

MERIDIAN ANALYTICAL LABORATORIES

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TEST REPORT

Mechanical and Dimensional Testing of Anchor Bolt Fasteners

Report Number:	MAL-2026-04471
Certificate Number:	NNLAS-2024-0356-R117
Date of Issue:	03 August 2026
Client:	Vertex Components Ltd
Client Address:	Unit 8, Calder Business Park, Halsworth, HX3 2LM
Client Reference:	PO-VC-88213, Attn. Daniel Whitfield, Procurement Quality Lead
Date Received:	21 July 2026
Date(s) of Testing:	24–28 July 2026
Total Pages:	This report comprises 5 pages, including all appendices

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1 Scope and Sample Identification

1.1 Scope of Work

Meridian Analytical Laboratories was instructed by Vertex Components Ltd to perform mechanical and dimensional verification testing on a batch of hot-dip galvanised anchor bolts intended for structural steelwork fixings. Testing was carried out under the laboratory's scope of accreditation to ISO/IEC 17025:2017 [1], granted by the Nimbus National Laboratory Accreditation Service (accreditation number NNLAS-2024-0356), which covers mechanical testing of metallic fasteners in accordance with ASTM F1554 [2], ASTM A370 [3] and ISO 898-1 [4].

1.2 Sample Description

The samples were received intact, individually bagged and labelled, with no visible damage recorded on receipt. Chain-of-custody form CoC-2026-3381 was completed and retained on file.

Sample Description:	Hex-head anchor bolts, hot-dip galvanised carbon steel
Nominal Designation:	ASTM F1554 Grade 36, M20 × 300 mm
Batch / Lot Number:	VC-LOT-22071
Quantity Submitted:	12 units (3 selected for destructive testing)
Condition on Receipt:	Satisfactory, no visible corrosion or deformation
Sample Retention:	Tested specimens retained 90 days per QP-014; untested units returned to client

Purpose of Testing

To verify that the submitted batch of anchor bolts conforms to the mechanical property requirements of ASTM F1554 Grade 36 and the dimensional tolerances specified in the client purchase order, in support of structural steelwork acceptance at the client’s Halsworth facility.

2 Test Methods and Equipment

2.1 Methods Applied

All tests were performed using accredited methods, listed below alongside the equipment used. Full method deviations, if any, are recorded in Section 5.

Test	Standard Method	Equipment (ID)	Accredited
Tensile properties	ASTM A370 [3], ISO 6892-1 [5]	Universal Testing Machine UTM-03	✓
Yield / tensile strength grading	ASTM F1554 [2]	Universal Testing Machine UTM-03	✓
Rockwell hardness	ASTM E18 [6]	Hardness Tester HT-07	✓
Thread and diameter check	ISO 898-1 [4]	Digital Micrometer DM-11, Thread Gauge TG-04	✓

2.2 Test Procedure Summary

- Tensile test:** Three specimens (SB-01, SB-02, SB-03) were machined to full-size bolt configuration and pulled to fracture at a controlled strain rate of 5 mm/min in accordance with ASTM A370 Annex A. Yield strength was determined using the 0.2% offset method; elongation was measured over a 50 mm gauge length after fracture.
- Hardness test:** Rockwell C hardness was measured at three locations on the bolt shank per ASTM E18, using a diamond indenter under a 150 kgf major load.
- Dimensional check:** Major diameter, minor diameter and thread pitch were verified against ISO 898-1 tolerance tables using calibrated micrometers and thread ring/plug gauges.

2.3 Environmental Conditions

Parameter	Recorded Value	Method Requirement
Ambient temperature	22.4°C ± 1.1°C	18°C – 28°C
Relative humidity	45% ± 5%	30% – 70%
Testing machine warm-up period	20 minutes	≥ 15 minutes

Recorded Deviation

Specimen SB-02 required re-clamping after minor grip slippage was observed during the initial loading ramp (<2% of yield load). The specimen was unloaded, re-aligned, and the test repeated in full. This deviation is logged under non-conformance record QF-114 and does not affect the validity of the reported results.

3 Test Results

3.1 Mechanical Test Results

Results are reported with expanded uncertainty at a coverage factor $k = 2$, corresponding to an approximate 95% confidence level. See Section 4 for the uncertainty budget.

