

CERTIFICATE OF CALIBRATION

ISSUED BY: ZwickRoell Ltd.
UKAS ACCREDITED CALIBRATION LABORATORY
CERTIFICATE NUMBER: 2409-3630
DATE OF ISSUE: 17 September 2024



0167

Zwick / Roell

ZwickRoell Ltd.
Worcester Six Business Park, Clayfield Road, Worcester
Worcestershire WR4 0AE
For Service Call: +44 (0) 1568 613516
For Email: laboratory@zwickroell.com

Internet:
www.zwickroell.com

Page 1 of 3 Pages

Approved Signatories

Dr N.S.Wrigley
T.Arnett
S. Pearce

Issued To: LCM Systems Ltd.
Address: Unit 15, Newport Business Park, Barry Way, Newport, Isle of Wight
Machine Description: Universal Testing Machine **Serial Number:** 8003
Manufacturer / Type: LCM TC150T **Force Capacity:** 1500kN
Display System: A single range computer digital display **Software:** LCM Systems VisualLink 5

Force Transducer: 1500kN LCM Load Cell **Serial Number:** 08003
Associated Equipment: Mantracourt Amplifier DSC **Serial Number:** 17038494
Associated Equipment: Asus Computer System **Serial Number:** D1PTAS001546

Date of Calibration: 08 July 2024 **Ambient Temperature:** 19.9°C
Zwick reference numbers: F116453 **Location:** Test & Calibration Room
Previous certificate number: 2310-4768 **Issued on:** 31 August 2023

Method:

The testing machine identified above has been calibrated in accordance with the requirements of **BS EN ISO 7500-1:2018** over the ranges given below for increasing forces only. The calibration was performed using force proving devices and / or masses which meet the requirements of BS EN ISO 7500-1 and equipment which is calibrated in accordance with BS EN ISO 376:2011
The machine complied with the requirements of the standard for the following ranges and classifications with regard to the relative error, repeatability, resolution and zero return to which table 2 of the standard refers:

Range	Mode	Display	Status	Classification of range(s)
1500kN	Compression	Display 1	As found	1500kN Class 1 down to 30kN

Detailed tabulated results are shown on the following pages.

Calibrated by: Micah Sizen

Certified by:

Dr N S Wrigley

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY: ZwickRoell Ltd.
UKAS ACCREDITED CALIBRATION LABORATORY 0167
CERTIFICATE NUMBER: 2409-3630
DATE OF ISSUE: 17 September 2024

Page 2 of 3 Pages

The following traceable force proving equipment was used for the calibration:

Description	Capacity	Class	Serial Number	Certificate Number	Date Calibrated
DC Ratio meter	N/A	N/A	283717	2024020399-1	20 March 2024
Load Cell	600kN	0.5	600/4U	2022080289-1	07 September 2022
Load Cell	3000kN	1.0	3000/7C	2023030163-1	30 June 2023

With reference to clause 6 of BS EN ISO 7500-1 the proving equipment used have been calibrated to BS EN ISO 376 and the class of the proving device(s) was equal to or exceeded the class to which the machine has been verified.

The expiry date of the certificates of calibration for the elastic proving devices used is 26 months and for masses 5 years from the dates given above.

Where masses are used, the value for gravity (g) used to calculate the forces exerted by the masses was 9.815m/s^2

When using elastic proving devices the constant indicated force method was used to effect the verification. When masses are used the constant true force method was used to effect the verification. Three verification runs were made on each range

The ZwickRoell Calibration Laboratory is accredited by UKAS to BS EN ISO/IEC 17025 (General requirements for the competence of testing and calibration laboratories) to perform the calibration which is reported on this certificate.

Prior to verification the machine was inspected for good working order and was found to satisfy the guidelines given in section 5 of BS EN ISO 7500-1

The calculation of the accuracy and repeatability errors and the classification of the testing machines performance was made in accordance with the method specified in BS EN ISO 7500-1:2018

Where there are adjacent results at the same force increment, these are at the overlap point from the two proving devices used.

The results only relate to the item calibrated, described above.

The decision rule of the classification does not take into account the uncertainty as described in Section 7 of BS EN ISO 7500-1

The machine has two work areas with a common force application and indicating device, therefore compression in one work area equals tension in the other work area and vice versa.

The following settings were made in accordance with the manufacturers instructions.

Range	Coefficient values	A	A1	A2	A3
1500kN		0.19162765	961.676613	2.04168965	-0.11559937

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. The uncertainty stated above refer to values obtained during calibration and make no allowances for factors such as long term drift, and alignment effects, the influences of these factors should be taken into account by the user.

CERTIFICATE OF CALIBRATION

ISSUED BY: ZwickRoell Ltd.
UKAS ACCREDITED CALIBRATION LABORATORY 0167
CERTIFICATE NUMBER: 2409-3630
DATE OF ISSUE: 17 September 2024

Page 3 of 3 Pages

Results:

Range 1 1500kN Compression Display 1		Shunt Cal 1692.02kNkN
These results are:		As found - no adjustments were made
Nominal Force	Relative Error	Relative Uncertainty
kN	%	%
30.00	-0.13	0.51
60.00	-0.13	0.29
75.00	-0.19	0.25
150.00	-0.30	0.27
300.00	-0.18	0.25
300.00	-0.03	0.48
450.00	0.00	0.48
600.00	0.03	0.48
750.00	0.05	0.48
900.00	0.08	0.48
1050.00	0.12	0.48
1200.00	0.16	0.48
1350.00	0.15	0.48
1500.00	0.12	0.48

End of Certificate

In the result table(s) above a negative relative error indicates that the machine indicator lags the true applied force.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. The uncertainty stated above refer to values obtained during calibration and make no allowances for factors such as long term drift, and alignment effects, the influences of these factors should be taken into account by the user.