

## Sail Measurement

### Appendix I – Sail Measurement Equipment

In the majority of cases, the accurate measurement of a sail may be undertaken using the following tools and equipment: -

- Steel tapes of good quality
- Sail measurement batten
- Pencils and permanent marker pens
- Masking tape and plain paper
- Method for **certification** – labels, buttons or stamp and ink pad etc.
- Sail number and sailmaker mark templates
- Micrometer and feeler gauge
- Equipment required to determine **ply** weight (if required this should be hired)

A measurer may supplement this list with other tools or equipment that either improves the accuracy of, or the time taken on, measurement. For pre-event check measurement this is encouraged as detailed in Part C of this guide.

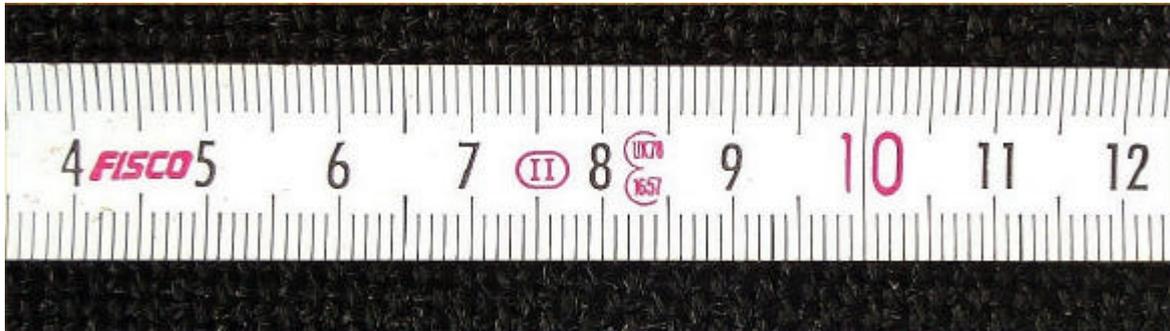
#### Steel Tapes

Good quality steel tape measures should be used. Plastic or cloth tapes, even if incorporating steel or glass fibre cores, are unsatisfactory.



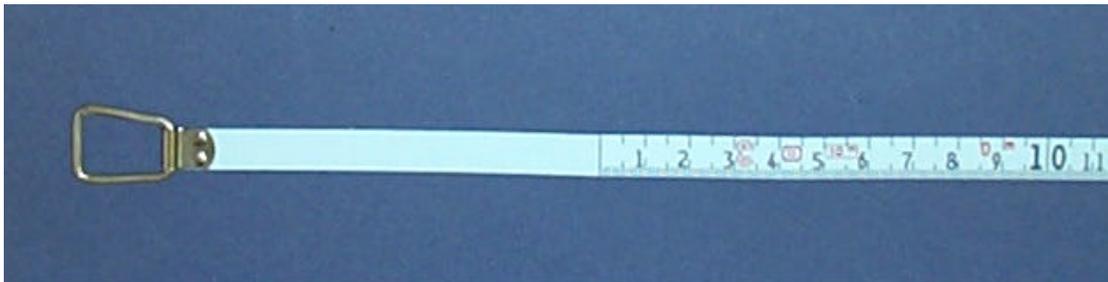
Figure 1

Ideally all tapes should be manufactured to an appropriate Standard. Metric tapes marked with an 'oval' including a Roman II have been granted EU pattern approval with their scale marked to an acceptable level. Additionally, tapes marked with the temperature 20°C and the force 50 Newtons have had their blades printed so that they are most accurate when used in that temperature with that force applied.



**Figure 2**

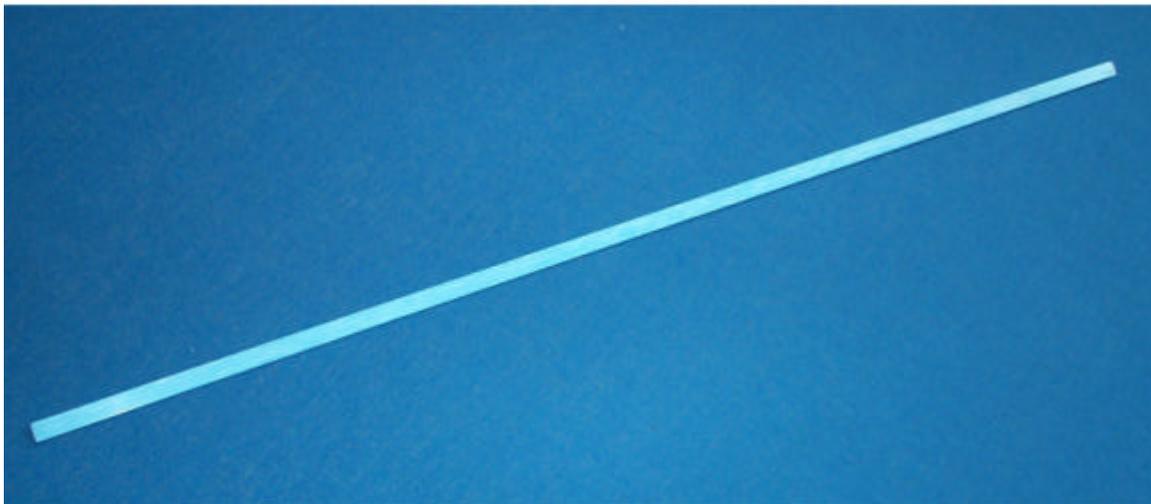
If possible tapes with their scale commencing some distance from the tape end-hook, and without "sharp" end-hook gripping devices are preferable for sail measurement. An example is shown in figure 3.



**Figure 3**

Printed scales should be metric and extend across the full width of the tape which itself should be as narrow as possible. For most ISAF classes a 5 metre and 10 metre tape will suffice. For larger, offshore and metre classes a 20 metre or 30 metre tape may be required.

### Sail Measurement Batten



**Figure 4**

In many places the ERS referred to a **measurement point** being at the intersection of two **sail edges**, each extended as necessary and it is when an extension is necessary that the sail measurement batten should be used.

The batten should be 1 metre in length and of uniform thickness and width giving uniform bending characteristics.

When used the batten should be held at its extreme ends and placed against the **edge** of the sail being extended so that one end of the batten falls near the **measurement point**. The batten should be bent so that its greatest length is touching the **edge** of the **sail** being extended.

## Pencils and Permanent marker Pens



**Figure 5**

Pencils are used for marking the folds in **sails** at **leech** or **foot** points (It is sensible to be equipped with a pencil sharpener).

Marking pens are used to **certify sails** and/or otherwise mark **sails** for identification purposes. Permanent markers are essential and black is the preferred colour as this is less likely to fail. Measurers may also consider equipping themselves with a white permanent marking pen, which can be used to modify oversize, or incorrectly spaced sail numbers or sailmakers marks.

The type of pen used for marking is very important, as the mark has to remain visible for several years. Ordinary ballpoint pens are not adequate and neither are ordinary felt tip pens. Laundry markers or permanent markers, such as Pentel N50, Edding 750 - which also comes in white or Papermate Permanent Marker are usually satisfactory, but it is recommended that

a rag be marked with the pen intended to be used, and then thoroughly washed in very hot water to see whether the mark remains.

Most of these pens will also mark film **sails** satisfactorily, provided that the ink is given time to dry and care is taken not to abrade the mark. No **certification mark** will remain for long if marked on a damp **sail**.

### Masking Tape and Plain Paper

Plain paper taped to the underside of the **sail** at a corner is often useful when the **corner measurement point** is not at the **edge** of the sailcloth. By use of the sail measurement batten and/or straight edges, the extension of the **edge** of the **sail** may be drawn on the paper to determine the **measurement point**.

### Method for certifying



Figure 6

**Certification marks** take different forms in different countries. The traditional method was by the stamping and signing of a **sail**. The disadvantages are that stamps can sometimes go missing and that the ink used in the stamp pad is often susceptible to fading, particularly if the **sail** is damp when stamping. Ink stamping can also be problematic on film **sails**.

More recent **certification marks** have taken the form of sail buttons or sail labels. The preferred ISAF method is currently the attachment of a **sail** label. This should be manufactured from conventional sailcloth and either stuck or sowed onto the sail or both. Provided the label is of the right material and applied correctly then it will be impossible to remove it from a **sail** without destroying its shape. As the sail label **certification mark** is made of woven material, endorsements added to it by permanent marker pen will be more readily absorbed into the label and should therefore last longer.

Remember **certification marks** are applied at the tack of fore and aft sails and at the head on spinnakers, and should be black and undertaken by a Measurer in the field. A red **certification mark** indicates in-house certification. See figure 7.



Figure 7

### Sail Number and Sailmaker Mark Templates

A transparent template will be helpful to check sail numbers and sailmakers marks particularly during **event measurement**. The limits of the numbers or marks can be scribed onto the template made of Perspex or some other similar transparent material. This can then be placed over the number or mark to ensure that it complies with the maximum and minimum requirements.

### Micrometer and Feeler Gauge



Figure 8

The micrometer shall have the following characteristics:

- Ratchet stop
- Measuring surfaces diameter as specified in **class rules** or, as a default, of 6.5 mm
- 400gf – 600gf applied to the measuring area
- Throat depth of approximately 21mm minimum
- Graduations to 0.001mm (0.00005in)
- Overall accuracy of plus or minus 0.002mm
- Flatness of anvil and spindle tips = 0.0006096mm or better or a parallelism of anvil and spindle tips = 0.00124mm or better
- Spindle lock

Padded carrying case

Note: A digital readout type is highly recommended to ensure speed and accuracy for regatta measurement.

Standard automobile feeler gauge.

### **Equipment Required to Determine Ply Weight (if required this should be hired)**

Sail ply weighing equipment (it is recommended that this equipment is hired).

A national governmentally approved laboratory type scale, approved to weigh samples to an accuracy of 0.01% to be used in accordance with its manufacturers' instructions

or

Yield scale type "E/M" and Sample Cutter 'ERC-2' manufactured by Alfred Suiter Co. of Orangeburg, NY, USA.

END