Specimen ID	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Verdict
SB-01	512 ± 9	651 ± 11	19.2 ± 0.6	Pass
SB-02	498 ± 9	639 ± 11	18.6 ± 0.6	Pass
SB-03	521 ± 9	658 ± 11	19.5 ± 0.6	Pass
Specification (ASTM F1554 Gr. 36)	≥ 248	≥ 400	≥ 18	—

3.2 Hardness and Dimensional Results

Specimen ID	Hardness (HRC)	Thread Pitch (mm)	Major Diameter (mm)	Verdict
SB-01	22.4 ± 0.8	2.50 ± 0.02	19.94 ± 0.03	Pass
SB-02	21.9 ± 0.8	2.50 ± 0.02	19.96 ± 0.03	Pass
SB-03	23.1 ± 0.8	2.51 ± 0.02	19.92 ± 0.03	Pass
Specification (ISO 898-1)	≤ 34	2.50 nominal	19.85 – 20.00	—

Overall Result

All three specimens submitted for destructive and dimensional testing met the mechanical property and dimensional requirements of ASTM F1554 Grade 36 and ISO 898-1. No non-conforming results were recorded.

4 Measurement Uncertainty

4.1 Uncertainty Evaluation Method

Measurement uncertainty was evaluated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM) [7] and clause 7.6 of ISO/IEC 17025:2017 [1]. Type A contributions were derived from repeated measurements on reference specimens; Type B contributions were derived from calibration certificates, manufacturer specifications and resolution limits.

4.2 Uncertainty Budget — Tensile Strength

Source of Uncertainty	Type	Distribution	Std. Unc. (MPa)	Contribution (MPa)
Load cell calibration	B	Normal	3.2	3.2
Repeatability (specimen alignment)	A	Normal	2.8	2.8
Cross-sectional area measurement	B	Rectangular	1.9	1.1
Testing machine resolution	B	Rectangular	0.6	0.3
Temperature effect on gauge	B	Rectangular	0.4	0.2
Combined standard uncertainty (u_c)				4.4
Expanded uncertainty ($k = 2, \approx 95\%$)				8.8

Statement of Conformity and Decision Rule

Conformity to the specified requirements was assessed using a simple (shared-risk) acceptance rule with a guard band factor of $w = 0$, as permitted under ILAC-G8:09/2019 [8] and agreed with the client in purchase order PO-VC-88213. Reported results are compared directly against the specification limits without additional guard-banding. Where the measurement uncertainty causes a result to fall within the guard band of a specification limit, this is flagged explicitly in Section 3; no such cases arose in this report.

5 Authorisation

5.1 Opinions and Interpretations

No opinions or interpretations relating to the fitness of the tested batch for a particular structural application are expressed in this report, in accordance with clause 7.8.3 of ISO/IEC 17025:2017 [1]. Fitness-for-purpose determinations remain the responsibility of the client’s designated engineer.

5.2 Authorised Signatory Panel

This report has been reviewed and approved for release by the following authorised personnel.

Dr. Amara Osei Technical Manager	Rohan Kapadia Quality Manager	Elena Marchetti Authorised Signatory
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End of Report

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6 Appendix: Equipment Calibration Status

All equipment used in this test was within its calibration validity period at the time of testing, traceable to national measurement standards.

Equipment ID	Description	Calibration Due	Certificate No.
UTM-03	Universal Testing Machine, 600 kN capacity	14 Feb 2027	CAL-2026-1187
HT-07	Rockwell Hardness Tester	02 May 2027	CAL-2026-0954
DM-11	Digital Micrometer, 0–25 mm	19 Sep 2026	CAL-2026-0731
TG-04	Thread Ring / Plug Gauge Set, M20	30 Nov 2026	CAL-2026-0812

References

[1] International Organization for Standardization. ISO/IEC 17025:2017 – general requirements for the competence of testing and calibration laboratories. Technical report, ISO/IEC, Geneva, Switzerland, 2017.

[2] ASTM International. ASTM F1554-20 – standard specification for anchor bolts, steel, 36, 55, and 105-ksi yield strength. Technical report, ASTM International, West Conshohocken, PA, 2020.

[3] ASTM International. ASTM A370-21 – standard test methods and definitions for mechanical testing of steel products. Technical report, ASTM International, West Conshohocken, PA, 2021.

[4] International Organization for Standardization. ISO 898-1:2013 – mechanical properties of fasteners made of carbon steel and alloy steel – part 1: Bolts, screws and studs with specified property classes. Technical report, ISO, Geneva, Switzerland, 2013.

[5] International Organization for Standardization. ISO 6892-1:2019 – metallic materials – tensile testing – part 1: Method of test at room temperature. Technical report, ISO, Geneva, Switzerland, 2019.

[6] ASTM International. ASTM E18-22 – standard test methods for rockwell hardness of metallic materials. Technical report, ASTM International, West Conshohocken, PA, 2022.

[7] Joint Committee for Guides in Metrology. JCGM 100:2008 – evaluation of measurement data – guide to the expression of uncertainty in measurement. Technical report, BIPM, Sèvres, France, 2008.

[8] International Laboratory Accreditation Cooperation. ILAC-G8:09/2019 – guidelines on decision rules and statements of conformity. Technical report, ILAC, 2019.