

# SCOTTISH FEDERATION OF MODEL BOAT CLUBS

## TESTING PROCEDURES FOR MODEL BOILERS AND REFILLABLE PRESSURE VESSELS

### **1. GENERAL RULES.**

1.1 Model Boat Clubs, Societies (or groups of clubs) which are affiliated to the Scottish Federation of Model Boat Clubs, (SFMBC) should set up a panel of BOILER TESTERS to oversee pressure vessel testing if any of their members operate model steamboats (or steam engines). If this is not possible, then the club or (member) should contact the Secretary of the SFMBC to obtain the address of the (nearest) club which can help.

1.2. In addition to SFMBC certificates, Boiler/Pressure vessel certificates issued by the MPBA, the Northern Association of Model Engineers, The Southern Federation of Model Engineers Societies, foreign Associations and Federations who have similar test standards and those of commercial manufacturers will also be acceptable at SFMBC events and regattas.

### **2. BOILER/PRESSURE VESSEL TESTERS**

2.1. All tests are to be carried out by two competent club members who have been elected as boiler testers by their club. They must, at least, have practical experience and theoretical knowledge of steam models and neither should be the owner of the boiler/pressure vessel under test.

2.2 The pressure gauge used for boiler/pressure vessel testing must not be a 'model gauge' but a reliable, properly calibrated gauge.

2.3. SFMBC affiliated clubs are to maintain a record of all boiler/pressure vessel certificates issued.

2.4. All boiler/pressure vessels must bear some form of permanent identification.

2.5. The SFMBC or testers shall not be liable to subsequent misuses of boiler/pressure vessels by the owner or operator.

### **3. COPPER BOILERS**

3.1. Any new boilers should be tested by the SFMBC or recognised club/society that have been previously authorised.

3.2. All new boilers are to be examined externally and as far as possible, internally; cladding or fittings are not to be fitted for this initial test.

Blanking plugs are to be fitted to all boiler bushes except one, which is required to be fitted with an adaptor to which the test pump can be attached. The boiler is to be subjected to a hydraulic test, using cold water, to twice its normal working pressure. The pressure should be held long enough for the boiler to be examined thoroughly for leaks.

3.3. Any appreciable distortion will cause the boiler to be rejected. Slight leaks may be corrected, after which the boiler must be retested.

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An accumulation test is carried out:- with the burner lit and all outlets closed the accumulation test is carried out for 5 minutes allowing a maximum increase 5% over that period.  
(This paragraph was added at the AGM 1998 taken from David Woods procedure)

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3.4. All copper boilers are to be tested every two years. Second and subsequent tests are to be to one and a half times the normal working pressure. The test pressure need only be applied once and held long enough to permit a thorough examination for leaks. Second and subsequent tests will include an examination of boiler fittings but it will not be necessary to remove boiler cladding unless the testers find reason to request its removal.

3.5. After each test the testers should complete a boiler test certificate (specimen attached).

#### **4. BRASS BOILERS**

4.1. All new boilers to be tested in accordance with with the same standards as for copper boilers.

4.2. It is strongly recommended that boilers are not made of brass. However some commercial boilers are so constructed. These, for second and subsequent tests should be tested each year and the hydraulic pressure should be twice the normal working pressure, but in other respects the second and subsequent tests will be conducted the same as for copper boilers.

#### **5. STEEL BOILERS**

5.1. It is very strongly recommended that boilers are not made of steel.

Expert advice should be sought on steel boilers and manufacture. SFMBC affiliated clubs/societies will not be obliged to offer test facilities. Any such boilers should be tested annually.

