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الموضـــــوع: كشف تكاليف تجارب معملية رقم ٨١٧

عمليـــــــة: إختبارات معملية على عينات GFRP

الجهة الطالبة: شركة تيرا تيك للحلول البيئية

على حســاب: شركة تيرا تيك للحلول البيئية

البطاقة الضريبية: ٥٧٧-١٣٠-٨٤٦

بند الخصـــم: ٧٦٠/٢/١٠٠

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١	ثالثاً-أ-٦-١	اختبار الشد حتى قطر ٢٠ مم	٩	٥٠٠,٠	٤٥٠٠,٠	

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مهندس المعمل

رئيس مركز الأبحاث
د. مهندس
(أحمد حسن أمين)

- صورة لوحدة حسابات الإدارة لإتخاذ اللازم.

Report Code: 2025/Mat./1179

Subject:	**Testing of composite fiberglass reinforcement of AKC grade of Ø10 mm, Ø12 mm, and Ø16 mm compliance with ASTM D7205-21 requirements**
Client:	**TERRA TECH Environmental Solutions L.C.C. company**

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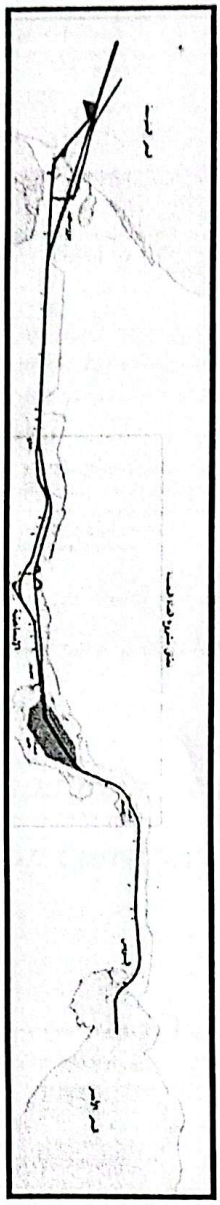

إدارة التخطيط والبحوث والدراسات
مركز الأبحاث

اختبارات معملية على عينات GFRP

(2025/Mat./1179)

نوفمبر ٢٠٢٥

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Code No. 2025/Mat./1179
Dated Nov.16, 2025

APPROVED BY
Head of Research Center
Ahmed Hassan Amin

Signature.

TEST REPORT
Glass Fiber Reinforced Polymers

Testing of composite fiberglass reinforcement of AKC grade of Ø10 mm. Ø12 mm, and Ø16 mm compliance with ASTM D7205-21 requirements

(According to ECP 208-2019)

Egyptian code for Design Principles and construction Requirements

For the use of Fiber Glass-Reinforced Polymers in construction

Prepared by: Eng. Mahmoud Mamdouh Zakaria *Signature*.

Reviewed by: Dr. Eng. Omaima Mostafa Hamed *Signature*.

Approved by: Eng. Karem Farouk Ibrahim *Signature*.

Ismailia Governorate

2025

LIST OF EXECUTORS

The Manufacturer: TERRA TECH Environmental Solutions L.C.C. company

Test Supervisor

Deputy Manager:
Eng. Karem Farouk Ibrahim

Signature.

Head of Soil Research Division:
Omaima Mostafa Hamed

Signature.

Test Executors:

Assistant Manager of Works:
Mahmoud Mamdouh Zakaria

Signature.

TABLE OF CONTENTS

INTRODUCTION

- The tests have been performed upon an order of TERRA TECH.
- Tested object: Fiberglass reinforcement of AKC grade of 10 mm, 12 mm and 16 mm diameter.
- Sample tagging – fiberglass reinforcement of AKC grade 10 mm, 12 mm and 16 mm.
- Address of the manufacturer of the tested objects: Investment Zone in Mit Ghamr
- Name of the manufacturer of the tested objects: TERRA TECH, LLC.
- Sampling reports (number, date): No. 2025/Mat./1179 dated Nov. 16, 2025.
- Test purpose: Determination of physical and mechanical characteristics of fiberglass reinforcement for compliance with the requirements of ECP 208-2019 "Composite polymer reinforcement for armoring concrete structures. General specifications".
- Physical and mechanical characteristics to be determined:
    - Nominal diameter and cross-section area
    - Strength limits at axial tension
    - Elasticity modulus
- Reference documents for testing methods:
    - ECP 208-2019 "Composite polymer reinforcement for armoring concrete structures. Methods of determining physical and mechanical characteristics"
    - ECP 208-2019 "Composite polymer reinforcement for armoring concrete structures. General specifications".

TEST RESULTS

1. DETERMINATION OF NOMINAL DIAMETER

- Sample tagging – fiberglass reinforcement of AKC 10 mm, 12 mm and 16 mm grade;
- Name of organization conducting the tests – Suez Canal Authority Research center;
- Test date – 27.10.2025;

Nominal diameter and cross-section areas of deformed composite fiberglass reinforcement of 10 mm, 12 mm and 16 mm diameter is given in table 1.

Table 1 – Nominal Diameter and Cross-section Area

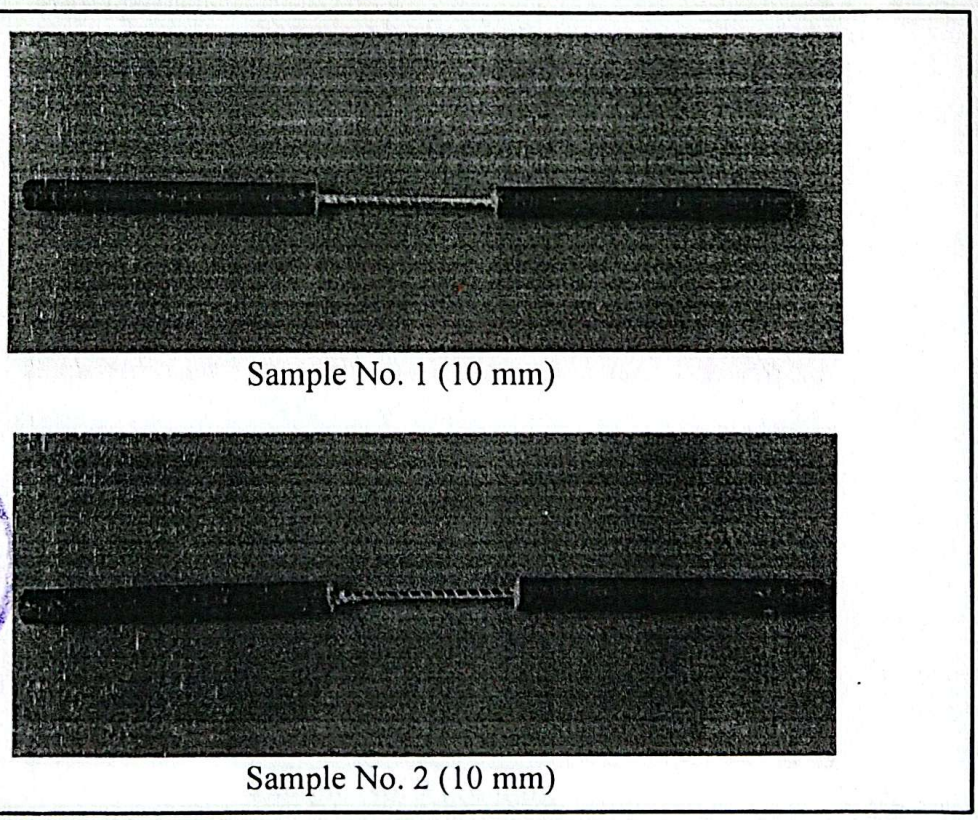
Sample No.	Sample length, mm	Nominal diameter, mm	Cross section area, mm^2	Average
1	204.1	10.04	79.20	78.99
2	204.3	10.03	79.04	
3	205.1	10.01	78.73	
4	200.2	12.02	113.52	113.52
5	205.2	12.01	113.33	
6	204.8	12.03	113.71	
7	215.1	16.01	201.39	177.10
8	205.6	16.01	201.39	
9	204.2	16.02	201.65	

II. TESTS FOR AXIAL TENSION

- Test date - 27.10.2025.
- Results of tests for axial tension of composite fiberglass reinforcement are given in table 2 and figures 1-2.

Table 2 – Strength Limit for Axial Tension of Composite Fiberglass Reinforcement

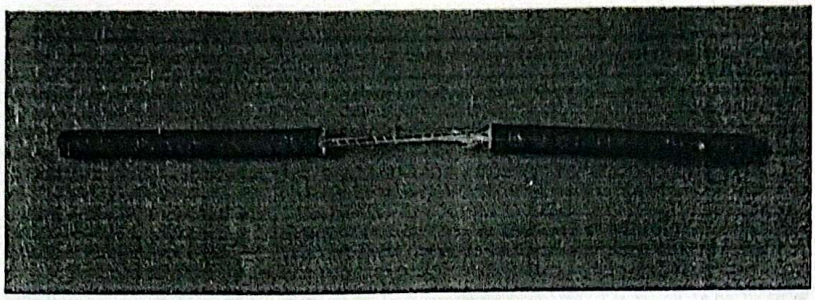
Sample No.	Nominal diameter, mm	Cross- section area, mm ^{2}	Max. load, kg f	Strength limit, MPa		Elasticity modulus, MPa		Relative extension, %	
				Single	Average	Single	Average	Single	Average
1	10.04	79.20	10996.9	1388.497	1359.941	15648	14314	14.06	13.07
2	10.03	79.04	10681.9	1351.455		13620		12.33	
3	10.01	78.73	10548.8	1339.87		13673		12.82	
4	12.02	113.52	15772.5	1389.403	1356.98	12512	9792	25.15	27.38
5	12.01	113.33	14690.6	1296.268		8794		29.13	
6	12.03	113.71	15751.9	1385.27		11070		27.86	
7	16.01	201.39	22425.0	1113.51	1156.64	6421	7071	23.08	22.33
8	16.01	201.39	24185.6	1200.93		8811		23.00	
9	16.02	201.65	23300.6	1155.50		5980		20.90	



Sample No. 1 (10 mm)

Sample No. 2 (10 mm)

Figure 1 – Composite Fiberglass Reinforcement after Tests for Axial Tension



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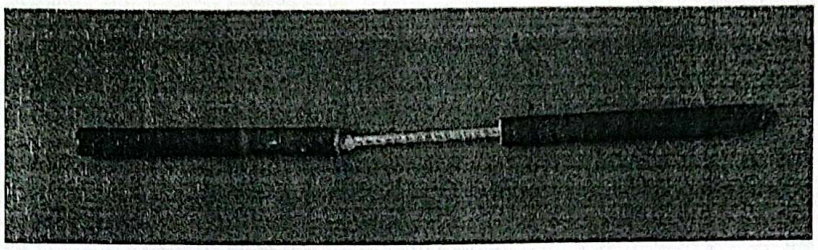
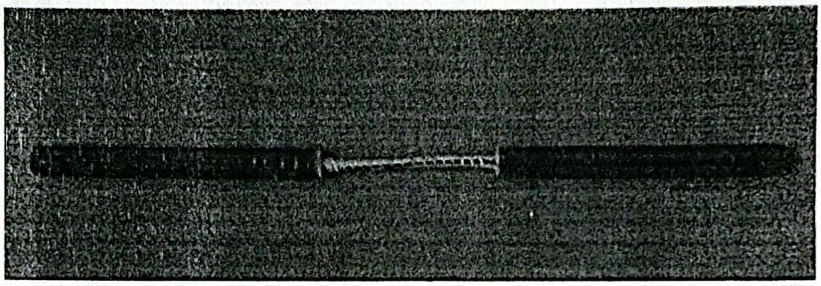
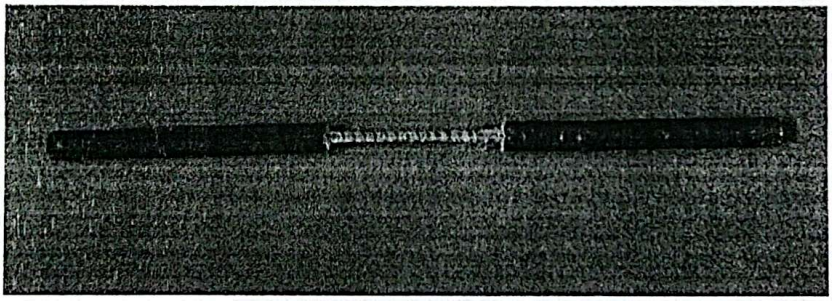


