Calibration of the Proceq DY-2

According to EN ISO 7500-1

Proceq DY-2 is calibrated according to EN ISO 7500-1 Annex C – Alternative Method of Testing Machine Classification.

This is a method recommended for automated calibration processes.

Class of machine range	Maximum permissible value %				
	Relative error of				Relative resolution
	accuracy	repeatability	reversibility[a]	zero	
	q	b	v	f_0	a
0,5	± 0,5	0,5	± 0,75	± 0,05	0,25
1	± 1,0	1,0	± 1,5	± 0,1	0,5
2	± 2,0	2,0	± 3,0	± 0,2	1,0
3	± 3,0	3,0	± 4,5	± 0,3	1,5

[a] According to 6.4.8, the relative reversibility error is only determined when required.

Most pull-off testing standards require class 2 accuracy.

Proceq DY-2 meets the requirements for Class 1 from 20% - 100% of the maximum load.

4.11 *Pull off test equipment*, complying with EN 24624 with a pulling capacity sufficient to cause tensile bond failure of the specimen. The accuracy shall be within ±2 %. (A capacity of 10 kN is sufficient for most applications). The pull-off equipment shall be capable of applying the load according to **3.1** of EN 24624:1992 and shall be provided with a measurement device that displays the exerted force by an analogue or digital system. The measurement device shall retain the reading of maximum force exerted.

Example of calibration certificate

DY-2 Device	Calibration Certificate
Model	DY-225
Serial No.	DT03-000-0002
Software Version	1.4.0
Display Resolution	0.01 kN
Test Load	25.00 kN
Calibration Device	F13.1348 KVZ 50.10.015

The device specified alongside was subjected to Proceq quality inspection. Proceq SA certifies herewith that this device meets all product specifications and quality requirements.

Date of Calibration	Schwerzenbach 2013-02-18
Inspector	sm

Results of Calibration

Nominal Load			Deviation[%] between Test Unit & Cal. Device			Accuracy 1%	Repeatability 1%	Resolution 0.5%
Step[%]	kN	lbf	1.Series	2.Series	3.Series	q	b	a
20	**5.00**	**1124**	0.63	0.59	0.39	**0.54**	**0.73**	**0.20**
30	**7.50**	**1686**	0.39	0.22	0.14	**0.25**	**0.69**	**0.13**
40	**10.00**	**2248**	0.02	0.07	0.02	**0.04**	**0.16**	**0.10**
50	**12.50**	**2810**	-0.39	-0.39	-0.38	**0.39**	**0.03**	**0.08**
60	**15.00**	**3372**	0.01	0.09	-0.03	**0.04**	**0.04**	**0.07**
70	**17.50**	**3934**	0.14	0.19	0.32	**0.22**	**0.09**	**0.06**
80	**20.00**	**4496**	0.01	0.03	0.01	**0.02**	**0.09**	**0.05**
90	**22.50**	**5058**	-0.04	-0.04	0.03	**0.04**	**0.01**	**0.04**
100	**25.00**	**5620**	-0.29	-0.34	-0.35	**0.33**	**0.14**	**0.04**

