CERTIFICATE OF CALIBRATION

ISSUED BY R & H TESTING SERVICES LTD

DATE OF ISSUE 24 January 2022 CERTIFICATE NUMBER 40955

UKAS CALIBRATION 0252

R & H TESTING SERVICES LTD

UNIT 7, CANNEL ROAD
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APPROVED SIGNATORY:
R. J. CHAMBERLAIN ☐
D. I. PEMBERTON ☐
M. J. WILSON ☐
SIGNATURE: .....

Issued to: B D Marine Ltd
Crosshouse Road
Southampton, SO14 5GZ

Description: Avery Universal Testing Machine having five ranges in Compression

Associated Equipment: TR200 Transducer Readout S/N BDM 2

0 to 160Tonnef in scale intervals of	0.1Tonnef
0 to 100Tonnef in scale intervals of	0.2Tonnef
0 to 50Tonnef in scale intervals of	0.1Tonnef
0 to 20Tonnef in scale intervals of	0.05Tonnef
0 to 10Tonnef in scale intervals of	0.02Tonnef

Location: Laboratory Machine Type: 7104 Serial No: E69103

Date of Verification: 11 January 2022 Year of Manufacture: 1969

The above testing machine has been verified in Compression, for increasing forces only, to BS EN ISO 7500-1: 2018 using verification equipment calibrated to BS EN ISO 376: 2011.

The machine complied with the requirements of the Standard for the following classification and ranges:

160Tonnef range:	Class 1	Compression	160Tonnef down to 32Tonnef
100Tonnef range:	Class 1	Compression	100Tonnef down to 22Tonnef
50Tonnef range:	Class 1	Compression	50Tonnef down to 10Tonnef
20Tonnef range:	Class 1	Compression	20Tonnef down to 2Tonnef
10Tonnef range:	Class 1	Compression	10Tonnef down to 6Tonnef
10Tonnef range:	Class 3	Compression	10Tonnef down to 2Tonnef

Decision Rule – 'Simple Acceptance' is used. Uncertainties are given in the results as per the standard BSEN ISO 7500-1:2018 Annex C. Conformity has to be within tolerance limits given in the standard.

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.

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UKAS ACCREDITED CALIBRATION LABORATORY No 0252

CERTIFICATE NUMBER
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Results as found, no adjustments made.

NOTE BS-EN-ISO 7500-1:2018 6.4.1 NOTE

Where a machine has two work areas i.e. Tension and Compression and the loading of these is always in the same direction as is the case in this machine.

Calibration in Compression was carried out and the results are listed. Calibration in Tension can also be assumed to be correct.

Verification equipment: The class of the verification equipment was equal to or better than the class to which the testing machine has been verified.

3000kN Load Cell 153, Certificate No. 0478-2021080150-1-2 dated 23 September 2021

500kN Load Cell 1464, Certificate No. 0054-04410 dated 5 July 2021

The above load cells were used with digital voltmeter number 16-5112.

Method: The constant indicated force method was used, five readings were taken on each range except 50Tonnef range where six readings were taken.

Three series of measurements were taken.

The start temperature at the time of verification was 15.1°C and at the finish it was 14.5°C.

The testing machine satisfied the requirements of BS EN ISO 7500-1: 2018 in respect to the relative error of accuracy, repeatability, zero and resolution (see Table 2 of the specification).

NOTE: CLAUSE 9 OF BS EN ISO 7500-1: 2018 STATES THAT "THE TIME BETWEEN TWO VERIFICATIONS DEPENDS ON THE TYPE OF TESTING MACHINE, THE STANDARD OF MAINTENANCE AND THE AMOUNT OF USE. UNLESS OTHERWISE SPECIFIED, IT IS RECOMMENDED THAT THE VERIFICATION BE CARRIED OUT AT INTERVALS NOT EXCEEDING 12 MONTHS".

The machine shall in any case be verified if it is moved to a new location necessitating dismantling or if it is subject to major repairs or adjustments.

The previous certificate of calibration reference 39627 was issued on 18 January 2021.

Machine has been calibrated to Procedure PD21 by engineer Mr Tim Reade.

CERTIFICATE OF CALIBRATION

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UKAS ACCREDITED CALIBRATION LABORATORY No 0252

CERTIFICATE NUMBER
40955

BS EN ISO 7500-1:2018

Avery 7104 S/N E69103 TR200 Transducer S/N BDM2				
Range Details	Applied Force	True Force	Mean Error %	Uncertainty %
Compression	0	0.00		
160tonnef	32	32.27	-0.85	0.42
x 0.1tonnef	64	64.59	-0.92	0.36
r = 0.1	96	96.87	-0.90	0.34
	128	129.19	-0.93	0.34
	160	161.49	-0.93	0.34
Compression	0	0.00		
100tonnef	22	22.11	-0.48	0.37
x 0.2tonnef	42	42.17	-0.40	0.35
r = 0.05	60	60.14	-0.23	0.34
	80	80.16	-0.20	0.34
	100	100.19	-0.19	0.35

Results as found no adjustments made

NOTE

The uncertainties stated above refer to values obtained during verification and make no allowances for factors such as long term drift, temperature and alignment effects - the influences of such factors should be taken into account by the long term user.

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.

