

# TENSILE LOAD TESTING OF 10 MM DURABAR GFRP BARS



## Technical Report For DEXTRA BUILDING PRODUCTS (GUANDONG) Co. LTD.

REPORT NO: 22-1017-A

REPORT DATE: 28/10/2022

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**MELBOURNE TESTING SERVICES Pty Ltd**  
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*In Confidence to the Client:*

**DEXTRA BUILDING PRODUCTS (GUANDONG) CO. LTD.**

Attention: Tina Huang

No. 54 Xinyao Bei Road, Xintang Town,

Zengcheng District, Guangzhou 511340

China

**TENSILE LOAD TESTING OF 10 MM DURABAR GFRP BARS**

Date of Testing: 18 October 2022

**TEST SYNOPSIS:**

A consignment of Glass Fibre-Reinforced Polymer (GFRP) bars was delivered to the Melbourne Testing Services (MTS) NATA accredited laboratory for testing and analysis (see Fig. 1).

At the request of the client, the 10 mm GFRP bars were to be tested for determination of tensile load and strength characteristics in accordance with the principles of the American Concrete Institute ACI 440.3R-12 GUIDE TEST METHODS FOR FIBRE-REINFORCED POLYMER (FRP) COMPOSITES FOR REINFORCING OR STRENGTHENING CONCRETE AND MASONRY STRUCTURES and ASTM D7205 / D7205 M-06 STANDARD TEST METHOD FOR TENSILE PROPERTIES OF FIBRE REINFORCED POLYMER MATRIX COMPOSITE BARS.



**FIG. 1  
TEST SAMPLES**

Prior to testing and in conjunction with the client, the test items were inspected and identified as follows:

<b>Material Type:</b>	<i>Glass Fibre-Reinforced Polymer (GFRP)</i>
<b>GFRP Bar Type.:</b>	<i>'Durabar-DIY GFRP Rebar'</i>
<b>GFRP Bar Profile:</b>	<i>Solid Bar</i>
<b>Markings:</b>	<i>None</i>
<b>Bar Designation No.:</b>	<i>10 mm</i>
<b>Nominal Dimensions:</b>	<i>9.5 mm Nominal Diameter; 71 mm<sup>2</sup> Nominal Cross Sectional Area</i>

**TEST PROCEDURE:**

The samples were pre-prepared with grip ends bonded using cylindrical steel sleeves and high strength adhesive by the client and delivered in a condition ready to test. Upon arrival at MTS, the GFRP samples were stored in a laboratory environment at a nominal temperature of 23 °C ( $\pm 3^{\circ}\text{C}$ ) and 50% ( $\pm 10\%$ ) relative humidity. A total of five (5) samples were delivered for testing.

In accordance with ASTM D7205/D7205M-06 Clause 7.4.1, extensometer gauge marks were applied to the test bars to provide a gauge length ( $L_e$ ) of 300 mm ( $>8D_{b,nom}$ ). The test pieces were then gripped in a calibrated universal testing machine and loaded in tension until the peak load was achieved and tensile rupture of the bar was observed. The applied test force and corresponding tensile strain over the gauge length was recorded automatically throughout the tests.

**TEST RESULTS:**

Tensile test results, including stress vs strain curves, are provided in Figure 2.



# Bar Tensile Test Report

Client:

**Report No:** 22-1017-A  
**Report Date:** 27-Oct-22  
**Specimen Description:** 10mm GFRP Bars

Dextra Building Products (Guangdong) Co. Ltd.  
 No. 54 Xinyao Bei Road, Xintang Town  
 Zengcheng District, Guangzhou 511340 China

## TEST DETAILS

Test Date:	18/10/2022	1	2	3	4	5
Extensometer Gauge Length:	$L_e$ (mm)	300	300	300	300	300

## SPECIMEN DETAILS

Outer Diameter	$OD$ (mm)	11.5	11.5	11.5	11.5	11.5
Nominal Diameter:	$d$ (mm)	9.5	9.5	9.5	9.5	9.5
Nominal Area:	$A$ (mm <sup>2</sup> )	71	71	71	71	71
Parallel Length:	$L$ (mm)	500	500	500	500	500

## TENSILE PROPERTIES

Ultimate Tensile Strength	$F_{tu}$ (MPa)	1093	1000	1072	991	1051
Tensile Capacity	$P_{max}$ (kN)	77.6	71.0	76.1	70.4	74.6
Ultimate Tensile Strain	$\epsilon_u$ (%)	2.21	2.03	2.19	2.02	2.15
Tensile Modulus of Elasticity	$E_{chord}$ (GPa)	52.0	50.0	50.2	50.7	48.7

## Test Comments:

Tested in accordance with  
 ACI 440.3R-12 and  
 ASTM D7205/D7205M-06.

Samples were provided by the  
 client in a condition ready to test.

Stress calculated using the  
 Nominal Area ( $A$ ) as provided and  
 requested by the client.

Tensile chord modulus ( $E_{chord}$ )  
 computed as per ASTM  
 D7205/D7205M-06 Clause 13.3.