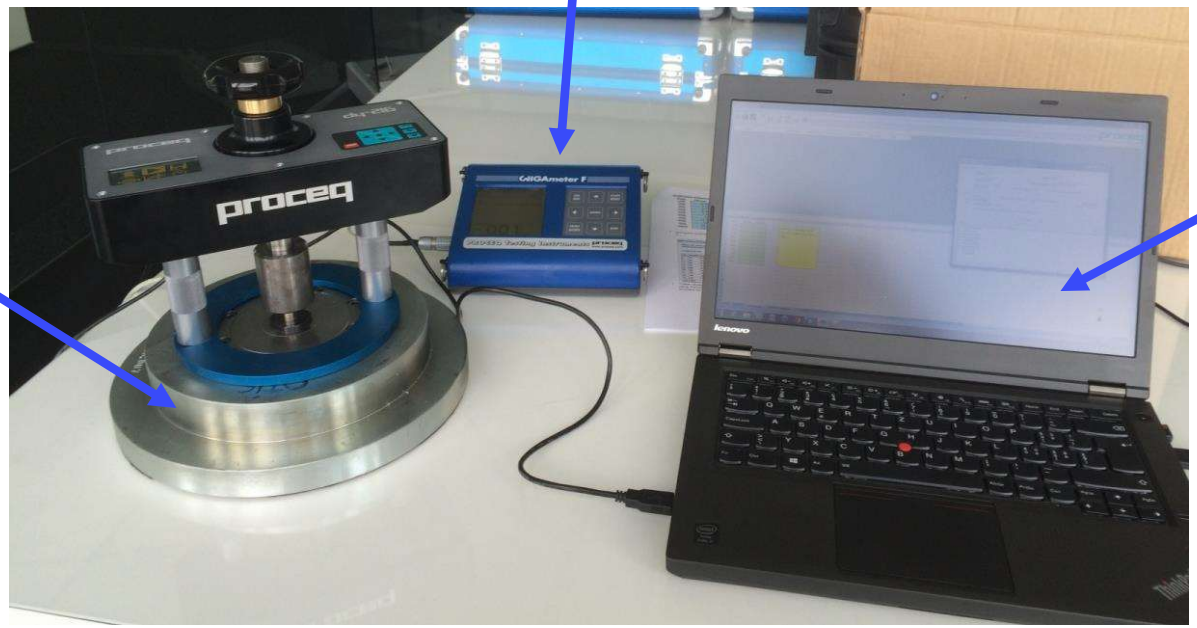
Remarks

Calibration conforms to the requirements of ISO EN 7500-1.