CERTIFICATE OF CALIBRATION

R & H TESTING SERVICES LTD

UKAS ACCREDITED CALIBRATION LABORATORY No 0252

CERTIFICATE NUMBER
40955

BS EN ISO 7500-1:2018

Avery 7104 S/N E69103 TR200 Transducer S/N BDM2				
Range Details	Applied Force	True Force	Mean Error %	Uncertainty %
Compression	0	0.00		
50tonnef	10	10.10	-0.99	0.29
x 0.1tonnef	20	20.13	-0.64	0.23
r = 0.02	30	30.14	-0.46	0.22
	40	40.07	-0.18	0.23
	50	50.08	-0.16	0.24
	0	0.00		
Compression	2	2.02	-0.89	0.46
20tonnef	4	4.03	-0.80	0.26
x 0.05 tonnef	8	8.04	-0.51	0.22
r = 0.01	12	12.04	-0.32	0.22
	16	16.01	-0.09	0.21
Lloyds	20	20.01	-0.06	0.33
Witness R4				

Results as found no adjustments made

NOTE

The uncertainties stated above refer to values obtained during verification and make no allowances for factors such as long term drift, temperature and alignment effects - the influences of such factors should be taken into account by the long term user.

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.

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R & H TESTING SERVICES LTD

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CERTIFICATE NUMBER
40955

BS EN ISO 7500-1:2018

Avery 7104 S/N E69103
TR200 Transducer S/N BDM2

Range Details	Applied Force	True Force	Mean Error %	Uncertainty %
Compression	0	0.00		
10tonnef	2	2.06	-2.79	0.48
x 0.02tonnef	4	4.09	-2.17	0.49
r = 0.004	6	6.08	-1.35	0.31
	8	8.07	-0.94	0.27
	10	10.09	-0.88	0.23

Results as found no adjustments made

NOTE

The uncertainties stated above refer to values obtained during verification and make no allowances for factors such as long term drift, temperature and alignment effects - the influences of such factors should be taken into account by the long term user.

End of Certificate

This certificate relates to the items calibrated. Any k value different from that in the footer supersedes that in said footer.

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.

CERTIFICATE OF CALIBRATION

ISSUED BY R & H TESTING SERVICES LTD

DATE OF ISSUE 24 January 2022 CERTIFICATE NUMBER 40954

UKAS CALIBRATION
0252

R & H TESTING SERVICES LTD

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M. J. WILSON ☐

SIGNATURE: .....

Issued to: B D Marine Ltd
BDM House
Crosshouse Road
Southampton
SO14 5GZ

Description: Load Frame 300Tonnes having one range in Tension only

Associated Equipment: Digital Display S/N 6448

0 to 300Tonnef in digital increments of 0.02Tonnef

Location: Site

Serial No: 6448

Date of Verification: 12 January 2022

Year of Manufacture: Not Known

The above testing machine has been verified in Tension, for increasing forces only, to BS EN ISO 7500-1: 2018 using verification equipment calibrated to BS EN ISO 376: 2011.

The machine complied with the requirements of the Standard for the following classification and range:

280Tonnef range: Class 1 Tension only 280Tonnef down to 40Tonnef

Decision Rule – 'Simple Acceptance' is used. Uncertainties are given in the results as per the standard BSEN ISO 7500-1:2018 Annex C. Conformity has to be within tolerance limits given in the standard.

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.

CERTIFICATE OF CALIBRATION

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UKAS ACCREDITED CALIBRATION LABORATORY No 0252

CERTIFICATE NUMBER
40954

To achieve correct load, test beams must be horizontal @ zero indicated.

Verification equipment:

The class of the verification equipment was equal to or better than the class to which the testing machine has been verified.

3000kN Load Cell 3000/3U, Certificate No. 0478-2021080204-1-2 dated 1 October 2021

The above load cell was used with digital voltmeter number 223071.

NOTE: The expiry date of each of the above certificates of calibration is 24 months from the above given dates.

Method:

The constant indicated force method was used, seven readings were taken on each range.

Three series of measurements were taken.

The start temperature at the time of verification was 7.6°C and at the finish it was 6.9°C.

The testing machine satisfied the requirements of BS EN ISO 7500-1: 2018 in respect to the relative error of accuracy, repeatability, zero and resolution (see Table 2 of the specification).

NOTE: CLAUSE 9 OF BS EN ISO 7500-1: 2018 STATES THAT "THE TIME BETWEEN TWO VERIFICATIONS DEPENDS ON THE TYPE OF TESTING MACHINE, THE STANDARD OF MAINTENANCE AND THE AMOUNT OF USE. UNLESS OTHERWISE SPECIFIED, IT IS RECOMMENDED THAT THE VERIFICATION BE CARRIED OUT AT INTERVALS NOT EXCEEDING 12 MONTHS".

The machine shall in any case be verified if it is moved to a new location necessitating dismantling or if it is subject to major repairs or adjustments.

The previous certificate of calibration reference 40028 was issued on the 30 April 2021.

Machine has been calibrated to Procedure PD21 by engineer Mr Tim Reade.

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UKAS ACCREDITED CALIBRATION LABORATORY No 0252

CERTIFICATE NUMBER
40954

BS EN ISO 7500-1:2018

300Tonne Load Frame S/N 6448 London Electrics Digital Display S/N 6448				
Range Details	Applied Force	True Force	Mean Error %	Uncertainty %
Tension	0	0.00		
300tonnef	40	40.18	-0.45	0.74
x 0.02tonnef	80	79.69	0.38	0.67
r = 0.02	120	119.79	0.18	0.79
	160	159.80	0.12	0.79
	200	199.93	0.04	0.86
	240	239.90	0.04	0.65
	280	279.60	0.14	0.56

Results as found no adjustments made

NOTE

The uncertainties stated above refer to values obtained during verification and make no allowances for factors such as long term drift, temperature and alignment effects - the influences of such factors should be taken into account by the long term user.

End of Certificate

This certificate relates to the items calibrated. Any k value different from that in the footer supersedes that in said footer.

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.