

CRD-C 513-74

CORPS OF ENGINEERS SPECIFICATIONS FOR RUBBER WATERSTOPS

1. Scope

1.1 These specifications cover rubber waterstop.

2. General Requirements

2.1 The water stop shall be of the shape and dimensions shown on the drawings accompanying the project specifications. It shall be produced by such a process that, as supplied for use, it will be dense, homogeneous, and free from holes and other imperfections. The cross section of the waterstop shall be uniform along its length and transversely symmetrical so that the thickness at any given distance from either edge of the waterstop will be uniform. The material for rubber waterstop may be natural rubber, suitable synthetic rubber, or a blend of natural and suitable synthetic rubber.

3. Inspection and Testing

3.1 All material and all finished waterstop will be subject to rigid inspection and testing in order to insure that the supplied waterstops meet the requirements of these specifications. Every facility shall be provided for representatives of the Government to perform careful sampling and inspection of the finished waterstop. The sampling of finished waterstop and job-made splices and all testing will be done by the Government.

4. Samples and Tests

4.1 A sample not less than 12 in. long (30.48 cm) shall be cut from each 200 ft (61 m) of finished waterstop. The sample or samples representing a lot of waterstop will include not less than 4 lineal ft (1.2 m) of finished water stop.

4.1.1 Five dumbbell-shaped specimens shall be tested for tensile strength and ultimate elongation according to CRD-C 573 from each sample representing 200 ft (61 m) of finished waterstop. All other tests

will be performed on specimens prepared from samples taken at random from among all the samples furnished to represent the lot of waterstop.

4.1.2 Two discs shall be drilled, buffed, and tested for compression set according to CRD-C 576, Method B, using an aging temperature of 70 ± 1 C (158 ± 1.8 F) for $22 \pm 1/4$ hr.

4.1.3 Portion of the sample or samples shall be cut into pieces of convenient size and reduced in thickness to between 1/16 and 1/8 in. (1.6 and 3.2 mm) according to the method specified in CRD-C 515. Dumbbell-shaped specimens shall be cut from the samples so prepared using die C of CRD-C 573, with the long axis of the dumbbell parallel with the long direction of water stop. In addition two specimens approximately 1 by 2 in. (25 x 50 mm) shall be cut for test for water absorption and tested in accordance with CRD-C 575.

4.1.4 Two specimens each of types described in Procedures A, B, and C, straight, looped, and tapered specimens, respectively, of CRD-C 534 will be evaluated for ozone resistance in accordance with CRD-C 536.

5. Test Conditions

5.1 Tests shall be conducted in a standard laboratory atmosphere of 23 ± 1.6 C (73.4 ± 3 F) and a relative humidity preferably not less than 50 percent unless otherwise specified in the test method. The tests for ozone resistance (CRD-C 536) shall be conducted at 20 percent strain of the specimens at an ozone concentration of 300 pphm in air for 70 hr at 104 F (40 C). These test specimens will be wiped with toluene to remove surface contamination.

6. Detailed Requirements

6.1 Finished Waterstop.- Samples taken from the finished waterstop shall meet the requirements listed below when tested by the test method and number of specimens to be tested shown.

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Method of Test	Number of Specimens Tested	Requirement*
CRD-C 573	5 per 200 ft (61 m)	Tensile strength, using die C, not less than: 2000 psi (13.78 MPa)
CRD-C 573	5 per 200 ft (61 m)	Ultimate elongation, using die C, not less than: 360 %
CRD-C 569	5 per lot	Hardness, Shore durometer, type A, between: 60 and 70
CRD-C 513	5 per lot	Tensile stress to produce 300% elongation, not less than: 900 psi (6.20 MPa)
CRD-C 575	2 per lot	Water absorption after 7 days immersion at 23 ± 1.1 C (73.4 ± 2 F) calculated as percent by weight, not more than: 5
CRD-C 576 (Method B)	2 per lot	Compression set, no more than: 30%
CRD-C 577	5 per lot	Tensile strength after aging, $94 \pm 1/2$ hr. oxygen bomb method, not less than: 80%
CRD-C 536	6 per lot	Ozone cracking resistance, no cracks

*The average or the median of the results of tests of the group of 2 or 5 specimens tested will be used to determine compliance with the stated requirements, depending on which value is called for by the method of test referenced.

6.2 Job-Made and Factory-Made Splices in Waterstop.- Samples taken across splices shall meet the following requirements when tested by the test method shown.

Method of Test	Number of Specimens Tested	Requirement
CRD-C 573	As directed	Tensile strength using die C, not less than: 1000 psi (6.89 MPa)

7. Methods of Testing

7.1 The methods of testing referred to in this specification are cited by the CRD-C designations by which they are given in the *Handbook for Concrete and Cement*.

8. Rejection

8.1 The waterstop may be rejected if it fails to meet any of the requirements of these specifications.