/10/26	2011/10/26	
Test temperature:	23.4	23.4	°C
Relative humidity:	45.7	44.8	%
Barometric pressure:	101.41	101.41	kPa
Indicator temperature:	23	23.4	°C

Conversion factor, f: 3.33

Table D.6

Pressure (kPa)	Indication (count)	Time	Change (V)	Change (v_{min}/kPa)	mpc (v_{min}/kPa)
101.41	-4.3	11:00	0.00	0.00	0
102.41	-4.0	11:01	0.09	0.18	1
101.41	-4.3	11:02	-0.09	0.18	1
100.41	-4.8	11:03	-0.15	0.30	1
101.41	-4.3	11:04	0.15	0.30	1

PASS: × FAIL:

Remarks:

Notes: *1* Change (v): the difference between the observed indication and the initial indication divided by the conversion factor, f.

2 Although A.4.4 specifies a change of only 1 kPa for this test, additional measurements may be taken.

3 Absolute (not relative) time shall be recorded.

Form D.7 Humidity effects (CH or no mark)

Ref.: 5.5.3.1;A.4.5.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

	At start	At end	
Date:	2011/10/7	2011/10/24	
Temperature:	20.0	19.9	°C
Relative humidity:	43.1	43.1	%
Barometric pressure:	100.88	101.13	kPa
Indicator temperature:	23.1	20.8	°C

Conversion factor, f: 3.33

Conditions during damp heat cyclic test:
Chamber temp.(high): 40.3 °C Relative humidity: 95.2 %
Chamber temp.(low): 24.9 °C Relative humidity: 95.8 %

Table D.7

	Test load (kg)	Before humidity test: Indication (count)	Before humidity test: Time	After humidity test: Indication (count)	After humidity test: Time	Change (v)	mpc (v)	
	0	-4.2	16:08:32	-2.4	9:20:13			
	20000	19987.7	16:09:22	19991.3	9:21:03			
	0	-3.6	16:10:13	-1.8	9:21:54			
	20000	19988.0	16:11:03	19991.7	9:22:44			
	0	-3.6	16:11:54	-1.8	9:23:34			
	20000	19988.0	16:12:44	19991.8	9:24:25			
	0	-3.7	16:13:35	-1.8	9:25:15			
¤	0	-4.0	16:18:39	-2.3	9:30:19			
‡	20000	19988.1	16:19:30	19991.9	9:31:09			
¤	0	-3.6	16:20:20	-1.7	9:32:00			
‡	20000	19988.1	16:21:10	19992.0	9:32:50			
¤	0	-3.6	16:22:01	-1.8	9:33:41			
‡	20000	19988.1	16:22:51	19992.0	9:34:31			
¤	0	-3.6	16:23:42	-1.8	9:35:22			
	0							
	0							
	Average(¤)	-3.70		-1.90		0.54	240	← ≦4%n_{max}
	Average(‡)	19988.10		19991.97				
	Averages difference(*)	19991.80		19993.87		0.62	1.0	

(¤) Indications at minimum test load

(‡) Indications at maximum test load (see Note 3)

(*) Average, see 5.5.3.1 and C.2.7

Change (¤), CHmin:	PASS:	×	FAIL:
Change (*), CHmax:	PASS:	×	FAIL:

Notes:
1 This test is not necessary if the load cell is marked NH or SH.
2 Change(v): the difference between the after indication and the before indication divided by the conversion factor, f.
3 Use five test runs for classes A and B; use three test runs for classes C and D.
4 Absolute (not relative) time shall be recorded.

Form D.9 Marking requirements

Ref.: 4.6, 4.7.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 0.7 DR: 1.666 kg
Force-generating system: —
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Table D.9.1

R 60 reference	Mandatory information	On load cell	In document
4.6.1	Accuracy class designation	-	+
4.6.2	Maximum number of load cell verification intervals, n_{max}	-	+
4.6.3	Loading designation (if necessary)	-	+
4.6.4	Working temperature designation	-	-
4.6.5.1	Humidity symbol "NH"	/	/
4.6.5.3	Humidity symbol "SH"	/	/
4.6.6.1, 4.7.1	Name or trademark of manufacturer (see *Note 1*)	+	+
4.6.6.1, 4.7.1	Manufacturer's own designation or load cell model (see *Note 1*)	+	+
4.6.6.1, 4.7.1	Serial number (see *Note 1*)	+	+
4.6.6.1	Year of manufacture	+	-
4.6.6.1	Minimum dead load, E_{min}	-	+
4.6.6.1, 4.7.1	Maximum capacity, E_{max} (see *Note 1*)	+	+
4.6.6.1	Safe load limit, E_{lim}	-	+
4.6.6.1	Minimum load cell verification interval (v_{min})	-	+
4.6.6.1	Other pertinent conditions	-	-
4.6.6.1	Apportionment factor, P_{LC} (if not equal to 0.7)	-	+
4.6.7	Standard classification	-	-
4.6.8	Multiple classifications	-	-

Table D.9.2

R 60 reference	Non-mandatory additional information	On load cell	In document
4.6.5.2	Humidity symbol "CH"	/	+
4.6.6.2	Relative v_{min}, Y	-	-
4.6.6.2	Relative DR, Z	-	-

Include references to the following:
Documents supplied with load cells:
Diagrams showing markings on load cells:

Notes:
1 Required both on load cell and in document.
2 Indicate that the marking is present with a "+".
3 Indicate that the marking is not present with a "-".
4 Indicate that the marking is not applicable with a "/".

Form D.10 Summary of results - Load cells equipped with electronics

Ref.: Clause 6.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 1.0 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Table D.10 Summary of results

Test description	Test procedure	Test report form no.	Passed	Failed	Remarks
Warm-up time	A.4.7.2	D11	×		
Power voltage variations	A.4.7.3	D.12	×		
Short time power reductions	A.4.7.4				NA
Bursts(electrical fast transients)	A.4.7.5				NA
Electrostatic discharge	A.4.7.6				NA
Electromagnetic susceptibility	A.4.7.7				NA
Span stability test	A.4.7.8	D.17.1.1,D.17.2	×		

Additional remarks:

Form D.11 Warm-up time

Ref.: 6.3.2; A.4.7.2

				At start	At end	
Application no.:	23-006		Date:	2011/9/28	2011/9/28	
Load cell model:	DCC1-20T		Time:	6:57:26	7:38:36	
Serial no.:	24071009		Temperature:	20.3	20.3	℃
E_{max}:	20000 kg		Relative humidity:	43.1	43.0	%
n_{max}:	6000		Barometric pressure:	101.72	101.71	kPa
v_{min}:	1.666 kg		Conversion factor, f:	3.33		
p_{LC}:	1.0	DR: 1.666 kg	Minimum test load,Dmin:	0 kg		
Force-generating system:	Load cell performance testing device		Maximum test load,Dmax:	20000 kg		
Indicating instrument:	YAMATO EDI-901		Duration of disconnection before test:	62 hour		
Evaluator:	Fukuda					

Table D.2

	Initial run		After 5 min		After 15 min		After 30 min		mpc
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	(V)
Minimum test load	-2.90	7:07:47	-3.70	7:12:47	-4.00	7:22:46	-4.00	7:37:47	
Maximum test load	19988.80	7:08:37	19988.10	7:13:36	19987.90	7:23:36	19988.00	7:38:36	
Span(count)	19991.70		19991.80		19991.90		19992.00		
Span(v)	6000.38		6000.41		6000.44		6000.47		
Change(v)	0.00		0.03		0.06		0.06		1.50

PASS: × FAIL:

Notes:

1 Absolute (not relative) time shall be recorded.

2 Span: the result of subtracting the indication at minimum test load from the indication at maximum test load. All span errors (error at maximum test load minus the error at minimum test load) shall be within the maximum permissible error during the 30 minute test.

3 Change: the difference between the span and the initial run span.

4 Maximum permissible change, mpc: the absolute value of the maximum permissuble error for the maximum test load applied.

Form D.12 Power voltage variations

Ref.: 6.3.3, 6.3.4; A.4.7.3.

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 1.0 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Date: 2011/9/29
Time: 13:34
Temperature: 20.0 °C
Relative humidity: 42.8 %
Barometric pressure: 101.08 kPa

Conversion factor, f: 3.33
Minimum test load,Dmin: 0 kg
Maximum test load,Dmax: 20000 kg

Power voltage(A.4.7.3): Mains: 12 V Battery: -

Reference voltage or range(see Note 5): - V
Upper limit: 15 V
Lower limit: 8 V

Table D.12

Test load (kg)	Reference indication (count)	Upper limit		Lower limit		mpe (v)
		Indication (count)	Error (v)	Indication (count)	Error (v)	
0	0.00	0.00	0.00	0.00	0.00	0.50
1000	999.52	999.17	-0.11	999.07	-0.14	0.50
2000	1999.04	1998.57	-0.14	1998.57	-0.14	1.00
4000	3998.09	3997.73	-0.11	3997.70	-0.12	1.00
6000	5997.13	5996.43	-0.21	5996.23	-0.27	1.00
8000	7996.18	7995.83	-0.10	7995.87	-0.09	1.00
10000	9995.22	9995.00	-0.07	9995.00	-0.07	1.00
12000	11994.27	11994.17	-0.03	11993.87	-0.12	1.50
14000	13993.31	13993.37	0.02	13993.33	0.01	1.50
16000	15992.36	15992.37	0.00	15992.40	0.01	1.50
20000	19990.44	19990.13	-0.09	19990.17	-0.08	1.50
16000	15992.36	15992.20	-0.05	15992.23	-0.04	1.50
14000	13993.31	13992.80	-0.15	13992.80	-0.15	1.50
12000	11994.27	11993.50	-0.23	11993.50	-0.23	1.50
10000	9995.22	9994.43	-0.24	9994.43	-0.24	1.00
8000	7996.18	7995.33	-0.25	7995.33	-0.25	1.00
6000	5997.13	5996.33	-0.24	5996.23	-0.27	1.00
4000	3998.09	3997.50	-0.18	3997.43	-0.20	1.00
2000	1999.04	1998.70	-0.10	1998.67	-0.11	1.00
1000	999.52	999.20	-0.10	999.20	-0.10	0.50
0	0.00	0.10	0.03	0.07	0.02	0.50

PASS: × FAIL:

Equipment used (supply sketch if necessary) :

Notes:
1 Upper limit not applicable to battery powered load cells.
2 At lower limit, battery powered load cells shall function and be within mpe, or cease to function.
3 Reference indications: if a 75% load point was not obtained, a straight line interpolation between the adjacent higher and lower load point indications is used (see 5.2.2 and calculation procedures in C.2.2).
4 Error: the difference between the test indication and the reference indication divided by the conversion factor, f
5 When a voltage range is marked, use the average value as the reference value and determine the upper and lower values of applied voltage according to A.4.7.3.

Form D.17.1.1(3 runs) Span stability-measurement data for classes C and D

Ref.: 6.3.6;A.4.7.8

Application no.: 23-006
Load cell model: DCC1-20T
Serial no: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg

Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
p_{LC}: 1.0 DR: 1.666 kg
Conversion factor,f: 3.33
Minimum test load,D_{min}: 0 kg
Maximum test load,D_{max}: 20000 kg

Table D.17.1.1(3 runs)
Measurement no. 1:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-2.7	7:12:29	-2.1	7:14:10	-2.1	7:15:51	-2.30
20000	19989	7:13:19	19989	7:15:00	19988.9	7:16:41	19988.97
						Span	19991.27

Date:	2011/9/20	
Time:	7:02:23	
Temperature:	20.0	℃
Relative humidity:	42.9	%
Barometric pressure:	100.82	kPa

Evaluator: Fukuda Remarks:

Measurement no. 2:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-3.9	7:19:40	-3.5	7:21:21	-3.5	7:23:02	-3.63
20000	19987.9	7:20:30	19987.7	7:22:11	19987.8	7:23:52	19987.80
						Span	19991.43

Date:	2011/9/27	
Time:	7:09:34	
Temperature:	20.0	℃
Relative humidity:	42.8	%
Barometric pressure:	101.58	kPa

Evaluator: Fukuda Remarks:

Form D.17.1.1(3 runs) Span stability-measurement data for classes C and D (continued)

Measurement no. 3:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-4	15:54:32	-3.6	15:56:13	-3.6	15:57:54	-3.73
20000	19988.2	15:55:22	19988.2	15:57:03	19988	15:58:44	19988.13
						Span	19991.87

Date:	2011/9/28	
Time:	15:44:25	
Temperature:	20.0	℃
Relative humidity:	42.9	%
Barometric pressure:	101.35	kPa

Evaluator: Fukuda Remarks:

Measurement no. 4:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-4.1	13:14:32	-3.6	13:16:13	-3.7	13:17:54	-3.80
20000	19988	13:15:22	19988.1	13:17:03	19988	13:18:44	19988.03
						Span	19991.83

Date:	2011/9/29	
Time:	13:04:26	
Temperature:	20.0	℃
Relative humidity:	42.8	%
Barometric pressure:	101.11	kPa

Evaluator: Fukuda Remarks:

Measurement no. 5:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-3.2	16:24:44	-2.8	16:26:25	-2.8	16:28:06	-2.93
20000	19988.9	16:25:35	19988.9	16:27:15	19988.9	16:28:56	19988.90
						Span	19991.83

Date:	2011/10/3	
Time:	16:14:38	
Temperature:	20.2	℃
Relative humidity:	43.0	%
Barometric pressure:	101.40	kPa

Evaluator: Fukuda Remarks:

Form D.17.1.1(3 runs) Span stability-measurement data for classes C and D (continued)

Measurement no. 6:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-3.2	16:33:56	-2.8	16:35:37	-2.8	16:37:18	-2.93
20000	19988.8	16:34:47	19988.9	16:36:27	19988.8	16:38:08	19988.83
						Span	19991.77

Date:	2011/10/4	
Time:	16:24:39	
Temperature:	20.1	℃
Relative humidity:	42.7	%
Barometric pressure:	101.94	kPa

Evaluator: Fukuda Remarks:

Measurement no. 7:

Test load (g,kg or t)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-3.6	16:37:00	-3.2	16:38:41	-3.2	16:40:21	-3.33
20000	19988.5	16:37:50	19988.5	16:39:31	19988.4	16:41:12	19988.47
						Span	19991.80

Date:	2011/10/5	
Time:	16:26:54	
Temperature:	20.0	℃
Relative humidity:	42.8	%
Barometric pressure:	101.31	kPa

Evaluator: Fukuda Remarks:

Measurement no. 8:

Test load (kg)	Run no.1		Run no.2		Run no.3		Average indication (count)
	Indication (count)	Time	Indication (count)	Time	Indication (count)	Time	
0	-4.2	16:38:31	-3.7	16:40:12	-3.7	16:41:53	-3.87
20000	19988	16:39:21	19988.1	16:41:02	19988	16:42:43	19988.03
						Span	19991.90

Date:	2011/10/6	
Time:	16:28:24	
Temperature:	20.0	℃
Relative humidity:	43.1	%
Barometric pressure:	100.15	kPa

Evaluator: Fukuda Remarks:

Form D.17.2Span stability-summary of test results

Ref.: 6.3.2;A.4.7.8;D.17.1.1(3runs)

Application no.: 23-006
Load cell model: DCC1-20T
Serial no.: 24071009
E_{max}: 20000 kg
n_{max}: 6000
v_{min}: 1.666 kg
p_{LC}: 1.0 DR: 1.666 kg
Force-generating system: Load cell performance testing device
Indicating instrument: YAMATO EDI-901
Evaluator: Fukuda

Table D.17.2

Measurement no. (see *Note 3*)	Span		Variation (v)	Maximum allowable variation(v)
	(count)	(v)		
1	19991.27	6000.25	0.00	
2	19991.43	6000.30	0.05	0.75
3	19991.87	6000.43	0.18	0.75
4	19991.83	6000.42	0.17	0.75
5	19991.83	6000.42	0.17	0.75
6	19991.77	6000.40	0.15	0.75
7	19991.80	6000.41	0.16	0.75
8	19991.90	6000.44	0.19	0.75

PASS: × FAIL:

Remarks:

Notes: 1 Variation: the difference in the span value from the span value of run no.1.
2 Maximum allowable variation:half the load cell verification interval or half the absolute value of the maximum test load applied.
3 Use the results from measurements nos. 1-8 on Form D17.1.1(3 runs) or From D17.1.