CAREY ARTHURSON  
 Authorised Signatory

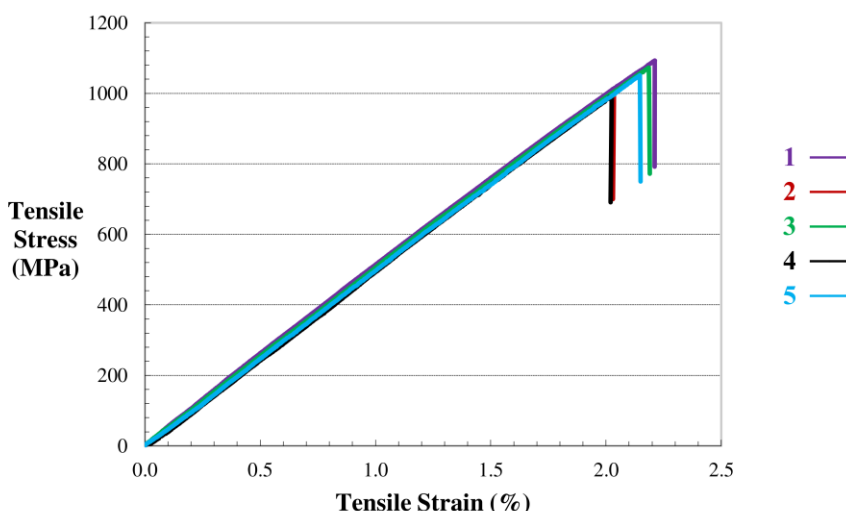
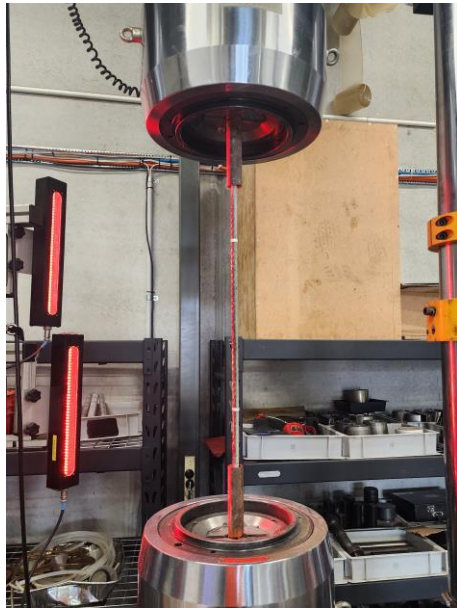


FIG. 2  
 TENSILE TEST RESULTS

**APPENDICES:**

An extract from the specification document as provided by the client is presented in Appendix A.



**FIG. 3  
TEST SET-UP**



**FIG. 4  
TESTED SAMPLE**

Notes:

- 1) Melbourne Testing Services (MTS) Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall MTS be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested.
- 2) It remains the responsibility of the client to ensure that the samples tested are representative of the entire product batch.
- 3) MTS shall take no responsibility for the procurement and authenticity of the test product as described herein.
- 4) This report is specific to the test items in their state at the time of testing. It should not be taken as a statement that all products in all states of repair, would also perform in the same manner.
- 5) MTS shall take no responsibility for the installation procedures used for the test items as described herein.
- 6) MTS shall take no responsibility for the interpretation or misinterpretation of the procedures or calculation methods as provided herein or for the appropriateness or validity of the test procedures for the test items described and reported herein.
- 7) The test results reported herein are specific and limited to the tensile properties of the delivered GFRP bars. This report makes no assessment of the compliance of the GFRP bars to any other requirements of ACI 440.3R-12 or ASTM D7205/D7205M-06 that may apply.
- 8) The number of specimens tested herein is not necessarily statistically significant. It remains the responsibility of the reader to conduct rigorous statistical analyses and employ appropriate load reduction safety factors as required.

**CAREY ARTHURSON**  
AUTHORISED SIGNATORY

**SAM SOLARI**  
TEST TECHNICIAN

APPENDIX A:



# Composite Fiberglass (GFRP) Rebar - Datasheet

Physical & Mechanical Properties							
Reference	Bar Dia.	Nominal Cross Sectional Area	Ultimate Tensile		Ultimate Tensile Strain	Modulus of Elasticity	Weight
	mm	mm <sup>2</sup>	kN	MPa	%	GPa	kg/m
Durabar-DIY	6	32	26.00	820	1.82	45	0.08
	8	45	37.00	820	1.82	45	0.11
	10	71	53.00	750	1.67	45	0.16
	13	129	87.00	685	1.52	45	0.27
	16	199	130.00	655	1.45	45	0.42
Durabar-SLIM	6	32	29.00	910	1.94	47	0.08
	8	45	41.00	910	1.94	47	0.11
	10	71	59.00	830	1.77	47	0.16
	13	129	96.00	760	1.62	47	0.27
	16	199	144.00	725	1.54	47	0.42

**FIG. A1**  
**SPECIFICATION DOCUMENT AS PROVIDED BY THE CLIENT**