	<p style="text-align: center;">QUALITY MANAGEMENT SYSTEM</p> <p style="text-align: center;">KEMENNY VEK</p>	
<p>СМК 02-8.2-03ПН</p>	<p style="text-align: center;">Tensile strength test method</p>	<p style="text-align: right;">Revision: 1</p>

This method applies to basalt single yarns, direct rovings, assembled rovings, twisted yarns and describes techniques of specimen preparation and their testing.

The test method is harmonized with ASTM D 3822 standard.

Due to the fact that basalt fiber is stiffer and more brittle than glass fiber, preparation of specimens for evaluation of mechanical properties should be more careful.

1. Testing equipment

1.1 Clamping faces of jaws must be thoroughly fitted to each other to provide the maximum contact area.

1.2. In order to prevent specimen slipping from the clamps it's allowed to glue leather or polyurethane pads on internal faces of clamps. Sandpaper with very small grit size also may be used (grit size – less than 40 μm , ISO designation - P400).

2. Bonding mix for tabbing (i.e. for protection of fiber ends in clamps)

To avoid elevated brittleness of impregnated parts of specimens the bonding mix consists of epoxy resin ЭД-20 (ED-20) with addition of acetone first (Fig.1) and then subsequent addition of plasticizer (dibutyl phthalate, dibutyl sebacate) in the ratio 100:10:10. Mixing and applying are performed with a brush (Fig.2).



Figure 1



Figure 2

3. Specimens preparation:

3.1 When testing in jaws, the length of fiber segments should be not less than 220 mm.

Preliminary it's necessary to remove 20 m of yarn from each package (Fig. 3) and 1-3 m of yarn should be removed between segments.



Figure 3

3.2 To prepare specimens for testing a paper template is used (see Fig.4). Specimens preparation activities are performed on a fluoroplastic pad.

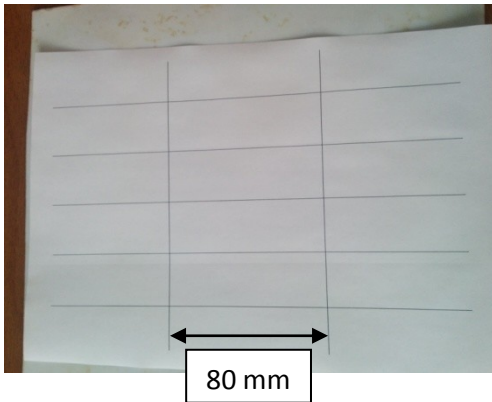


Figure 4

3.3 Apply a sufficient amount of bonding mix with brush (Fig. 5 and in the next ones)



Figure 5

3.4 Place the fiber segments in the center of strips and straighten them thoroughly (Fig.6,7,8)

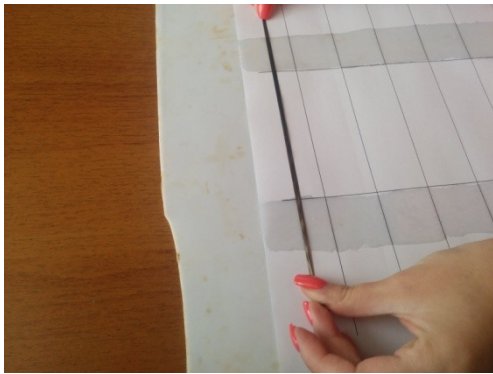


Figure 6

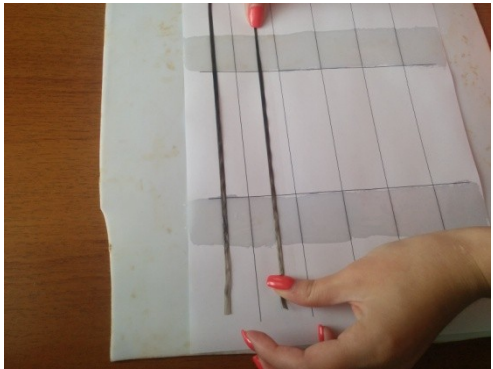


Figure 7

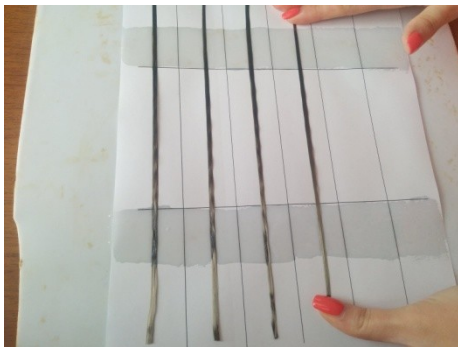


Figure 8

3.5 Apply one more layer of bonding mix, gluing the fiber to the paper. Remove minute air bubbles from impregnated part of fiber by tapping with a brush (Fig.9).

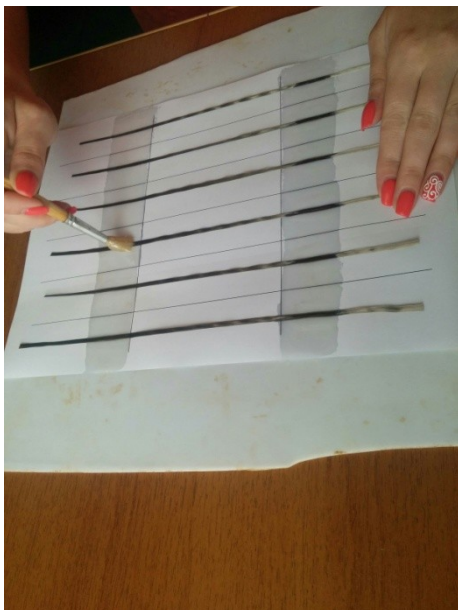


Figure 9

3.6 Place a paper strip on impregnated parts of fiber, press it by fingers (Fig. 10, 11). Repeat the same procedure on the other side of the yarns (Fig. 12, 13, 14)

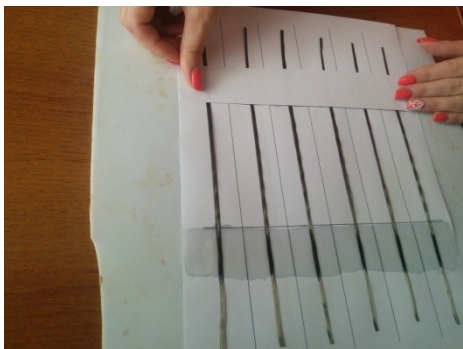


Figure 10



Figure 11

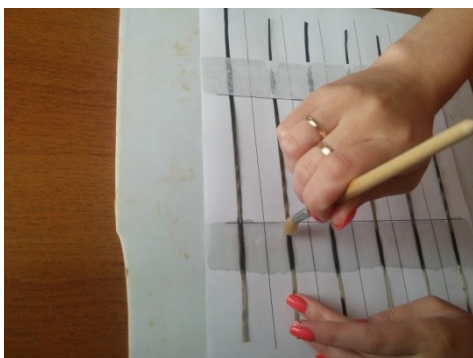


Figure 12

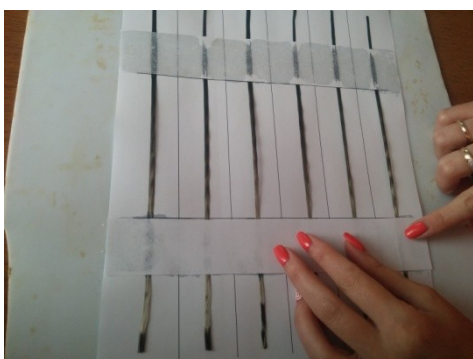


Figure 13

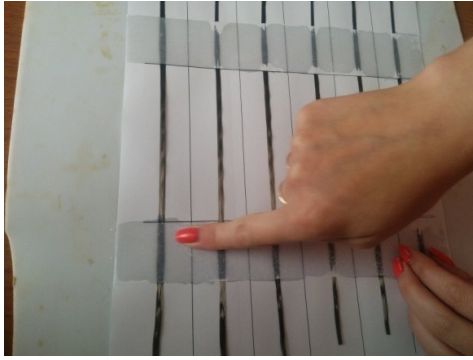


Figure 14

3.7 Apply a layer of bonding mix on the paper strips (Fig.15).

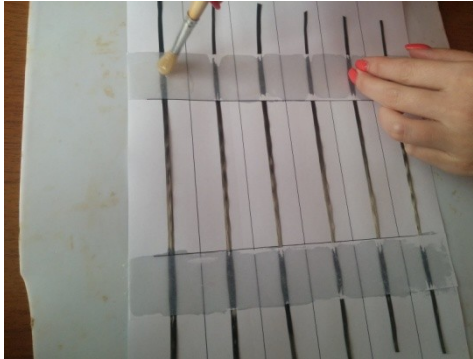


Figure 15

3.8 To provide even distribution of bonding mix between monofilaments, specimens should be kept in the air under natural conditions during 2 hours.

3.9 Then the specimens are cured at $107 \pm 2^\circ\text{C}$ during 1 hour (Fig.16). After heat treatment the specimens are temperature-stabilized during 1 hour under natural conditions.



Figure 16

4. Testing procedure

4.1 Paper template with specimens should be cut as shown in Fig. 17 (after cooling-down during at least 15 min)

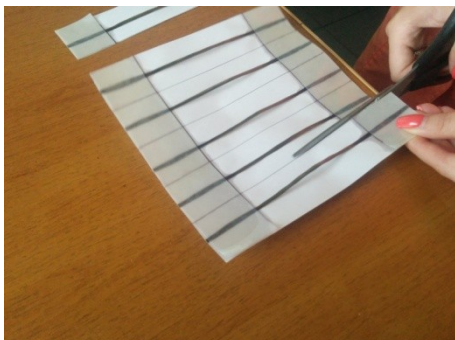


Figure 17

4.2 When testing in jaws, a specimen with paper tabs is mounted precisely in the center of upper clamp of tensile machine so that 8-10 mm of impregnated part is out of jaws. Fix the specimen in jaws. Then mount the other end of the segment, straightening and pulling it carefully by hand. When mounting in lower clamp, special care should be taken: don't bend the yarn and don't touch unimpregnated part of the specimen (Fig.18). The distance between the clamps is 100 ± 1 mm.

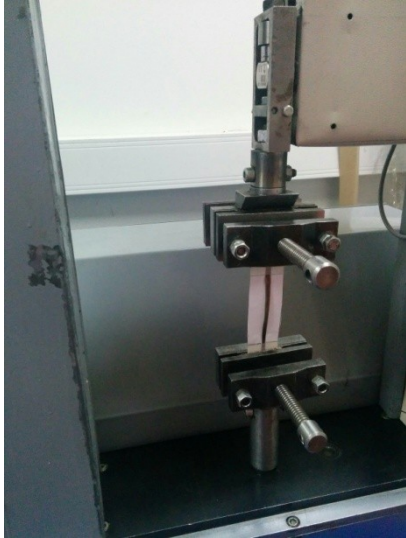


Figure 18

4.3 Before testing cut the paper carefully behind the yarn with scissors without touching the yarn (Fig.19).

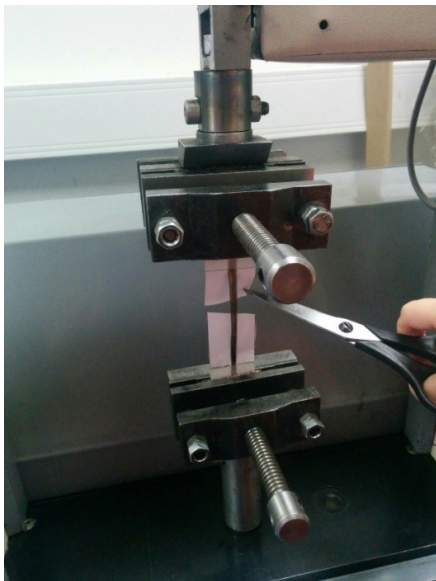


Figure 19

5. Warning: When preparing and testing the specimen, special care should be taken:

- It isn't allowed to touch the specimens within the gage length;
- When cutting the template with specimens, it isn't allowed to touch the strand by hand or crush it by scissors to avoid damage of fiber within gage length.
- When carrying the specimens in room for testing, it isn't allowed to put one template on another one
- When clamping the specimens in jaws of tensile testing machine, it's necessary to avoid their bending

NOT ALLOWED:



6. Arithmetic mean value of all test results is taken as a final test result.