BRITISH COLUMBIA NET CAGE MESH STRENGTH TESTING PROCEDURE

VERSION I
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BRITISH
COLUMBIA

Ministry of Agriculture,
Food and Fisheries

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1.   SCOPE

This procedure specifies the method that must be used in British Columbia for the purpose of determining the tensile (breaking) strength of mesh used for the containment of farmed fish.

This procedure is intended for use with nets common to the BC finfish aquaculture industry. These nets are generally made with knotless nylon mesh with published breaking strengths of between 50 and 400 lbs. This procedure may not be suitable for other types of nets.

2.   PRINCIPLE

A mesh is extended until it ruptures under the applied load. The test is performed using a suitable apparatus that records or indicates the load at the point of rupture. The testing machine is operated at a rate of elongation which is both constant and within prescribed limits.

3.   APPARATUS

3.1   Testing Machine

The machine used for testing shall meet the following criteria:

a)   Machine shall include a digital load cell or dynamometer providing direct measurement (in units of force) of the load applied to the mesh. The load cell or dynamometer shall be accurate to within 2.5 lbs (11 N), or 1.0% of the mesh breaking strength, whichever is greater.

b)   The load cell or dynamometer shall have an accurate means of recording the peak load applied prior to failure of the mesh.

c)   Machine shall apply load to a single mesh at a constant rate of elongation equal to 10 inches per minute (25 cm per minute), plus or minus 10%.

d)   For testing machines which apply force in discrete steps (such as by way of a hydraulic cylinder with a hand pump), the rate of elongation, per (c) above, shall be the average rate of elongation. During each step, the rate of elongation shall be as close as possible to the average rate required, that is the steps must be consistently applied at a given rate. The maximum mesh elongation for each step shall be 0.20 inches (5 mm). Testing machines of this nature shall be designed such that the user can readily apply the load at a rate that will meet these requirements.

e) The machine shall engage a single mesh for testing with steel pins or hooks formed from round material with a diameter of 0.1875 inches (5 mm) The pins or hooks shall be so mounted as to remain in direct line with the applied load in order to provide a true reading on the load cell or dynamometer. The pins or hooks shall be smooth and free of any sharp edges or roughness.

3.2 Calibration and Maintenance

The dynamometer or load cell from each testing machine shall be calibrated annually in accordance with the manufacturer's recommendations. Testing machines shall also be calibrated annually to ensure that the specified elongation rate is maintained. The owner of the machine shall keep calibration certificates on file, with a copy kept with the machine.

The testing machine shall be properly maintained in order to continue to provide accurate results and to meet the requirements above. This will include replacement of the testing hooks as necessary due to wear, corrosion or roughness.

4. TESTING REQUIREMENTS

4.1 A net cage must be tested according to the testing protocol in Section 5 of this document at the following locations:

(a) two locations separated by greater than 10 meters on the underwater portion of the net; and

(b) one location on the jump net.

4.2 For each location tested on a net cage, the reported result must be the average of 5 breaks.

4.3 Test locations shall be representative of the mesh making up the whole net, and shall not be located in a previously repaired area. If a net has large areas of repair or is fabricated from different sources of mesh, the test procedure (Section 5) shall be performed on each different mesh type or age of mesh, and the reported result must be the average of 5 breaks.

4.4 Testing may be done on mesh remaining in the net or on a sample cut from a net. Cut samples shall be large enough to accommodate the required number of breaks within a single sample.

4.5   Testing done on mesh remaining in the net shall be performed by pulling the net slack around the area to be tested, such that no outside forces are acting upon the mesh being tested, and maintaining such slack for the duration of the test.

4.6   Testing may be performed on dry or wet mesh. Temperature shall be within normal ambient temperatures for the B.C. coast. Tests shall not be conducted on frozen mesh.

*NOTE: 'Mesh size' refers to the distance between the centers of two opposite joints (or knots) in the same mesh when fully stretched; this information should be obtained from the original tagging on the net cage.

5.   TEST PROCEDURE

5.1   Testing shall be performed on a single mesh, oriented so that the pillars (bars) of the mesh are engaged over the pins or hooks, <u>not</u> the knots or joints of the mesh.

5.2   Mount the mesh over the pins or hooks, and take up the slack.

5.3   Apply load at a steady rate of elongation, as defined in 3.1, until the mesh breaks. Record the peak load indicated.

5.4   Repeat for a total of five breaks at the location being tested.

5.5   Average the five results to get the recorded breaking strength for that location.

Example: 200 lbs, 210 lbs, 230 lbs, 195 lbs, 185 lbs

Record breaking strength of (200+210+230+195+185)/5 = 204 lbs

5.6   Record breaking strength to the nearest pound force.

6.   REPORTING

Test results shall be recorded on a form that also includes information about the net. Information recorded shall include:

a)   Owner of net and net identification number.

b)   Mesh manufacturer and manufacturer's published mesh-breaking strength.

c)   Net fabricator and date of net fabrication.

d)   Accumulated in-water service time.

e)   Size and gauge of mesh and dimensions of net cage.

f)   Date and location of testing, company and name of person doing test.

g)   Information on antifoulant treatment of net, if any.

h)   Whether net was tested wet or dry.

i)   Approximate ambient temperature at test.

j)   Breaking strength test results for each prescribed location, and pass/fail grades per requirements of the Aquaculture Regulation, Appendix 2, section 12.

i)   General comments and notes on overall condition of net.

j)   Signature of tester.

7.   ADDITIONAL INFORMATION

For more information or a printed copy of this document, please call the Courtenay office of the Ministry of Agriculture, Food and Fisheries at (250) 897-7540.

An electronic version of this document is available on the Government of British Columbia web site: www.gov.bc.ca/agf

8. EXAMPLE REPORTING FORM

NET CAGE TESTING RECORD

Date of Testing:	Net ID:	Job Order No.:

Owner of Net (Company):	Name of Company performing testing:	
Name of Contact:	Location of Testing:	Name of Tester:

Mesh Manufacturer:	Dimensions: (ft) or (m)? _____x_____x _____deep:
Net Fabricator:	Mesh Size (mid knot to mid knot): (in) (mm)
Date of Net Fabrication: / Accumulated in-water service time:	Gauge: 210/
Mesh Manufacturer Breaking Strength (lbs):	Tested: WET or DRY ?
Required Strength (lbs or kg ?) BELOW WATERLINE: JUMP:	Test temperature (approx.):

Breaking Strength (lbs or Kg ?)

	Dipped?	Test 1	Test 2	Test 3	Test 4	Test 5	Average	Pass/ Fail	Initials of Tester
BELOW WATERLINE 1	Yes No								
BELOW WATERLINE 2	Yes No								
JUMPNET	Yes No								

Details of Complete Visual Inspection:

Repairs Completed:

Comments:

Signature of Tester: