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## TENSILE TESTS ON POLYLITE 440-M888 REINFORCED WITH RT 300 ROVING FABRIC

R.Purcărea<sup>1</sup>, A.Stanciu

<sup>1</sup> Transilvania University, Brasov, ROMANIA, e-mail: [r.purcare@unitbv.ro](mailto:r.purcare@unitbv.ro)

<sup>1</sup> Transilvania University, Brasov, ROMANIA, e-mail: [ancastanciu77@yahoo.com](mailto:ancastanciu77@yahoo.com)

**Abstract:** The paper presents the results of tensile tests accomplished on RT300 glass fabric reinforced unsaturated polyester resin specimens.

**Keywords:** RT300 glass fabric, plain weave, polymer matrix composites, tensile tests, unsaturated polyester resin

### 1. INTRODUCTION

Generally, the strongest material in a class is usually the most difficult to test for tensile properties. Composite materials are no exception and for instance the axial loading of a unidirectional composite presents the greatest challenge.

The composite material used in tensile tests is a thermosetting polymer, namely unsaturated polyester resin reinforced with RT300 roving fabric. Generally, the RT roving fabrics are obtained from E glass fibers with continuous filaments, with cutted edges and reinforced with Dreher weave

### 2. MATERIAL'S FEATURES

The specimens based on polyester resin reinforced with RT300 roving fabric were manufactured at Compozite Ltd. Brasov, Romania, according to the standard SR EN ISO 527-1: Determination of tensile properties of fiber reinforced composite materials

### 3. SPECIMENS

The experimental attempt to traction of eight test specimen based on poliesteric resine type Polylite 440- M888 armed with 12 fabric roving type RT 300 used on the material weft direction, has been realized at the speed of 1 mm/ min:

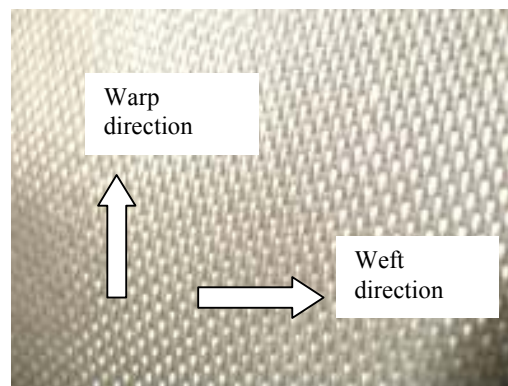
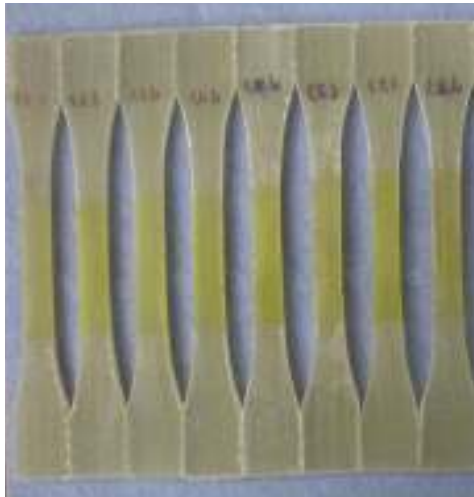


Figure 1: The sampling mode of the test specimen on the material weft direction



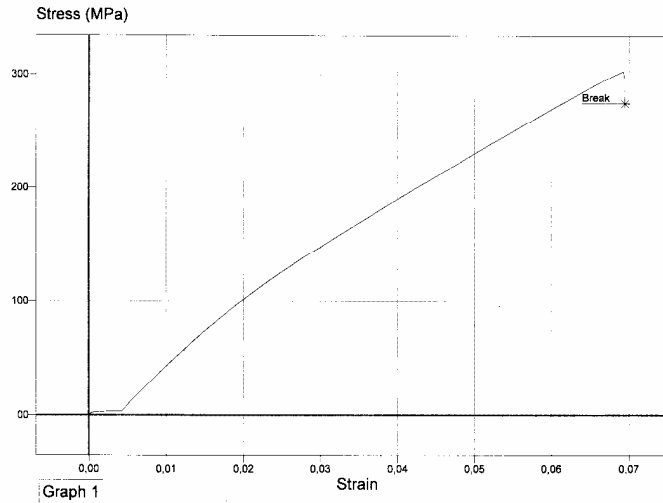
**Figure 2:** Test specimens based on polyester resin type Polylyte 440 M888

The test machine is type LS100 and it is produced by Lloyd's Instruments, Great Britain. The results of the attempt to traction with the speed of 1mm/min performed on the test specimens based on polyester resin type Polylyte 440-M888 are presented in fig.3 and in fig. 4-11 are presented the diagrams stress-strain of the testing specimens

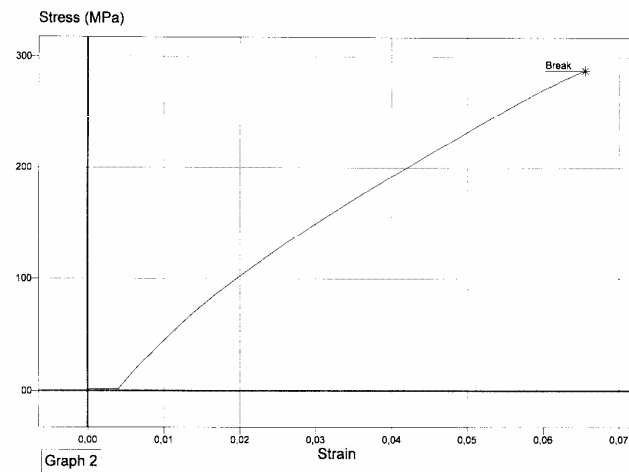
	Maximum	Minimum	Mean	Median
SamplePassed				
Gauge Length	50,000 mm	50,000 mm	50,000 mm	50,000 mm
Speed	1,0000 mm/min	1,0000 mm/min	1,0000 mm/min	1,0000 mm/min
Width	10,000 mm	9,2000 mm	9,6375 mm	9,6500 mm
Thickness	3,8000 mm	3,5000 mm	3,6500 mm	3,7000 mm
Area	38,000 mm <sup>2</sup>	32,200 mm <sup>2</sup>	35,200 mm <sup>2</sup>	35,220 mm <sup>2</sup>
Limit	100,00 mm	100,00 mm	100,00 mm	100,00 mm
Timestamp				
Load at Maximum Load	11,571 kN	9,1886 kN	10,321 kN	10,536 kN
Stress at Maximum Load	312,74 MPa	277,87 MPa	293,16 MPa	288,32 MPa
Extension at Maximum Load	3,8893 mm	3,1285 mm	3,4275 mm	3,3872 mm
Strain at Maximum Load	0,077785	0,062569	0,068550	0,067744
Load at Maximum Extension	4,2801 kN	-0,11717 kN	0,82445 kN	-0,098060 kN
Stress at Maximum Extension	123,06 MPa	-3,2986 MPa	24,609 MPa	-2,6405 MPa
Extension at Maximum Extension	3,8994 mm	3,1522 mm	3,4492 mm	3,4369 mm
Strain at Maximum Extension	0,077988	0,063044	0,068983	0,068738
Load at Minimum Load	0,0038147 kN	-0,15476 kN	-0,096023 kN	-0,12449 kN
Stress at Minimum Load	0,10968 MPa	-4,4318 MPa	-2,6781 MPa	-3,4342 MPa
Extension at Minimum Load	3,8985 mm	0,0000000044828 mm	2,5852 mm	3,3517 mm
Strain at Minimum Load	0,077970	0,00000000089655	0,051705	0,067033
Load at Minimum Extension	0,0038147 kN	-0,0035583 kN	0,00054937 kN	0,000015888 kN
Stress at Minimum Extension	0,10968 MPa	-0,10018 MPa	0,014845 MPa	0,00044931 MPa
Extension at Minimum Extension	0,0000000074936 mm	0,0000000032219 mm	0,0000000048768 mm	0,0000000045142 mm
Strain at Minimum Extension	0,00000000014987	0,000000000064438	0,000000000097537	0,0000000000902
Load at Break	11,567 kN	8,7131 kN	10,053 kN	10,185 kN
Stress at Break	312,61 MPa	267,68 MPa	285,33 MPa	280,86 MPa
Extension at Break	3,8956 mm	3,1486 mm	3,4449 mm	3,4320 mm
Strain at Break	0,077912	0,062973	0,068899	0,068639
Tensile Strength	312,74 MPa	277,87 MPa	293,16 MPa	288,32 MPa
Number of Rows that Passed	8			
Number of Rows that Failed	0			

**Figure 3:** The attempt results to traction on 1mm/min.

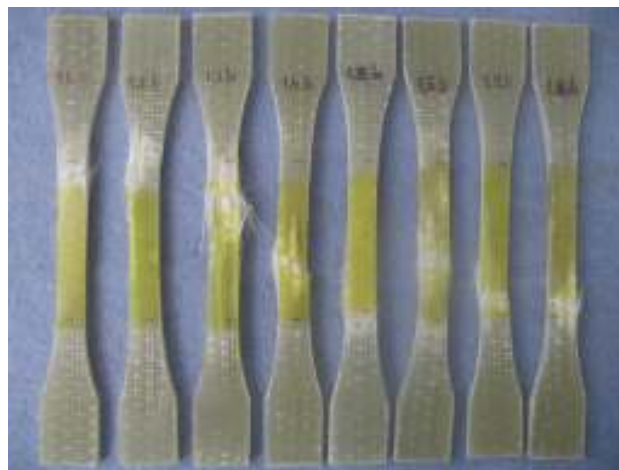
Typical stress-strain behaviour of RT300 roving fabric reinforced polyester resin specimens is presented in fig. 4.



**Figure 4: The stress-strain diagram**



**Figure 5: The stress-strain diagram**



**Figure 6: Test specimens tried on a 1mm/min speed**

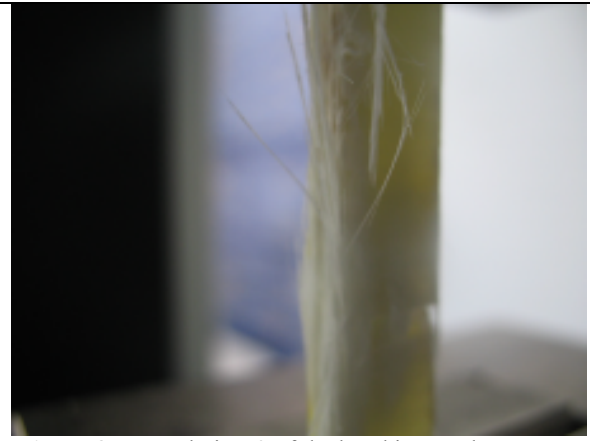
**Bursting modes of testing specimens at 1mm/min speed.**

The bursting modes of testing specimens are presented in fig 7-10.

The first irreversible breaks of testing specimens take place by inter-fiber breaks, breaks that appear to elongation between 0.06 and 0.07.  
The traction attempts stooped when fibers broke. Some failure modes of RT300 roving fabric reinforced polyester resin specimens are presented



**Figure 7:** Frontal view 1 of the breaking mode



**Figure 8:** Frontal view 2 of the breaking mode



**Figure 9:** Side view 1 of the breaking mode



**Figure 10:** Side view 2 of the breaking mode

It can be noticed that the common specimens' failure mode is the inter-fiber break that begins at a strain of 0.06 as well as fibers break.

## REFERENCES

- [1] [www.firos.ro](http://www.firos.ro) – RT roving fabrics. Products SC FIROS SA Bucharest, Romania.
- [2]. Lloyd's Instruments. LS100 User Manual.