Typical calibration set-up

Display instrument to read the load from the reference load cell

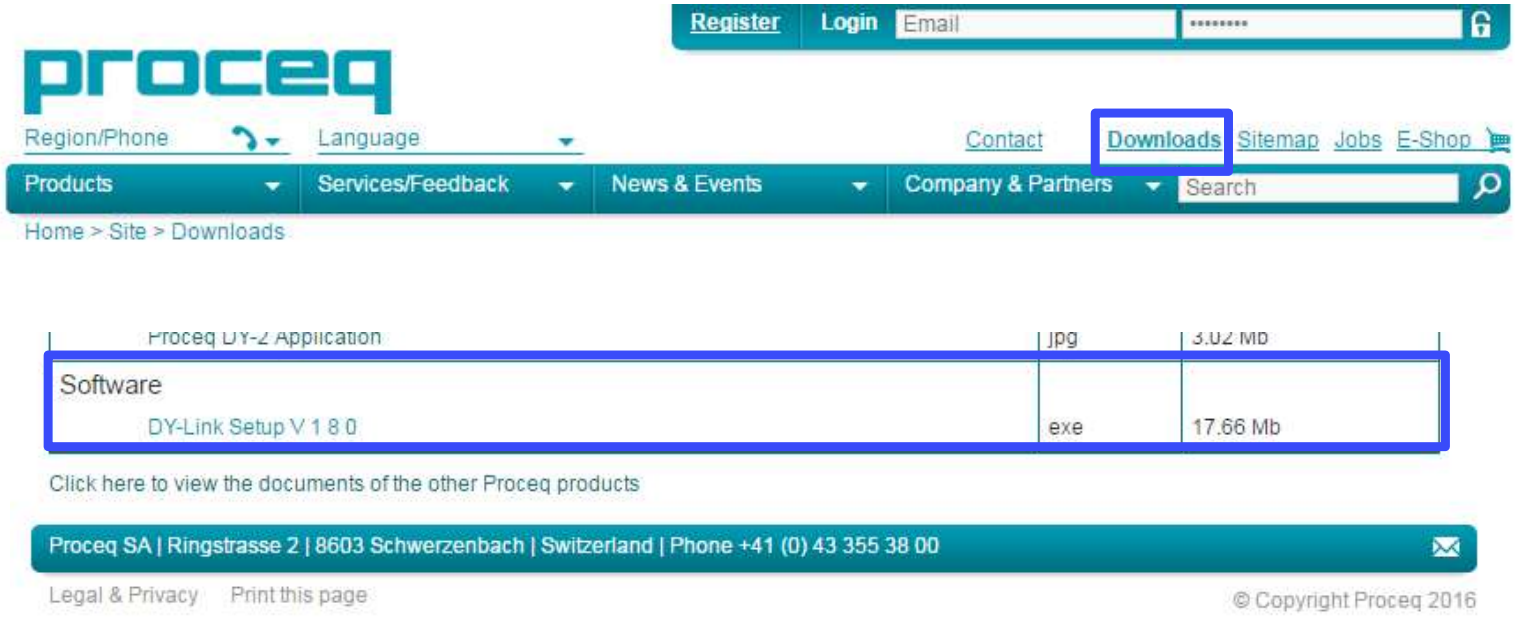
Reference load cell



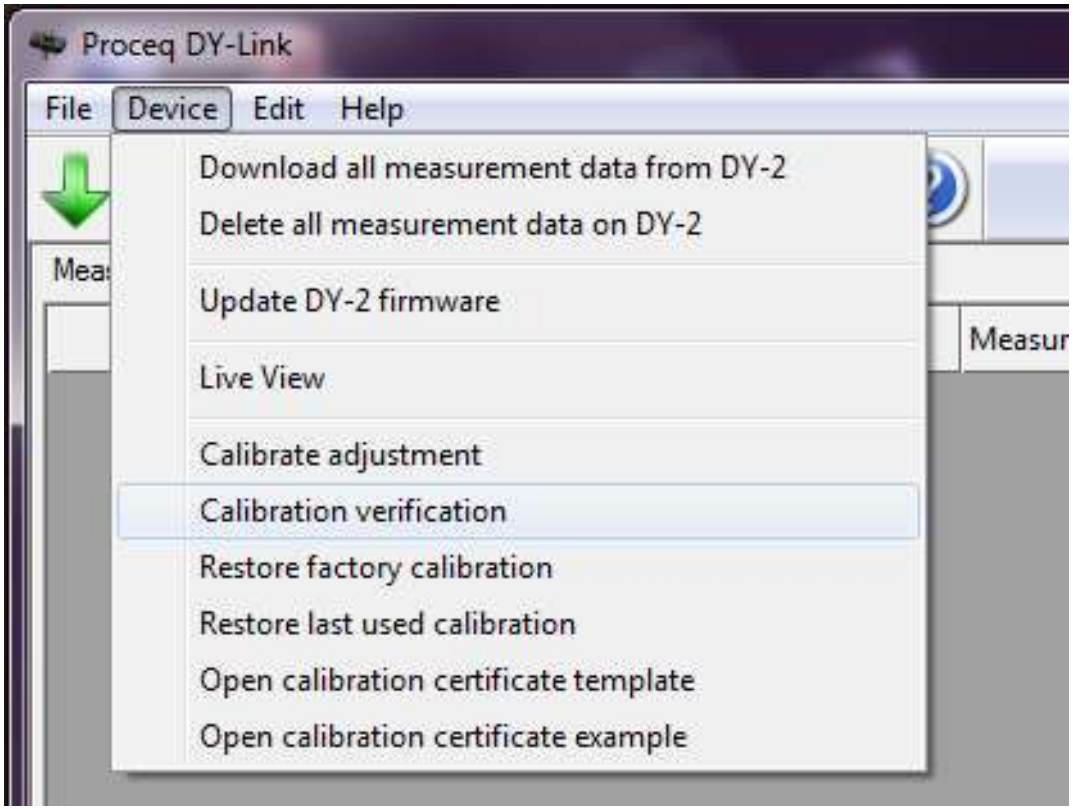
PC running Proceq DY-Link software

Proceq DY-Link software

- The Proceq DY-Link software provided with the instrument, includes the calibration software. It allows any reference load cell to be used to calibrate the Proceq DY-2.
- It is necessary to use this software also if the instrument is sent to an independent calibration institute.
- Available on our website under “Downloads”:



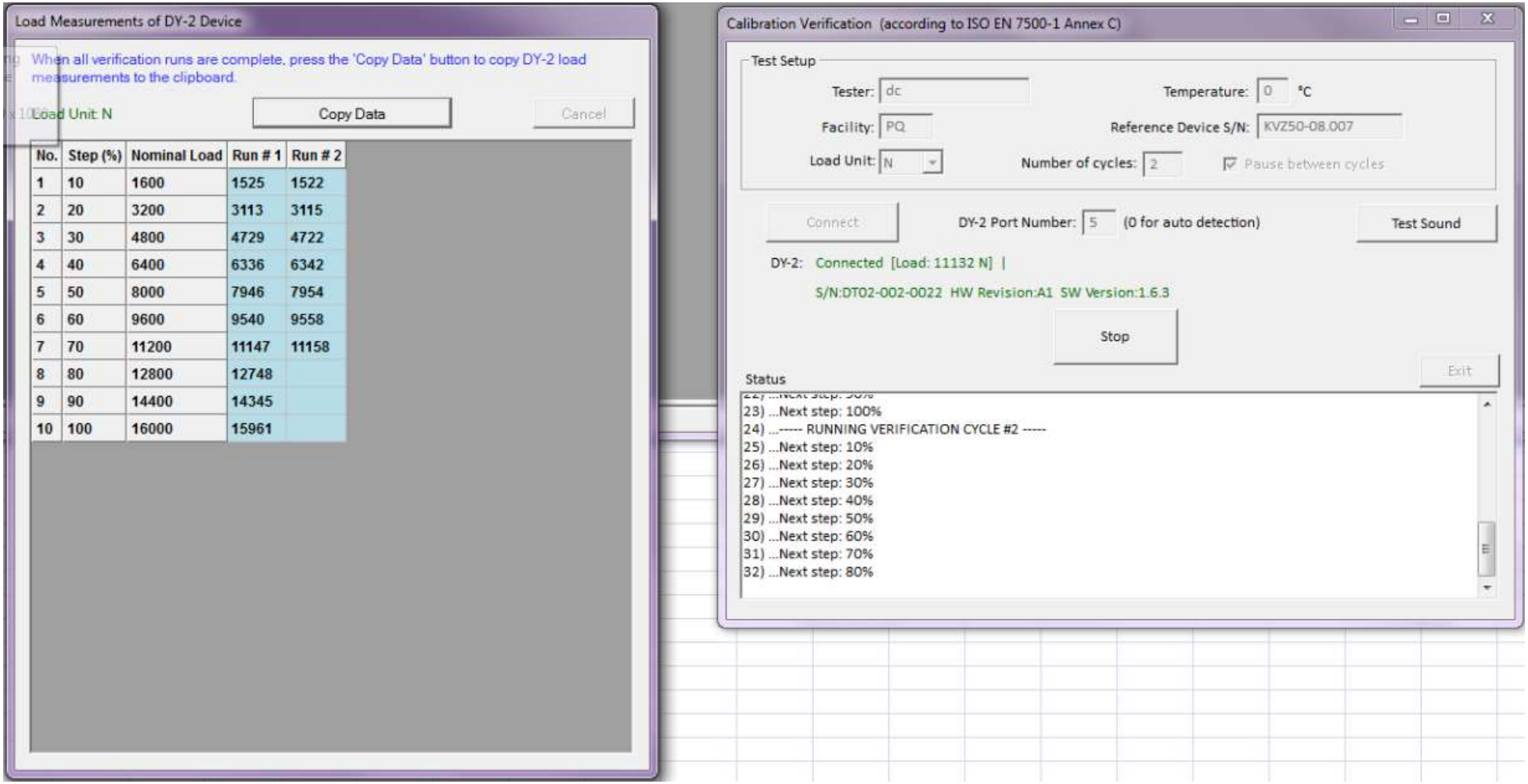
Proceq DY-Link calibration menu



Typical calibration procedure

1. Verify the current calibration.
2. If calibration is within the required tolerance – STOP.
3. If calibration is out of tolerance – Perform a calibration adjustment.
4. Repeat calibration verification.

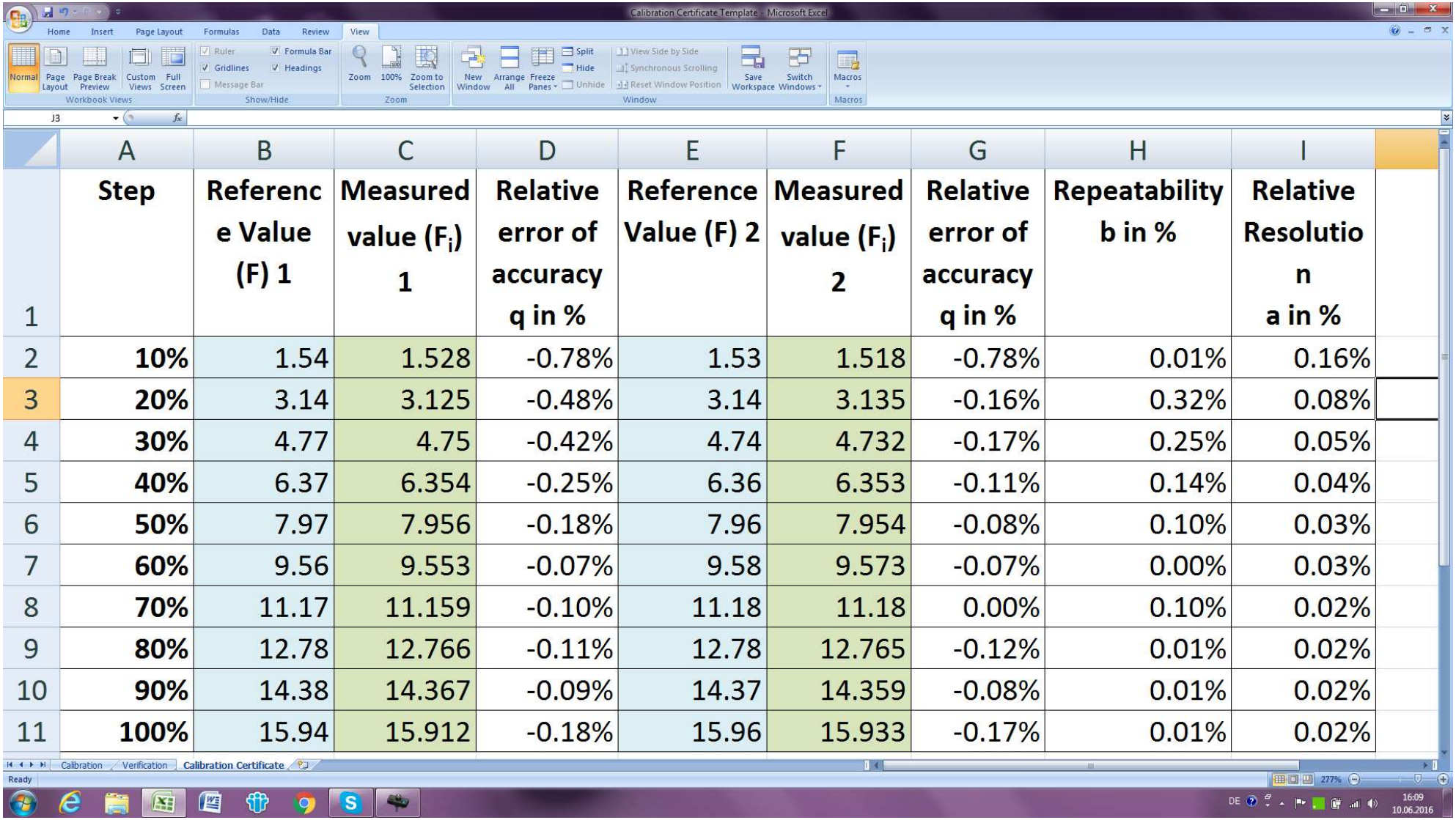
Verification



Excel calibration certificate template

	A	B	C	D	E	F	G	H	I
1	Serial Number	DT02-002-0022		Nominal Load	16	kN	Resolutio	10	
2	HW	A1							
3	SW								
4									
5	**Verification Reference Reading True Force (F)**								
6	**Step**	**1st run**	**2nd run**						
7	10%	1.44	1.45		Enter the true force value (F) indicated by the reference device for each load step.				
8	20%	3.01	3.01						
9	30%	4.63	4.63						
10	40%	6.22	6.23						
11	50%	7.84	7.84						
12	60%	9.44	9.43						
13	70%	11.04	11.03						
14	80%	12.64	12.64						
15	90%	14.24	14.23						
16	100%	15.84	15.84						
17									
18	**Verification DY-2 Reading (F_i)**								
19	**Step**	**1st run**	**2nd run**						
20	10%	1.527	1.535		Copy the Load values read from DY-2 here using CTRL-C, CTRL-V				
21	20%	3.119	3.12						
22	30%	4.739	4.731						
23	40%	6.333	6.334						
24	50%	7.952	7.963						
25	60%	9.563	9.557						
26	70%	11.162	11.151						
27	80%	12.761	12.767						
28	90%	14.358	14.353						
29	100%	15.953	15.955						

Certificate



	A	B	C	D	E	F	G	H	I
1	Step	Reference Value (F) 1	Measured value (F_i) 1	Relative error of accuracy q in %	Reference Value (F) 2	Measured value (F_i) 2	Relative error of accuracy q in %	Repeatability b in %	Relative Resolution a in %
2	10%	1.54	1.528	-0.78%	1.53	1.518	-0.78%	0.01%	0.16%
3	20%	3.14	3.125	-0.48%	3.14	3.135	-0.16%	0.32%	0.08%
4	30%	4.77	4.75	-0.42%	4.74	4.732	-0.17%	0.25%	0.05%
5	40%	6.37	6.354	-0.25%	6.36	6.353	-0.11%	0.14%	0.04%
6	50%	7.97	7.956	-0.18%	7.96	7.954	-0.08%	0.10%	0.03%
7	60%	9.56	9.553	-0.07%	9.58	9.573	-0.07%	0.00%	0.03%
8	70%	11.17	11.159	-0.10%	11.18	11.18	0.00%	0.10%	0.02%
9	80%	12.78	12.766	-0.11%	12.78	12.765	-0.12%	0.01%	0.02%
10	90%	14.38	14.367	-0.09%	14.37	14.359	-0.08%	0.01%	0.02%
11	100%	15.94	15.912	-0.18%	15.96	15.933	-0.17%	0.01%	0.02%

Adjustment procedure

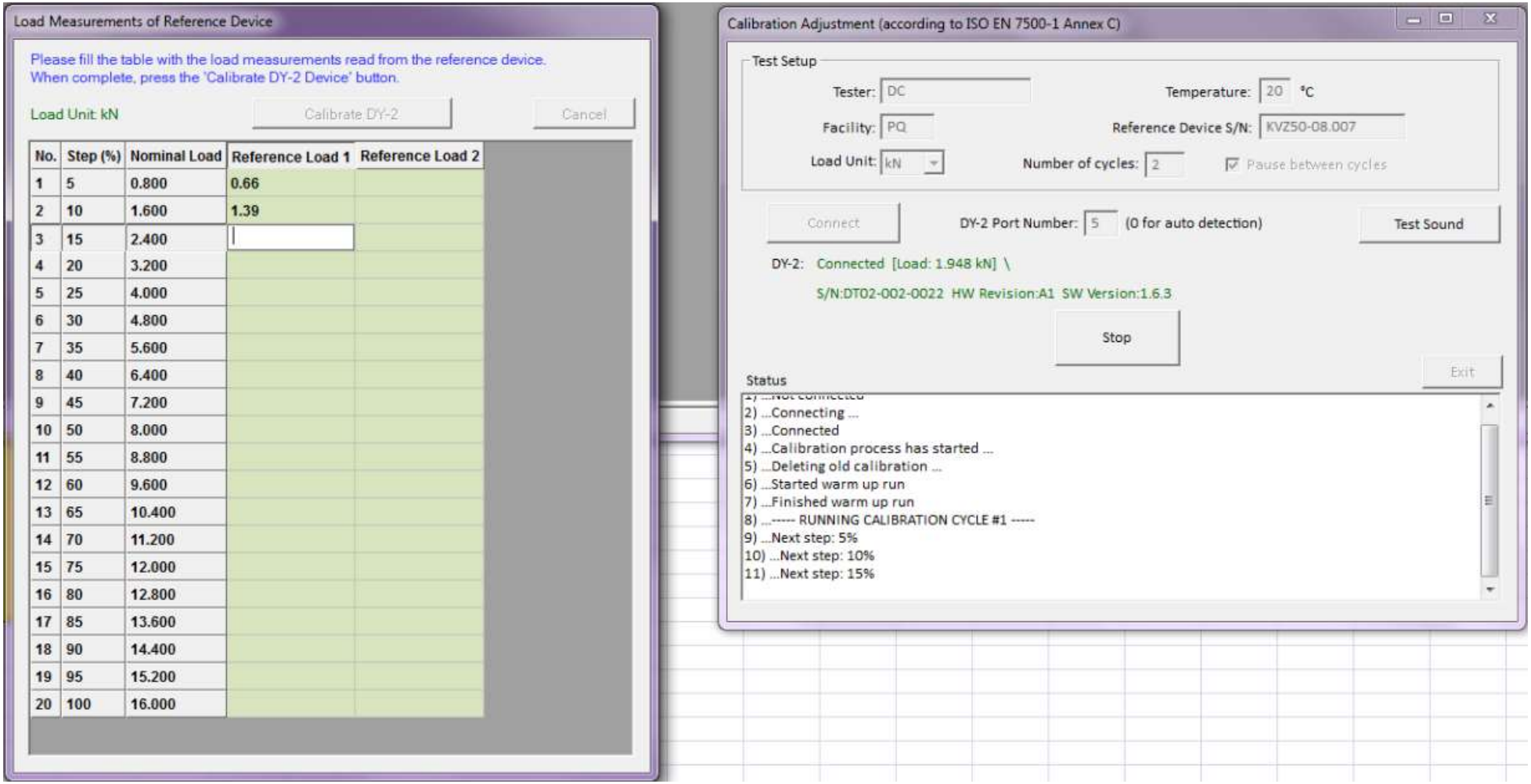
1. Set up is the same as for verification.
2. This time we record the results on the calibration sheet as there are now 20 steps.
3. Again there is a warm up cycle and two complete cycles.
4. On completion of 2nd run, copy the results into the table provided and press calibrate Proceq DY-2.

Complete process takes about 10 minutes.

Notes:

- The previous calibration data are deleted when we start.
- A previous calibration or the initial factory calibration can be restored if there is a problem.

Adjustment



Conclusion

Pull-off testing with Proceq DY-2

- The Proceq DY-2 family of pull-off testers makes it easy to **work in accordance with the standards**.
- This is achieved by simple entry of the key parameters, a **fully automated test and a complete record of the test** including the load development and the failure mode.
- The accuracy of the instrument **exceeds the typical requirements** of pull-off standards.
- Calibration of the instrument in **accordance with EN ISO 7500-1** has been simplified with the DY-Link software included.
- A **complete set of test discs and accessories** completes the offering.

