ANNALS OF THE UNIVERSITY OF ORADEA
FASCICLE OF TEXTILES, LEATHERWORK

CHARACTERISTICS STUDY OF UNCONVENTIONAL TEXTILE FIBERS RECOVERED FROM RECYCLABLE MATERIALS - PART II

OANA Ioan-Pavel[1], OANA Dorina[1], ŞUTEU Marius[1]

[1]University of Oradea, Romania, Department of Textiles – Leatherwork and Industrial Management in Faculty of Energy Engineering and Industrial Management, Str. B.Şt Delavrancea nr.4, 410087, Oradea, Bihor, Romania,
E-mail:textile@uoradea.ro

Corresponding author: Oana. Ioan-Pavel, E-mail: oanaioanpavel@yahoo.com

Abstract: *Unconventional textiles can be obtained by strengthening the fibrous layer using wires, thereby achieving auxiliary materials for clothing, apparel linings, carpets. The fiber layers can be reinforced backing fabric using mechanical or mixed methods. The products are designed as filter materials, basic clothing. The global market for raw materials there is a continuing concern for material recovery specialists and their reintroduction into the economic cycle. Reconsideration materials as technological losses in production processes and in the sphere of consumption as factors polunaţi environment on the one hand and as a source of raw materials and energy, on the other hand, gave rise to different views regarding society's attitudes also potential resources and practical concepts that operate in these areas are unforgettable.*
Researches in order to create new unconventional textile fiber content of recyclable materials recovered were considered objectives:
-The establishment of new wool upholstery variants which besides reusable textile fibers recoveredto be entered and recovered fiber in textile products
-Make gre-lightweight textile per unit area that could be used in land drainage works on clay as filter elements covering plastic tubes.

Key words: *hysteresis, air permeability, recovered fibers.*

1. PERMEABILITY TO AIR

The property of textiles to let air pass through them are called air permeability [1,2]. Air permeability at a pressure difference will be expressed by the ratio of the specimen surface airflow and went through the air.

$$P_{a\Delta p} = \frac{\sum \Delta p}{A} \tag{1}$$

In order to determine the air permeability penetrometer using known apparatus. Calculation of permeability to air at a desired pressure differential is expressed in m3 / min m2 depending on air flow rate, expressed in liters / hour depending on the sectional area of the suction mouth.

$$P_{a\Delta p} = \frac{\sum \Delta p \cdot 10^{-3}}{60 \cdot A} \tag{2}$$

$$A = \frac{\pi \Delta^2}{4} = 1{,}96 \cdot 10^{-3} \tag{3}$$

$$K = \frac{10^{-3}}{A \cdot 60} = 17{,}32 \cdot 10^{-3} \tag{4}$$

$$P_{a\Delta p} = K \cdot \sum \Delta P \tag{5}$$

Table 1 presents data taken from the device for specimens of the two versions of nonwoven and processing them according to the relations above calculation.

Table 1: *Values obtained by calculating air permeability*

Crt. No.		$p\Delta p[l/h]$ $\Delta la = 10N/m^2$	$p\Delta p[l/h]$ $\Delta la = 50N/m^2$	$Pa\Delta p = K \cdot p\Delta p$	$Pa\Delta p = K \cdot p\Delta p$
1	Variant 1	330	1650	5,71	28,58
2		550	2150	9,52	37,24
3		550	2400	9,52	41,57
4		575	2400	9,96	41,57
5		825	3200	14,29	55,43
6		640	3900	11,08	50,23
7		625	3500	10,82	43,30
8		625	3600	10,82	45,03
9		610	2600	10,56	45,03
10		575	2300	9,96	39,84
X		590,5	2470	10,22	42,78
σ		121,057	417,133	2,09	7,22
ω		20,49	16,88	20,49	16,88
1	Variant 2	460	1900	7,96	32,91
2		310	1650	5,37	28,58
3		360	1950	33,77	33,77
4		425	1900	7,36	32,91
5		410	2100	7,10	36,37
6		325	1900	5,62	32,91
7		250	1400	4,33	24,25
8		190	1100	3,29	19,055
9		450	2100	7,79	36,37
10		225	1200	3,89	20,78
X		340,5	1720	5,89	29,79
σ		96,59	365,3	1,67	6,32
ω		28,36	21,23	28,36	21,23

2. DETERMINATION OF MASS IRREGULARITY PER UNIT AREA

To determine the mass irregularity following method is recommended:

- Cropping specimens with dimensions of 10 cm;
- Cooling the specimens;
- Specimens weighing with analytical balance,
- Calculation of the mass per unit area;

$$M_{mp} = \frac{M}{S} \tag{6}$$

- Calculation of tendency and scattering parameters
  - an arithmetic average of the masses specimens:

$$M = \frac{\sum_{i=1}^{n} Mi}{n} \tag{7}$$

  - the standard deviation:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} (0.01Mi - M)^2}{n-1}} \tag{8}$$

In Table 1 are presented the readings analytical balance for 10 specimens of each variant of unconventional fabric also the tendency and scattering parameters calculation

Table 1: *The values calculated the trend and scattering parameters.*

Crt. No.	Variant 1		Variant 2	
	Mi[g]	Mmp[g/m^2]	Mi[g]	Mmp[g/m^2]
1	2,70	270,73	3,75	375,66
2	2,39	239,19	3,76	376,66
3	2,34	234,09	3,71	371,56
4	1,79	179,93	3,35	335,2
5	1,75	175,72	3,65	365,89
6	1,72	172,05	4,98	493,88
7	1,87	187,87	4,58	542,83
8	1,89	189,9	3,95	395,11
9	1,871	187,1	4,19	419,11
10	2,69	269,46	4,14	414
X	2,10	210,59	3,99	399,9
б	0,38	38,86	0,46	46,54
ω	18,45	18,45	11,63	11,63

3. DETERMINATION OF RESISTANCE TO REPEATED REQUESTS OF TENSION

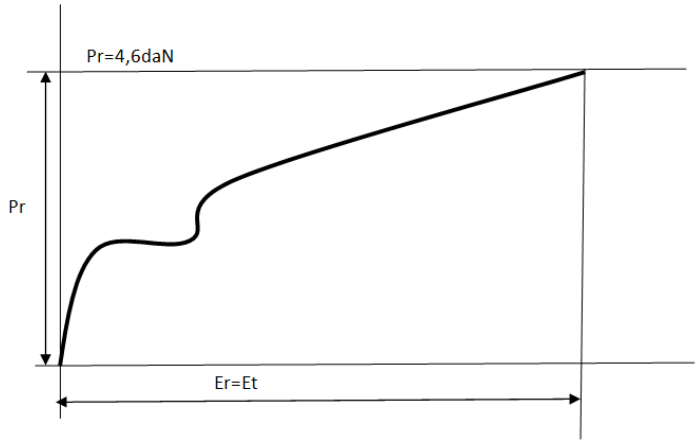
Trying unconventional fabrics resistance to cyclic tensile stress is known as fatigue. [3] The test piece of fabric tension is applied in a certain direction in the form (T) less than the value corresponding to the load after rupture. After each charge will following to descharge. [4,5] Thus the action of the tension T1 is expressed by the elongation deformation occurs if the load condition is followed by an absolute discharge hysteresis occurs. Following the diagram recorded by the camera can be seen that as the number of loading and unloading ciclilord increase deformations also will increase. At the beginning of charging curves - download distinguish very well, then they begin to overlap, an effect corresponding to a given condition due to high internal frtecări so, from one cycle to the other deformations grow very slowly. By breaking points binding fter some time loading and unloading curves are again visible with larger deformations from one cycle to another and finally rupture the analyzed material. The specimens may be required for a predetermined time after that can investigate changes on other features of the fabric unconventional.[6]

$$T_0 = F + G \cdot sin\alpha$$

G= 3,65daN, $\alpha = 30$, F=35,77daN (9)

$$T_0 = 53{,}655daN$$

In the following figures, diagrams are provided from the apparatus for specimens taken from the two variants unconventional fabric.



a)

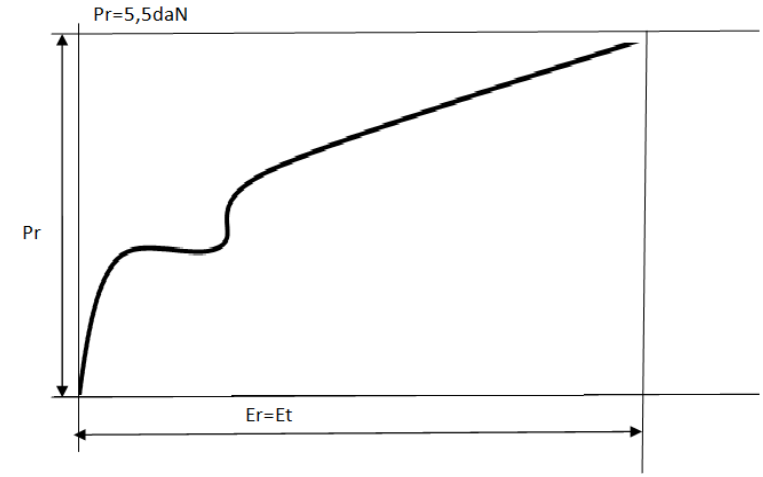
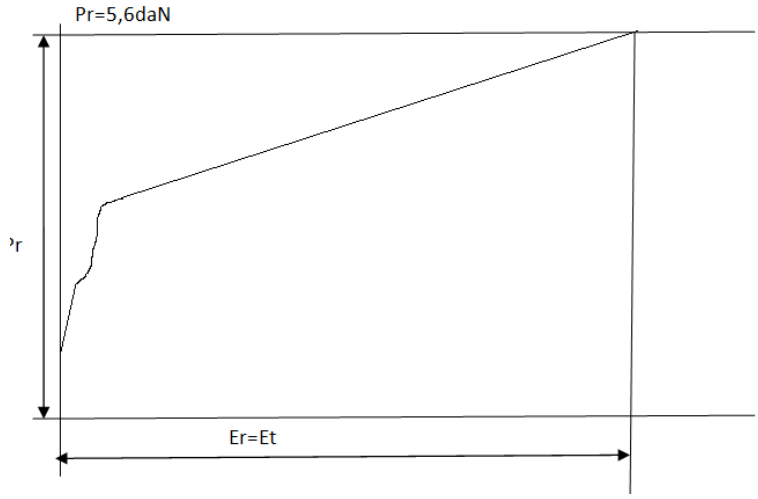
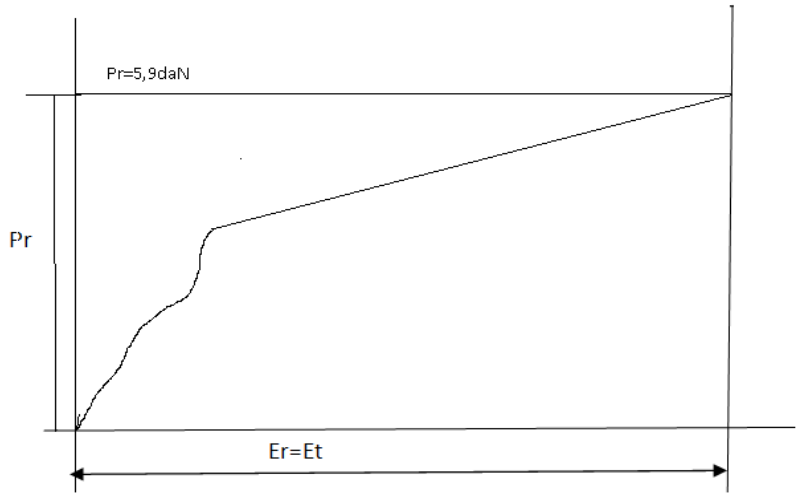


Fig.1-a), b): *Diagram direction 0 -180*

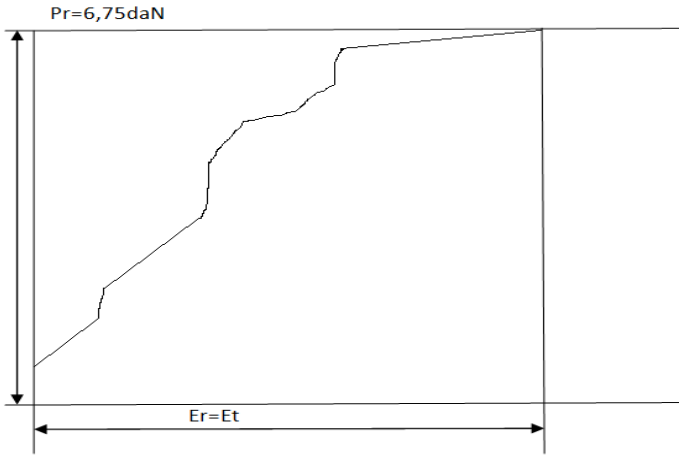


a)

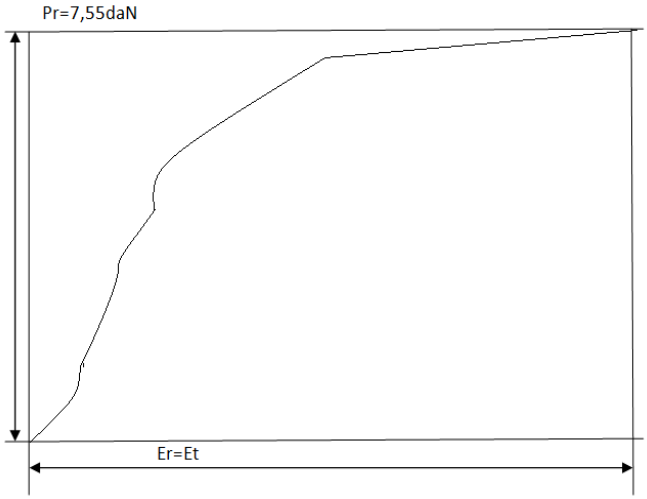


b)

Fig.2-a), b): *Diagram direction 135 -315*

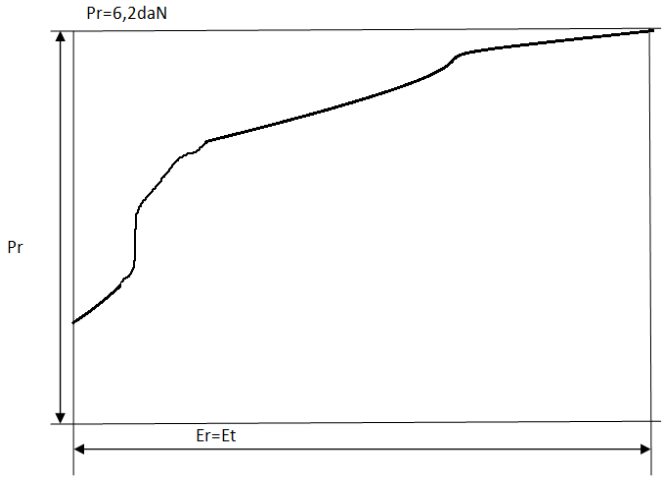


a)

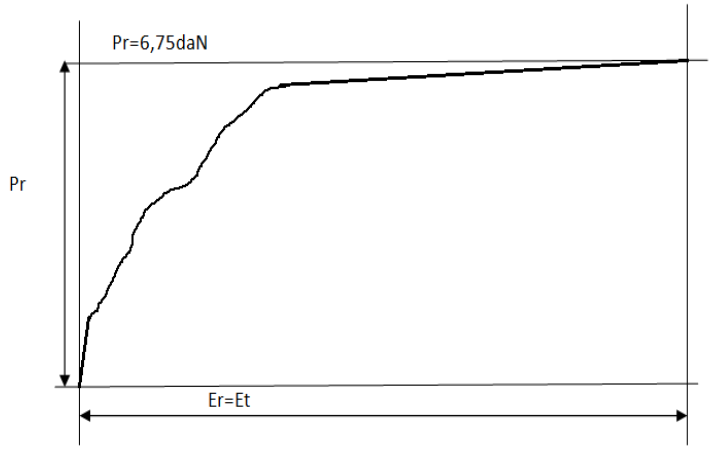


b)

Fig.3-a), b): *Diagram direction 90 -270*



a)



b)

Fig.4-a), b): *Diagram direction 45-225*

4. CONCLUSIONS

As noted in laboratory experiments, the article made in two variants allows some different properties. The first version of the fabric shows the average weight per m2 and average thickness less than the second variant. The second variant has a better thermal insulation capacity and a lower permeability.After measurements have been calculated the average values of parameters and coefficient of variation to highlight the degree of unevenness.

The irregularity average weight, average thickness and density averaged are included within the normal variation in both materials. The task after rupture in the transverse direction has the maximum value and the minimum value in the longitudinal direction in inverse proportion to the elongation after rupture.

Both irregularity breaking load and elongation at break is normal. The material 1 is not resistant to repeated tensile stress. Breaking load value is small but has very high elongation. In variant 2 inter-weaving hard pulvotex makes the material have good tensile strength. All pulvotex support gives good material resistant to fatigue.

REFERENCES

[1] O. Malcomete, "*Fibre textile*", vol. I şi II, Ed. Fundaţiei Gh. Zane, Iaşi, 1995;

[2] C. Preda, "*Structuri şi tehnologii de obţinere a materialelor textile neconvenţionale*", Ed. BIT, Iaşi, 1997;

[3] C. Preda,"*Ştiinţa şi ingineria proceselor textile neconvenţionale*" Editura Performantica, Iaşi, 2003

[4] C. Preda, "*Tehnologia textilelor neconvenţionale*" Editura Performantica, Iaşi, 2003

[5] C. Preda, C. Preda, „*Metode şi aparate pentru controlul calităţii materialelor textile destinate confecţionării produselor de îmbrăcăminte*" Editura BIT, Iaşi,1996

[6] C. Preda, A. Leon, C. Racu, *Textile neconvenţionale cu conţinut de fibre recuperate din materiale refolosibile*",Editura Performantica, Iaşi, 2004