#### **6. SAFETY VALVES.**

6.1. A safety valve/valves must be fitted to all boilers. The operator of any steam driven craft/model must check the functioning of the safety valve/valves on each and every occasion steam is raised

#### **7. MONOTUBE BOILERS**

7.1. Monotube also called "Flash Steam" boilers do not require a test certificate.

#### **8. PRESSURISED FUEL CONTAINERS/TANKS L.P.G.**

8.1. All refillable gas containers/tanks used in model steam craft should be pressure tested every two years. They should be made of copper and their design and construction should be to the same standards as model steam boilers. They should not exceed 450cc in internal volume. It is recommended that gas should not be stored in these tanks after use. The test pressure must be appropriate to the proposed contents : viz:-

GAS		PSIG	BAR
(se notes)			
Butane		185	12.7
Butane/Propane	90/10	195	13.3
"	85/15	215	14.82
"	80/20	240	16.34
"	70/30	285	19.57
"	60/40	335	22.42

8.2. Tanks should be examined as if they were a boiler (see section 3 above) except that the hydraulic pressure must be to the table above. There must be no leaks. They should then be dried, fitted with their valves, filled with LPG and placed under water which is just detectable as warm. Again there must be no leaks. Any leak/s constitutes a failure. Testers must check that the design includes a means of preventing the tank from being filled to capacity with liquid; this may be visual or mechanical. It is not recommended that tanks are fitted with safety valves.

8.3. Some commercial re-fillable gas tanks for models are fitted with a safety valve. Any such valve must not lift or leak in the warm water test. Arrangements must be made for any efflux to be piped to the outside of the model.

8.4. Gas containers of the disposable type, eg. TAYMAR, EPIGAS, CALOR, CAMPING GAS, will not be subjected to SFMBC tests.

8.5. All pipe work for LPG must be of copper with brass fittings.

**NOTES.**

The pressures given in the table above have been derived from information supplied by TAYMAR Ltd who are EPIGAS INTERNATIONAL. They have been calculated in accordance with B.S.5239 of 1988.

The method was as follows:

Vapour pressure @ 55 degrees C times a safety factor of 1.9

Pressures were calculated in BARS and converted to pounds per square inch rounded to the nearest 5 psig.

The conversion used was 1bar = 14.504 psi.

BS 5355 of 1976 deals with filling ratios and developed pressures of liquifiable and permanent gasses. It also gives observed maximum shade temperatures worldwide. It does not offer any additional information on any allowance which should be made for solar radiation in the event that the container may not always be in the shade. However containers are normally marked "Do not expose to temperatures exceeding 50 degrees C/120 degrees F". Shade temperatures were extracted as follows:

COUNTRY	DEGREES C
United Kingdom	35
Germany	39.5
France	44

**9.0 LIQUID FUELS OTHER THAN LPG (I.E. PETROL/PARRAFIN ETC)**

9.1. Containers should be examined and tested as if they were a boiler (see section 2 above). The test pressure is to be twice working pressure or 75 psi if the working pressure is not known. They should be tested every two years.

(The above is a copy of the document read out to the A.G.M. 1998 and originating from the Darlington MBC. April 1996)

**SCOTTISH FEDERATION OF MODEL BOAT CLUBS**  
**BOILER/PRESSURE VESSEL CERTIFICATE**

ISSUED BY \_\_\_\_\_ CLUB/SOCIETY

We the under signed that the boiler/pressure vessel detailed below has been subjected to an INITIAL/SUBSEQUENT (delete as applicable) test as follows:-

BOILER/PRESSURE VESSEL TYPE: \_\_\_\_\_

MATERIAL OF CONSTRUCTION: \_\_\_\_\_

BOILER/PRESSURE VESSEL NUMBER: \_\_\_\_\_

WORKING PRESSURE (WP) : \_\_\_\_\_

OWNER: \_\_\_\_\_ OWNERS SIGNATURE: \_\_\_\_\_

PRESSURE APPLIED AT THIS TEST: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_ VALID FROM: \_\_\_\_\_ TO: \_\_\_\_\_

SIGNED: \_\_\_\_\_ BOILER TESTER 1

SIGNED: \_\_\_\_\_ BOILER TESTER 2

SIGNED: \_\_\_\_\_ WITNESS

The boiler/pressure vessel as detailed above PASSED/FAILED (delete as applicable) the test.

Remarks: