

The International Table Tennis Federation

Racket Control Technical Leaflet T9

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Section 1: Introduction

This Technical Leaflet describes how the umpires may check and measure that a racket is legal and does not release volatile organic compounds, except water.

Section 2: The Laws of Table Tennis

Racket control is the procedure to test whether a racket complies with the Laws of Table Tennis, which can be found in the ITTF Handbook, Section 2.

Section 3: Regulations for International Competitions

The Regulations for International Competitions of Table Tennis relating to racket control can be found in the ITTF Handbook, Section 3.

Section 4: Racket Coverings

It is the responsibility of umpires to check whether the racket coverings of the players are authorised and included on the current List(s) of Authorised Racket Coverings (LARC), at the time of the racket control.

Section 5: Racket Control facilities and equipment

Racket Control facilities and equipment requirements are described in the «Referee Directives regarding Racket Control» and the «Racket Control Requirements». Both documents can be found in the URC section of the ITTF website.

Section 6: The Racket Control panel

The referee or nominee is responsible for racket control. The duties of the referee and umpires are described in the "Referee Directives regarding Racket Control".

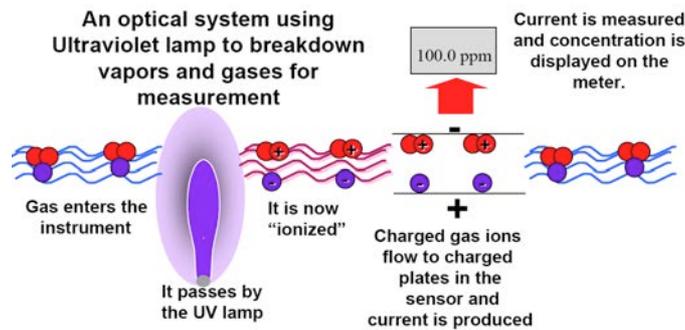
Section 7: Racket tests

In this chapter the different methods currently available to check the legality of a racket are explained, but one of the first things that an umpire has to take into account is that the racket is the most important tool of the players, so, when collecting rackets, umpires must cautiously take the rackets by the handle, without touching the racket coverings with their fingers. If the player has covered the side of the blade and the sponge with trimming, the umpire may carefully remove half of the trimming, if necessary for him/her to perform the tests, while remembering that he/she will have to attach it correctly afterwards.

7.1 Harmful volatile organic compounds (VOC) measurement with MiniRAE-Lite®

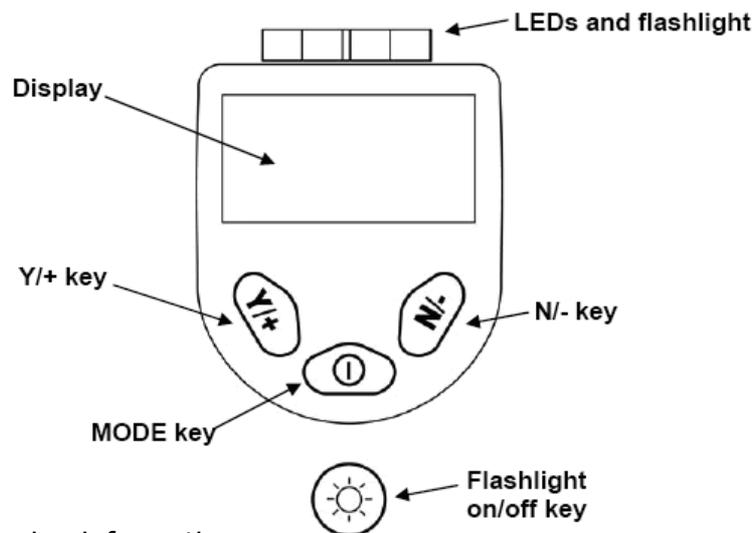
The ITTF has banned VOC from use on the racket. The current limit is 3.0ppm, but it may change if decided otherwise by the ITTF Executive Committee.

MiniRAE-Lite is currently used by the ITTF and is a photoionization detector (PID) which uses ultraviolet (UV) light (*photo* = light) source of 10.6 eV (electron volts) to break down chemicals to positive and negative ions (*ionization*) that can easily be counted with a *detector*.

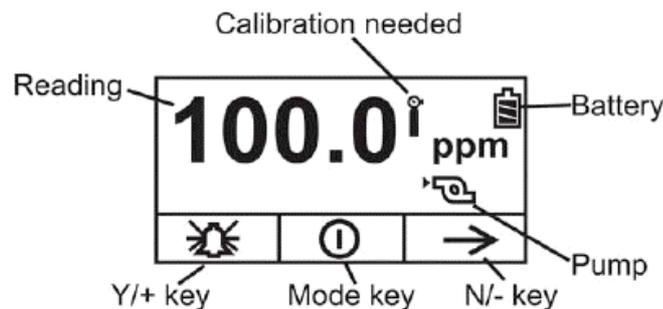


The instrument's user interface consists of the display, LED's, an alarm transducer, and four keys. The keys are:

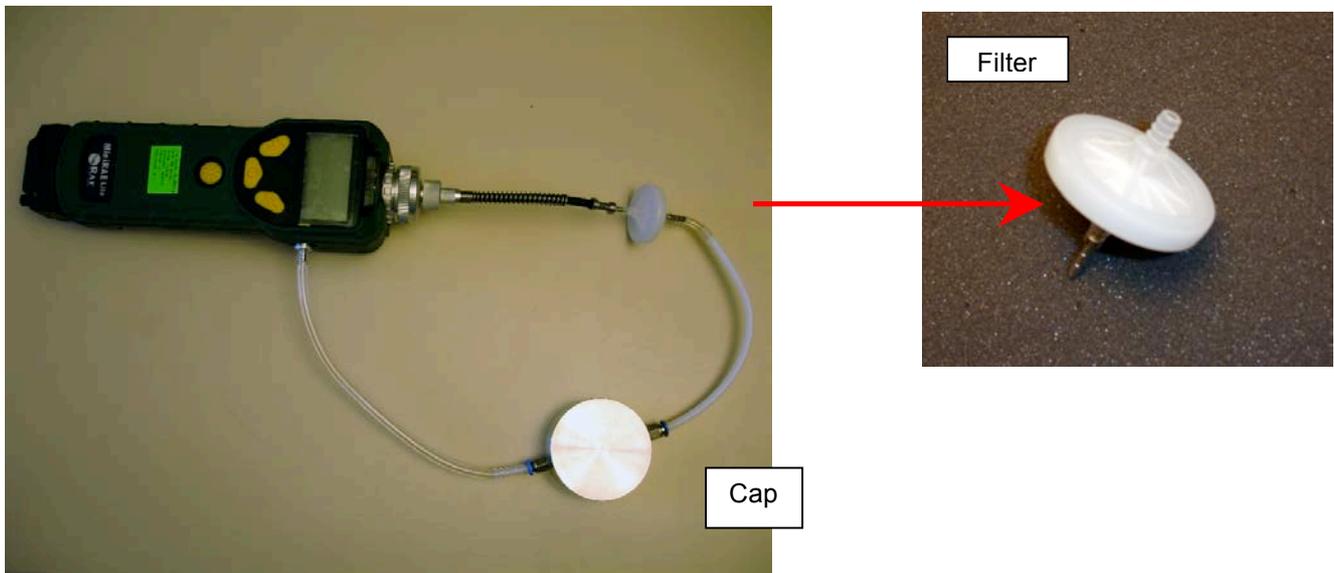
- Y/+
- MODE
- N/-
- Flashlight On/Off



The display shows the following information:



For proper measurement on the surface of the coverings of the racket, the device is used together with a special cap connected by two tubes to the MiniRAE Lite. These tubes shall be of PTFE Teflon. A filter supplied by RAE shall be used to reduce the effects of the humidity and dust. If there is a mark "INLET" on the filters, that side of the filter should face away from the device. The filter shall be changed every two events, in the case of competitions with duration of a maximum of 5 days. For World Championships the filter shall be changed once in the middle of the competition. For Olympic and Paralympic Games the filter shall be changed twice during the competition.



Steps to be followed to ensure correct measurement:

1. Connect the air outlet tube, which is with the device, to the threaded hole in the right side of the instrument.
2. Connect the flexible tube to the top part of the device and then the filter to this tube.
3. Once all accessories have been connected, each one has to be attached to the Teflon tubes of the cap.
4. To turn on the instrument press and hold the MODE key.
5. When the display turns on, release the MODE key.



6. When the display shows "Ready ... Start sampling?" press the Y/+ key to start the measurement.
7. Zeroing calibration: every day, before starting any measurement, it is recommended to make a "Zeroing calibration".
 - Go to a fresh air environment.
 - Press and hold together the MODE and N/- keys.
 - A password will be required (normally "0000"). Use the Y/+ and N/- keys to change numbers. Press Enter (MODE key).
 - Select "Calibration" and "Zero calib".
 - When the display shows "Please apply zero gas..." press Y/+ key to start calibration and wait for 30 seconds, and the calibration is finished.
8. Span calibration: before each competition the MiniRAE Lite shall be calibrated with a span gas. For Olympic and Paralympic Games this calibration shall be done daily, after the "Zeroing calibration". This operation shall be only done by an experienced person. A bottle of 10 ppm of Isobutylene shall be used as a reference gas for the span calibration.

9. To start with a measurement of the gases released by a racket, read the background level on the display and write this reading in the Racket Testing Form 3a.
10. Then apply the cap to the middle of the racket for 20 seconds. After that, write the reading in the same form. The difference between the reading after 20 seconds and the background reading is the "real reading".

| RED SIDE | BLACK SIDE |
|-------------------------------------|-------------------------------------|
| Background level reading (A): _____ | Background level reading (A): _____ |
| Reading after 20 seconds (B): _____ | Reading after 20 seconds (B): _____ |
| Real reading (B - A): _____ | Real reading (B - A): _____ |

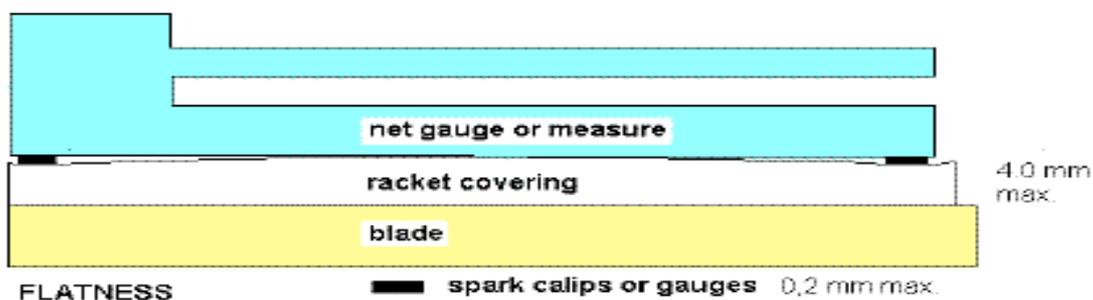
11. Repeat the same procedure with the other side of the racket. But to do so, the device must be separated from the racket until the display displays its previous background level.
12. In those competitions where second RAE equipment is available, and when a racket is found with a reading over the allowed limit, the second device shall be used to confirm the result of the first measurement. If the second device also gives readings above the acceptable level then it is clear that the racket has failed the test. However, if the second device gives readings below the defined level then the racket is deemed to be within acceptable limits.
13. To turn off the instrument press and hold the MODE key for 3 seconds, and a 5 seconds countdown to shut off begins. Once the countdown stops and the display shows "Unit off..." release the MODE key, and the instrument is now switched off.

When using MiniRAE-Lite it has to be taken into account that the tolerance of the reading is $\pm 10\%$. So, a player should not receive any disciplinary action if his/her racket does not release more than the limit stated in each moment by the ITTF Executive Committee plus a 10% more of this limit. E.g.: if the limit is set in 3.0 ppm, the tolerance would be ± 0.3 and the maximum reading that a racket covering may release would be 3.3 ppm.

7.2 Concave vs. convex

The contours of the zones of different sponges under a top sheet are sometimes seen under a strong light. A glue pocket or a bent blade may render the racket centre convex*; a net gauge laid down as a ruler with its straight edge on the rubber and observed against the light should not show a gap between its ends and the rubber of more than 0.2 mm when the shape is convex, and no more than 0.5 mm when the shape is concave.

Any excessive height of the bump can be determined by using standardized steel blades (callipers or gauges for sparks), 0.2 mm thick for convex shapes, and 0.5 mm for concave shapes, that are laid under the ends of the net measure, but at a distance of about 2 mm from the side of the covering.



7.3 Flatness measurement

Flatness measurement with electronic devices

As in thickness measuring, these devices are in a support with a dial in the middle with a pin. The support is placed across the racket in different positions and the pin is placed on the rubber as well. If the rubber is not flat, the dial displays the difference as shown in the figure below.

The diameter of the pin touching the rubber shall be between 08.0 and 010.0 mm, and the pressure of the spring inside the dial shall be between 40 and 50 grams.

For convex rubbers, the dial shows readings over 0.00 mm (> 0.00), and for concave rubbers the dial shows readings below 0.00 mm (< 0.00). The maximum deviation for convex rubbers is $+ 0.2$ mm, while for concave rubbers the maximum deviation is $- 0.5$ mm.



*To determine the reason of the bad flatness of a racket, 2 quick checks are available:

- a) if a side of the racket is concave and the other side of the racket is convex, the blade is *bent* (with pimple-out rubbers this is not visible);
- b) if the flatness at the convex side as well as in the prolongation of the handle (without including the area with the raised rubber name), if there is no gap, the blade is *warped*.

Steps for flatness measurement:

1. Check with a net gauge to determine the profile of both sides of the racket;
2. Check the flatness of both sides and fill in the results on the form.

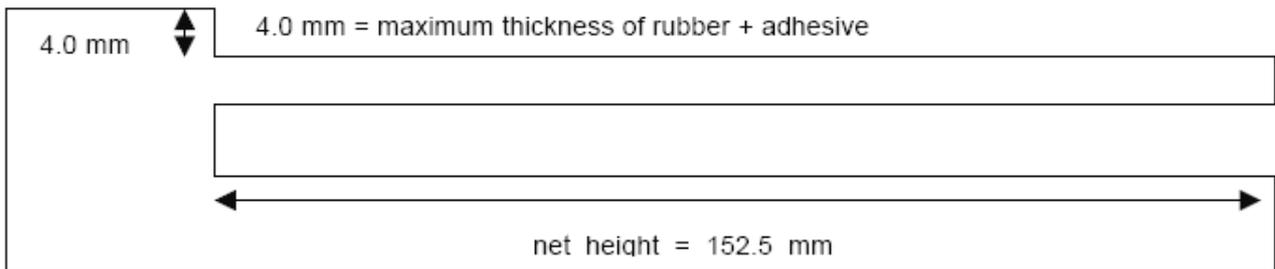
7.4 Thickness measurement

The thickness of a:

- **sandwich rubber** including the adhesive layer may not be more than 4.0 mm;
- **pimpled rubber** including the adhesive layer may not be more than 2.0 mm.

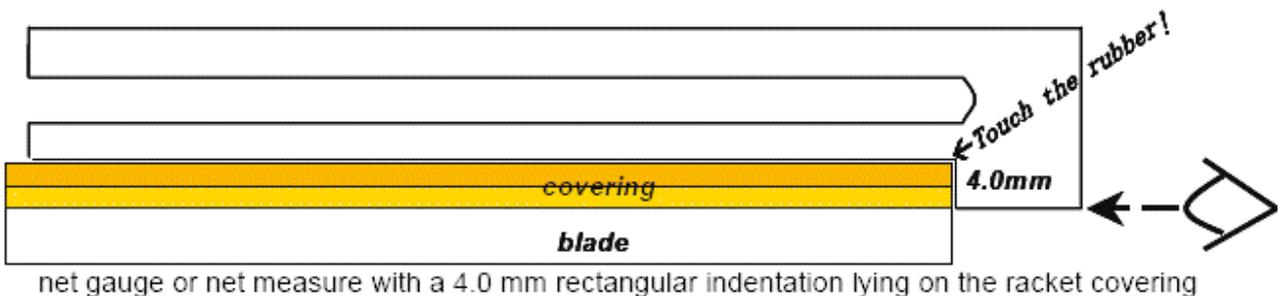
These values should not be exceeded on any part of the playing surface of a racket covering. This thickness refers to the total covering, including any reinforcement in the rubber (for instance textile) and any glue/adhesive used to attach it to the blade.

Umpires can make an initial thickness measurement with the net gauge. The net-gauge measures the height of the net (= 152.5mm) and the thickness of the rubber (≤ 4.0 mm)



The umpire should check the thickness of the racket covering by:

- placing the net gauge on the rubber without indenting the covering;
- the edge of the gauge must touch the rubber at the measuring point;
- if the wider part reaches the bottom of the racket covering so that the observer, looking along the edge of this part in the direction of the side of the blade, does not see any sponge, the thickness of the rubber is not more than 4.0 mm;
- if the umpire suspects the rubber is too thick, he/she can report it to the referee, who may decide by testing with the rectangular indentation of the net measure, or a magnifying glass with an integrated 0.1 mm scale, or refer the racket to the racket testing panel for a thickness test.



It is also possible to check the thickness of a racket covering using magnifier glasses with a scale of tenth of millimetres.

When using these magnifier glasses the umpire has to place the device in the edge of the racket coverings so that it has to be perpendicular to the plane of the blade. Any inclination of the device may give a false reading. Also the tester has to be careful to distinguish which is the blade and which is the thickness of the layer of glue. Sometimes, especially in black rubbers with dark sponges, and blades with a final layer of carbon fibre, it is quite difficult to see what is the blade and what the racket covering.

Thickness measurement with electronic devices

These devices, in a support, are placed on the rubber with a dial and a pin which touches the bare zone of the blade between the handle and the end of the rubbers as shown in the figure below.



The diameter of the pin touching the blade shall be between 4.5 and 5.0 mm.

When an umpire uses this device he/she must do 4 measurements on each side of the racket as follows:

- Firstly by placing the pin in each bare zone of the blade with the support placed along the racket parallel to the direction of the handle and making 2 measurements;
- Secondly by placing the pin in each bare zone of the blade with the support placed crossing the racket diagonal to the direction of the handle and making 2 measurements.

The final result of the thickness measurement shall be calculated by the average of these four measurements. An average of 4.04 mm or below should be recorded. An average above 4.04 mm should be recorded and must be referred to the referee.

Attention: it is important to note that, when a side of the racket has a convex shape, the result of the flatness test has to be added to the final thickness average of this side of the racket. When one side of the racket is convex and the other side concave it is very likely that the blade of this racket is bent. In these cases the result of the flatness in the convex side should not be added.

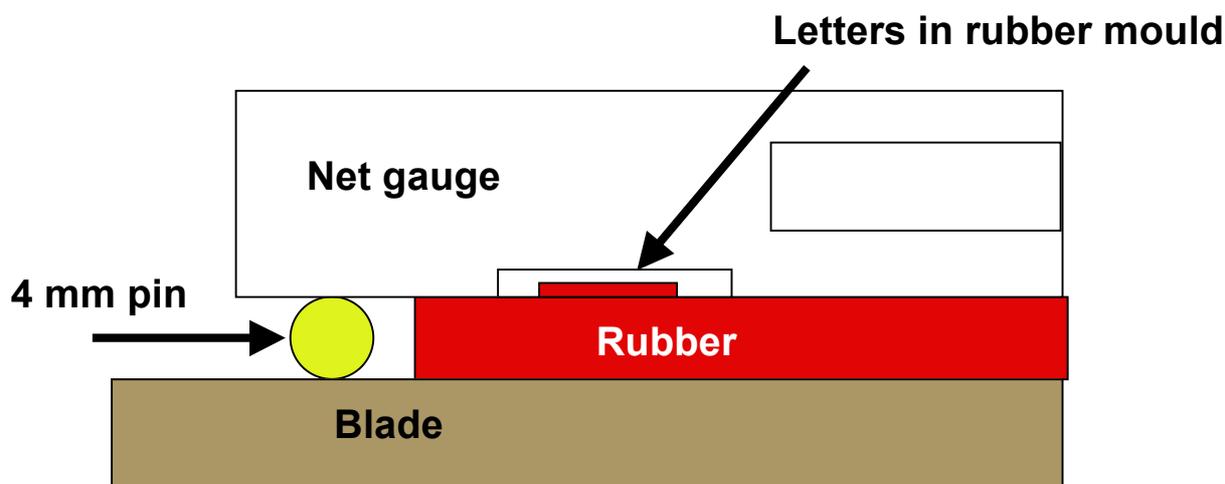
Thickness measurement with manual devices

The umpire shall proceed as follows to measure the thickness of the rubbers:

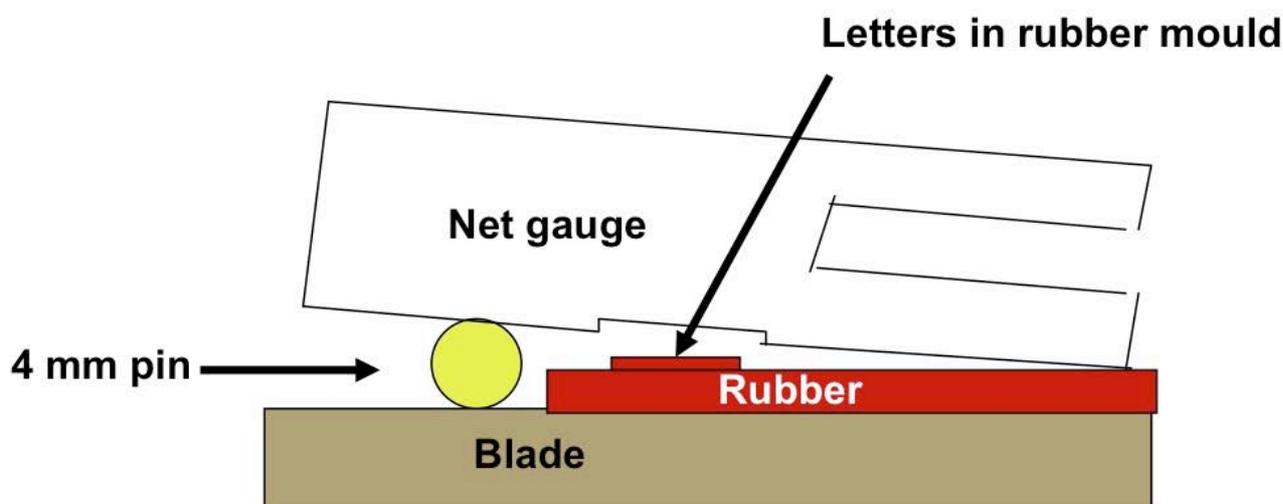
- a) Place a metallic piece of a pin with a diameter of 4.0 mm in the zone of the blade between the handle and the end of the rubber.
- b) Then across the rubber, place a ruler (which could be a net gauge) with a slot avoiding the height of the letters in the rubber mould (as shown below).

There are several possible results:

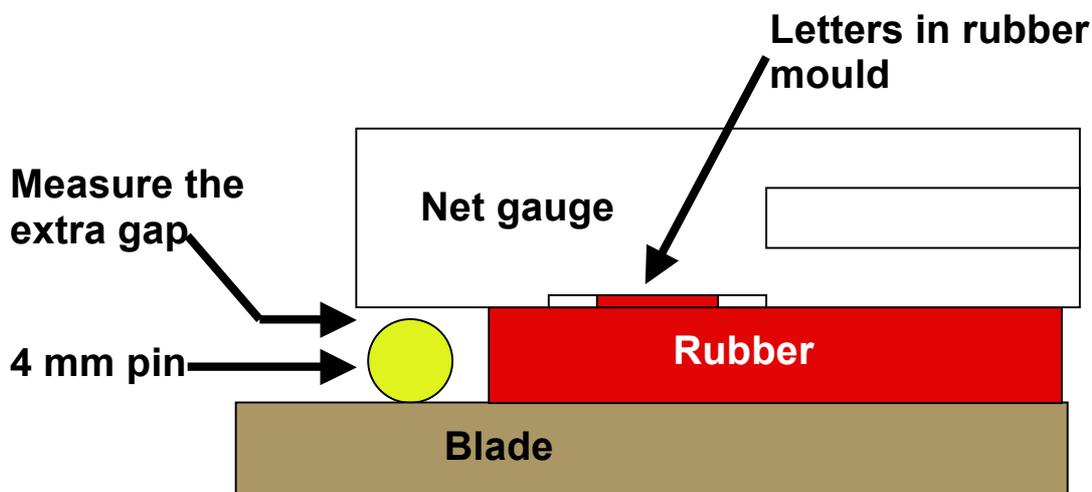
- a) If the ruler touches the rubber and the pin at the same time the rubber is 4.0 mm thick and the result should be recorded.



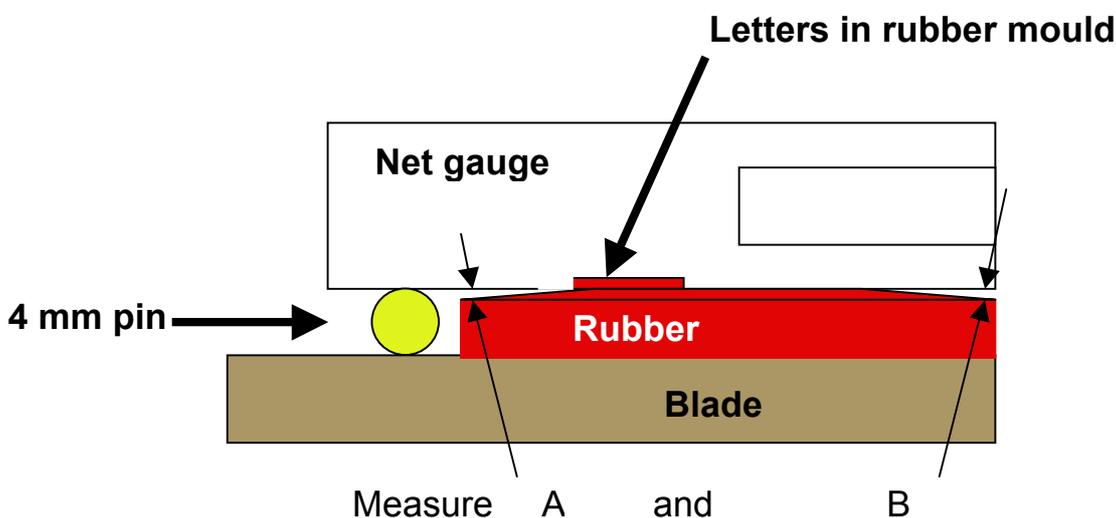
- b) If the ruler touches the pin and the far side of the rubber (as shown below), it is less than 4.0 mm thick and the result should be recorded.



c) If the ruler touches the rubber, but not the pin, the rubber is too thick (as shown below). The gap between the ruler and the pin can be measured using a thickness gauge. The maximum thickness which can be introduced between the pin and the ruler (without pushing up the ruler) will determine the value of the extra thickness of the rubber. The result should be recorded and must be referred to the referee.



d) If the ruler touches the rubber and the pin, but the rubber is not perfectly flat (i.e. the rubber has a convex shape up to a maximum of 0.2 mm as shown on page 11), the umpire has to measure the remaining gap nearest the pin and at the end of the rubber (see picture below). If the gap near the pin is equal to or larger than the gap at the far end of the rubber, and this gap is less than 0.2 mm, the result should be recorded. If the gap at the end of the rubber is larger than the gap nearest the pin and larger than 0.2 mm, the result should be recorded and must be referred to the referee. To avoid any misunderstanding, the ruler has to always be in contact with the rubber and the pin when measuring this way.



A = B, max 0.2 mm

A > B, OK A < B > 0.2 mm refer to referee

7.5 Powdering

Powdering can be detected with the naked eye and can be confirmed with a magnifying glass.

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