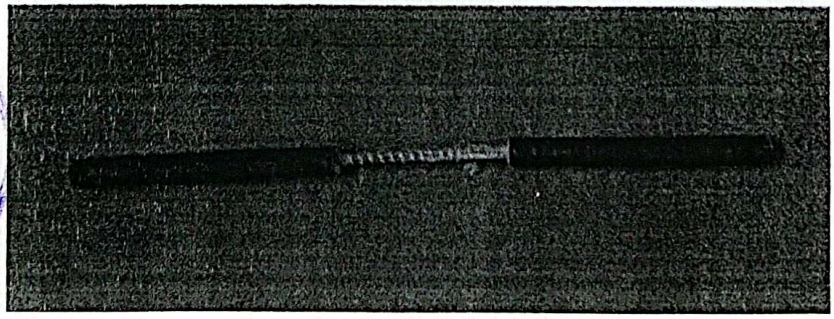
Sample No. 4 (12 mm)



Sample No. 5 (12 mm)

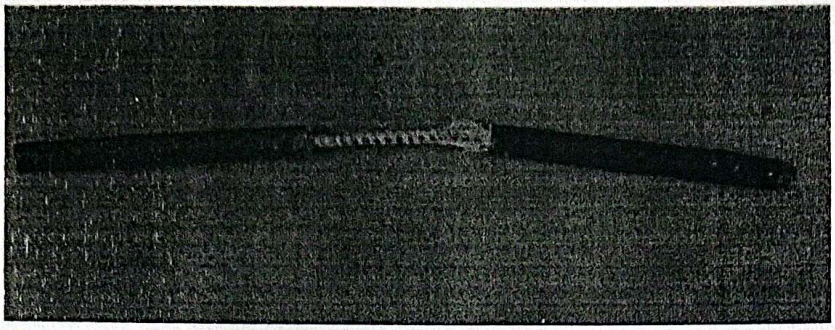


Sample No. 6 (12 mm)

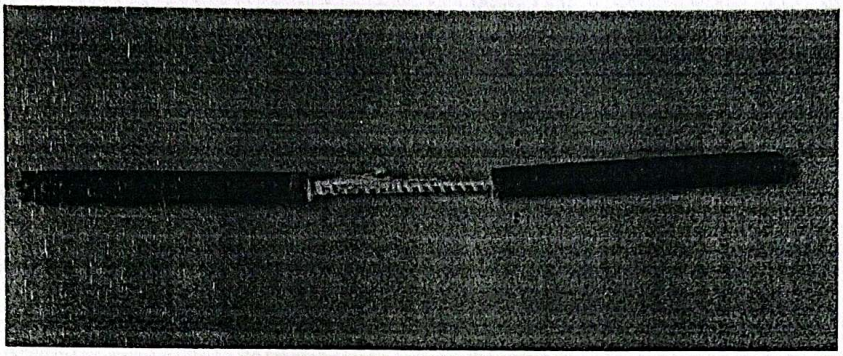


Sample No. 7 (16 mm)

Figure 1 – Composite Fiberglass Reinforcement after Tests for Axial Tension (Cont.)

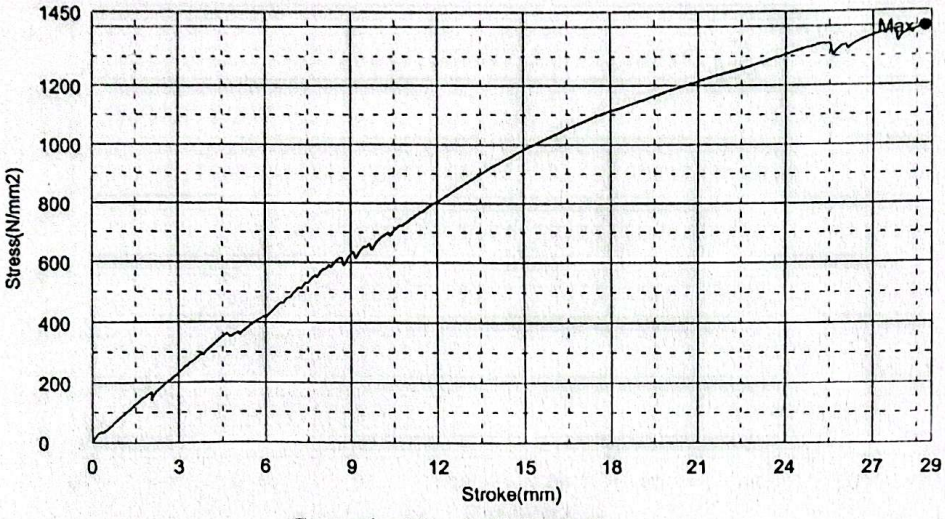


Sample No. 8 (16 mm)

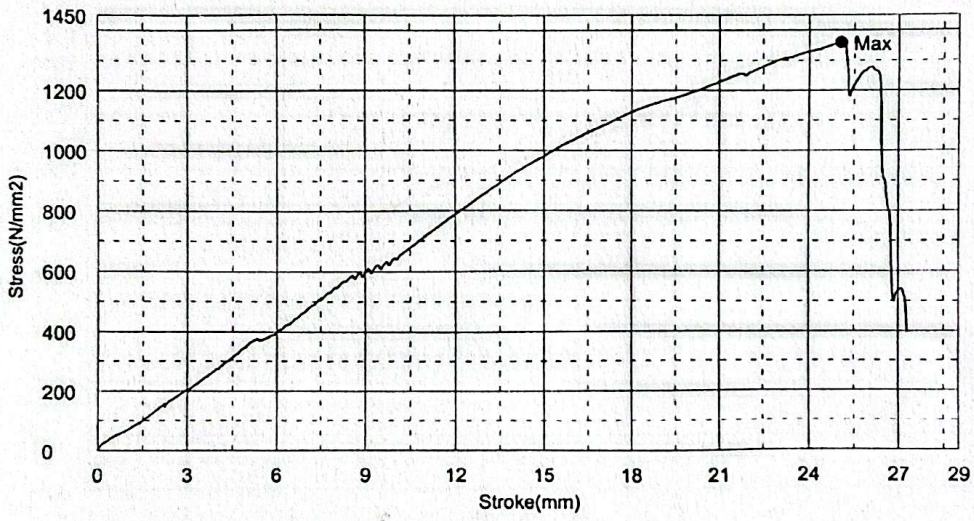


Sample No. 9 (16 mm)

Figure 1 – Composite Fiberglass Reinforcement after Tests for Axial Tension (Cont.)



Sample No. 1 (10 mm)



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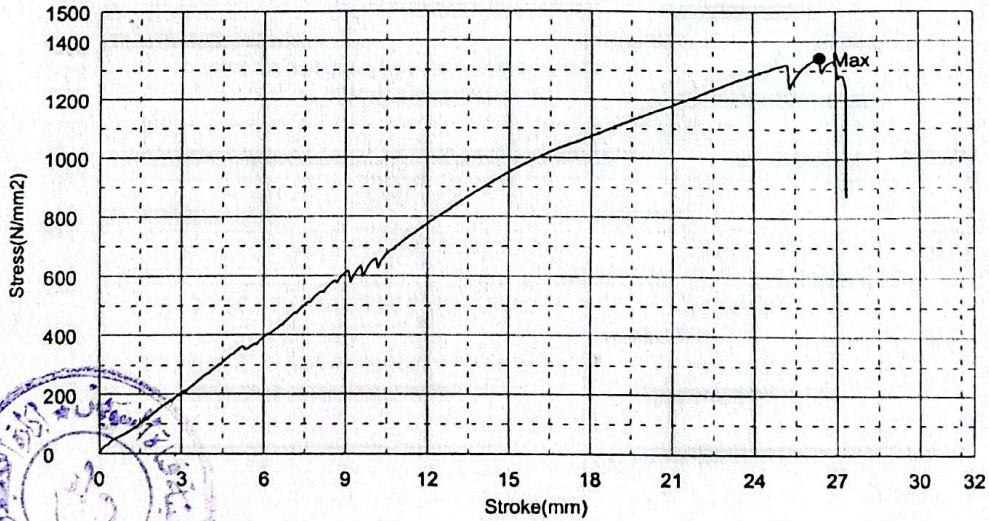
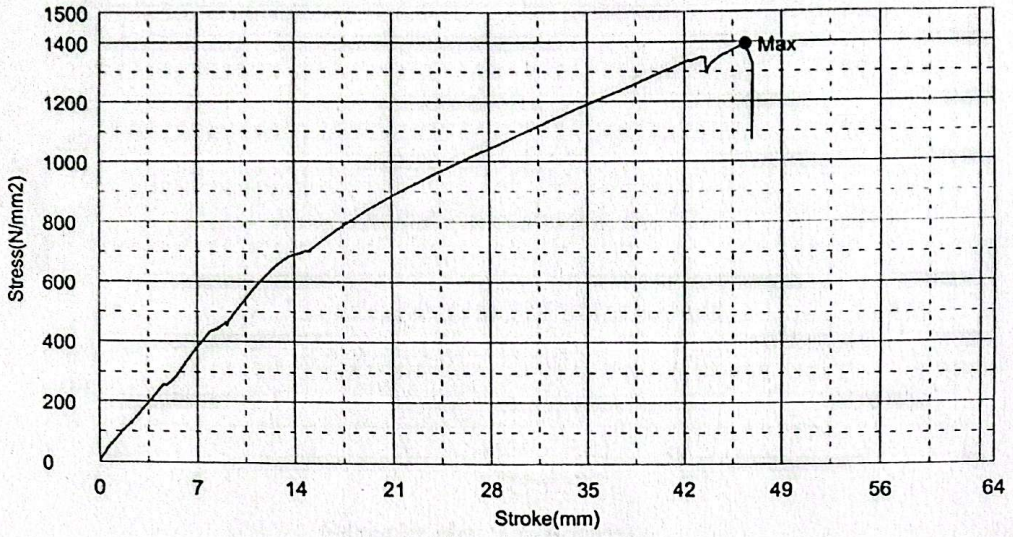


Sample No. 3 (10 mm)

Figure 2 – Course of Testing of Composite Fiberglass Reinforcement for Axial Tension



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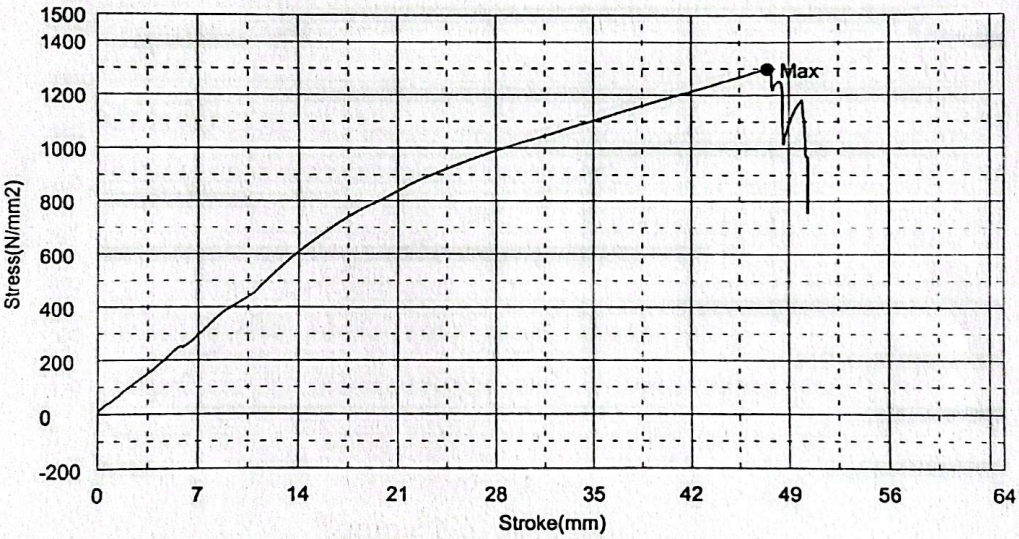

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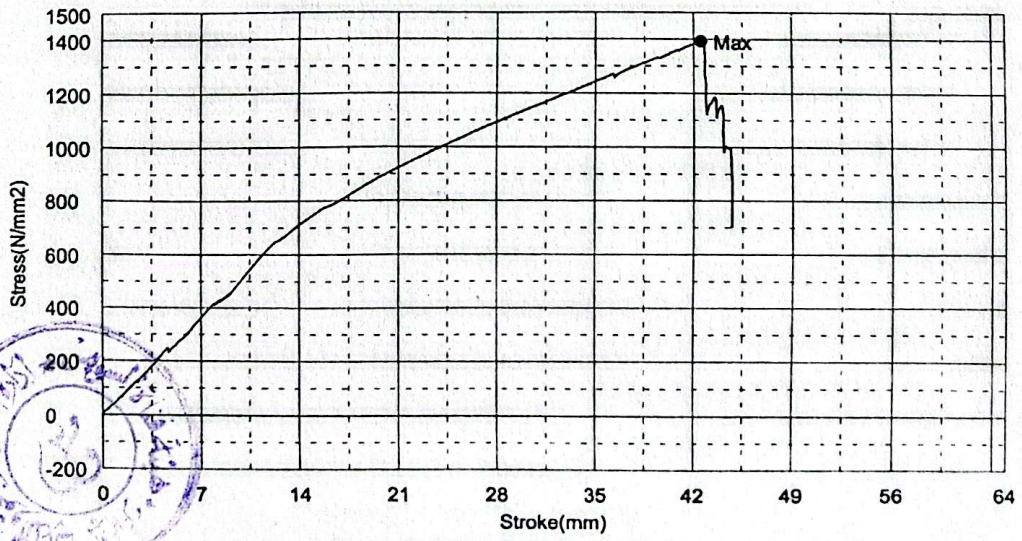
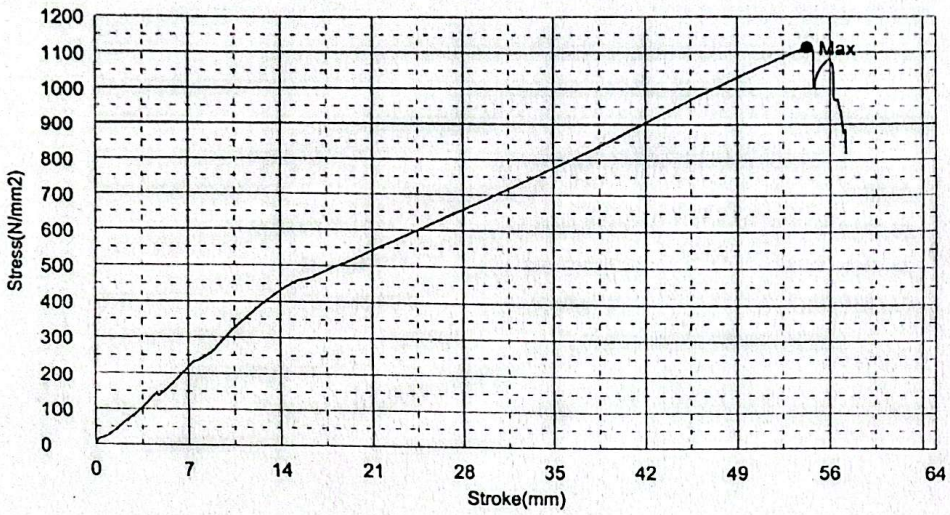


Sample No. 6 (12 mm)

Figure 2 – Course of Testing of Composite Fiberglass Reinforcement for Axial Tension (Cont.)



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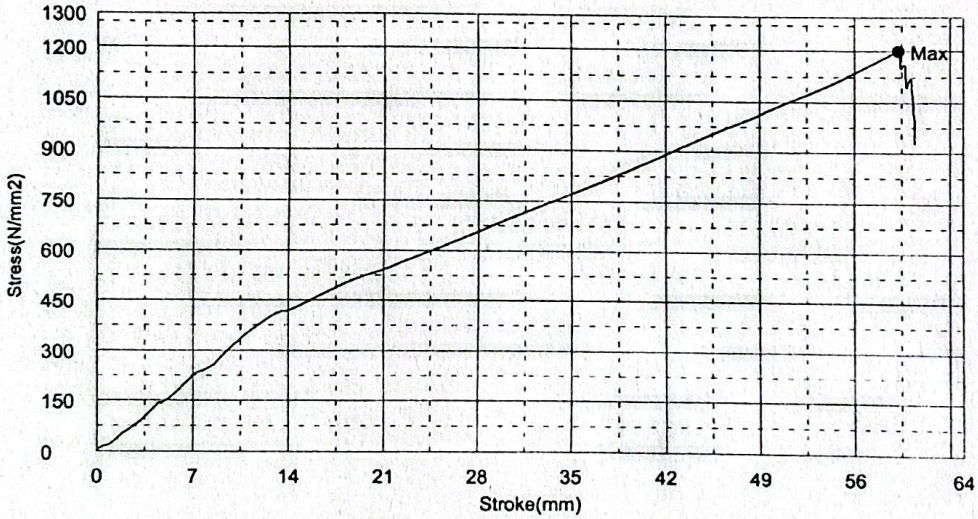

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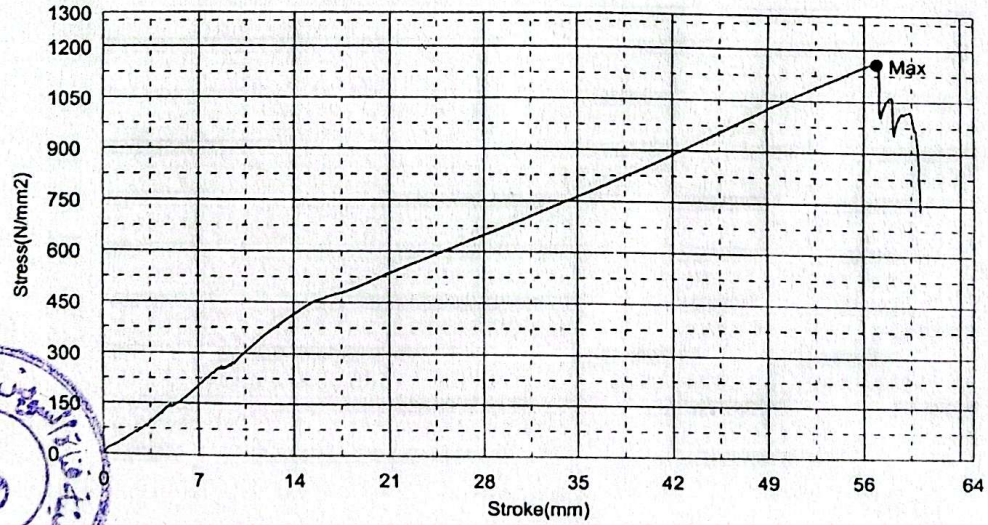

Sample No. 9 (16 mm)

Figure 2 – Course of Testing of Composite Fiberglass Reinforcement for Axial Tension (Cont.)