

The International Table Tennis Federation

RACKET CONTROL
Technical Leaflet T9



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Effective 1 September 2010

Section 1: Introduction

This Technical Leaflet describes how the umpires and/or racket controllers may check and measure that a racket is legal and does not release volatile solvent vapours, except water.

During a world title competition or ITTF sanctioned event as well as during a regional or continental championship, the umpires and racket controllers check the rackets and report to the referee under whose jurisdiction racket control resides. Before the event starts, the tournament organisers provide and equip the necessary facilities, for use, at the latest, one day before the competition starts.

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 racket controllers and 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 takes place in a facility with specific requirements, which are sent to the organizers in advance. Players are obliged to go to the Racket Control Centre, if they are

selected to have their racket tested. The Racket Control Centre is identified by several signs in the competition venue.

Racket Control will be established at all ITTF World Title and Olympic events, as well as at a select number of ITTF Pro Tour and Junior Circuit events and may be established at Continental and Regional competitions.

Section 6: The Racket Control panel

At events including the World Championships, Olympic or Paralympic Games, the ITTF Equipment Committee shall recommend up to 3 people as racket controllers, and one shall be appointed as Chief Racket Controller.

The referee is responsible for deciding the acceptability of playing equipment, including any allowable tolerances, and must advise the Chief Racket Controller prior to the start of competition. However any rackets that exceed the values listed in the Laws or Regulations must be referred to the referee for approval, even if they are within any agreed tolerance. The ITTF Executive Committee is responsible for setting the allowable level of harmful volatile substances.

The Chief Racket Controller:

- reports to the referee;
- agrees with the referee the confidential schedule and random choice of match-controls, written reports about racket failures and other activities;
- prepares and checks the documents and forms in advance for racket preparation and control to be distributed to the officials, players and umpires once approved by the referee;
- liaises with the organizer before the start of the tournament;
- inspects, as soon as possible after his/her arrival, the racket preparation and racket control areas and meets the referee and the tournament director to discuss arrangements;
- attends, if possible, the umpires' and the coaches' briefing and answers all relevant questions;
- actively tests and coordinates the work of the panel;
- plans the duty-roster of the members of the panel;
- is considered as a match official, and the results of his/her measurements are a matter of fact;
- watches that the tests are conducted with care and accuracy, and that the results are correctly recorded, kept confidential, and are submitted only to the referee;
- submits, after the tournament, a report to the ITTF Equipment Committee (number of the tests, failures and their reasons, reports to the referee, other problems). Statistics about the test results may be published.

The detailed inspection of the racket remains the duty of the umpires, who may ask the referee for a racket control, before the match starts, if they consider a racket may be illegal.

The racket control panel may detect manufacturing imperfections or illegalities (such as pimple geometry) that are not included in the Laws or International Regulations but are against the specifications of the Technical Leaflet; these items are not referred to the referee but to the ITTF Equipment Committee.

Section 7: Practical organisation of Racket Control

Every day, the Chief Racket Controller does the draw and schedule for racket controls for the next day, and reports to the referee and the competition manager of the competition. The referee must endorse the schedule and may, at any time, change this schedule by adding or removing matches to be checked.

Section 8: Voluntary and compulsory racket control and racket inspections

Before the tournament the referee or nominee will inform all delegations and officials, including umpires, the details of the racket control procedure. This information includes voluntary and compulsory controls, procedure for the tests, the necessity to air new rubbers correctly, the location of the racket preparation area and the racket control centre, sanctions encountered in case of a racket failure, and procedures for appeal at World Championships, Olympic and Paralympic Games.

Voluntary racket control

- Voluntary control is available on the day before the tournament, as well as during the tournament, without interrupting the compulsory racket controls. Players can ask the Chief Racket Controller, when there is free time so they can have a voluntary control;
- Each player may bring only two rackets for one test each or have the same racket tested twice at one tournament;
- The rackets submitted will be examined carefully;
- All measurements or observations during a voluntary test will be recorded in the normal "Racket Test Report" form;
- All defaults identified will be recorded on a special form, which must be signed by the player as a record that the player was informed about the irregularity found (the specific test failed without an indication of the actual measurement), and which will be submitted to the referee for action if necessary;
- The member of the racket control team will then encourage the player to seek the referee's advice about the consequences of a failed test, prior to compulsory testing;
- No disciplinary action will be taken against a player whose racket fails in a voluntary test. If requested, the forms for voluntary testing are handed to the jury; otherwise they remain confidential.

Compulsory racket control

Racket control is compulsory during the tournament and may include before-match and after-match examination of the authorization and the playing properties of the racket, as well as tests of the prohibited solvents, which will be carried out according to the regulations, and also other tests which may be found useful.

- A. Racket Control tests will be carried out **after-match** at random. In the case where rackets do not pass a random Racket Control after-match test, the offending player will be **liable to penalties** as implemented at the 2010 World Championships (refer below).

B. However, from the quarter-finals on, Racket Control tests will be **before-match** for selected matches of individual events and randomly selected individual matches in team matches. Rackets that do not pass the Racket Control tests before the match cannot be used in the above-mentioned events.

Team events – before-match

- In team events, a member of the racket control panel will inform the captains during the draw for the selection of letters and sequence of play;
- The players who have to play the first individual match must submit their rackets to the racket control centre at least 20 minutes before the scheduled match time;
- The players who have to play the second individual match must submit their rackets to the racket control room before the previous individual match starts. The same procedure should be followed for subsequent individual matches;
- The rackets tested will be given directly by the racket controller to the match umpires, who will give them back to players in paper bags, keeping the rackets separate when they come into the playing area;
- If it is necessary for a player to change their racket during play due to it being accidentally damaged, the umpires must collect the replacement racket used, which will then be subject to an after-match test;
- If a player brings the racket late, his/her racket will be tested after the match.

Team events – after-match

- For an after-match test, the match umpires will be informed in advance, and they must collect the rackets of both players or pairs, immediately when the match finishes. Rackets will be submitted to the racket control panel for testing and players may collect their rackets at the racket control centre ten minutes later.

Individual events

- For a **before-match** test, players will be informed in advance, and they have to submit their rackets to the racket control centre at least 20 minutes before the scheduled match time;
- When the rackets for a match have been tested, they should be kept separately in paper bags. They are then given to the match umpires, who will give them back to players when they come into the playing area to start the match;
- If it is necessary for a player to change his/her racket during play due to it being accidentally damaged, the umpires must collect the replacement used, which will then be subject to an after-match test;
- If a player brings the racket late, his/her racket will be tested after the match;
- For an **after-match** test, the match umpires will be informed in advance, and they must collect the rackets of both players or pairs immediately when the match finishes. Rackets will be submitted to the racket control panel for testing and players may collect their rackets at the racket control centre later.

When collecting rackets, racket controllers or umpires must cautiously take the rackets by the handle, add a note with the name of the player, and take them in separate paper bags to the racket control centre.

If the player has covered the side of the blade and the sponge with trimming, the controller 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.

All data about the racket covers are recorded on the racket control report form.

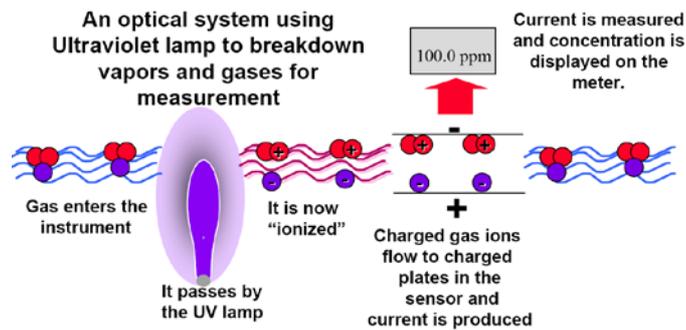
Section 9: Racket tests

9.1 Harmful volatile solvents measurement with MiniRAE-Lite®

The ITTF has banned volatile solvents from use on the racket. The limit has been decided by the ITTF Executive Committee as follows:

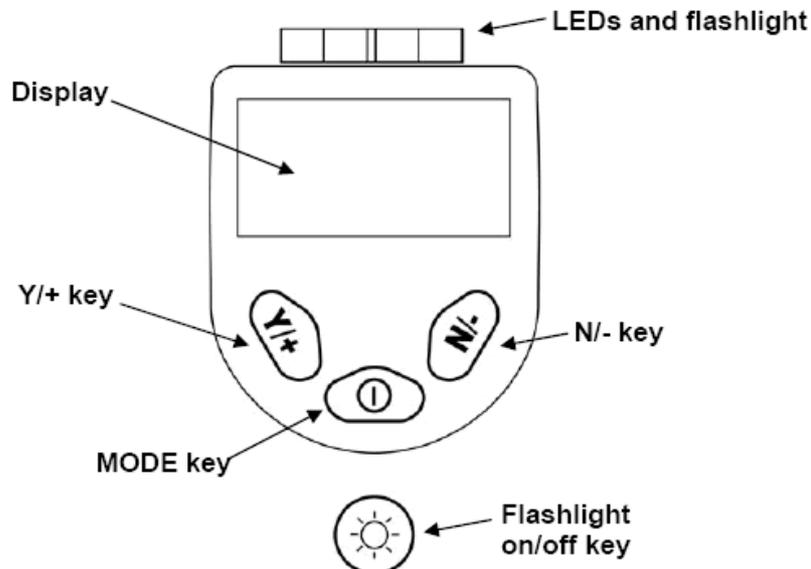
- from September 2009 to August 2010: maximum reading of 4,0 (4,0 is accepted);
- from September 2010 to August 2011: maximum reading of 3,0 (3,0 is accepted);;
- from September 2011 to August 2012: maximum reading of 2,0 (2,0 is accepted);.

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*.

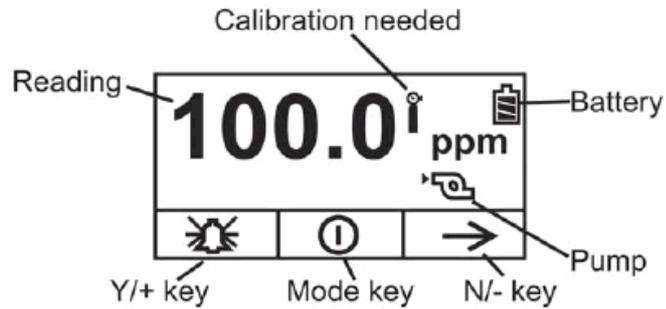


The instrument's user interface consists of the display, LED's, an alarm transducer, and four keys. The keys are:

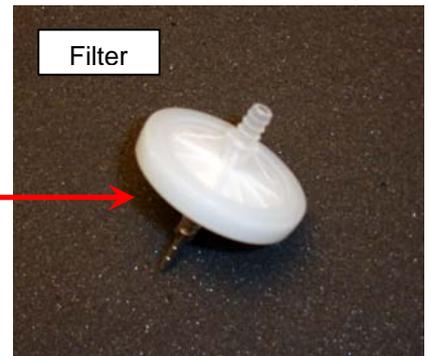
- Y/+
- MODE
- N/-
- Flashlight On/Off



The display show:



For proper measurement on the surface of the coverings of the racket, the device is used together with a special cap connected by two Teflon tubes to the MiniRAE-Lite. A filter is used to reduce the effects of the humidity.



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. 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.
8. 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): _____

9. 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.
10. 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.
11. 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 show "Unit off..." release the MODE key, and the instrument is now switched off.

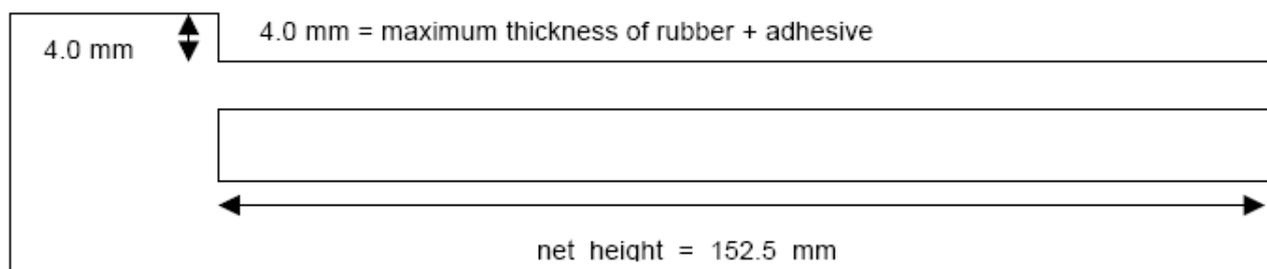
9.2 Thickness measurement

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.

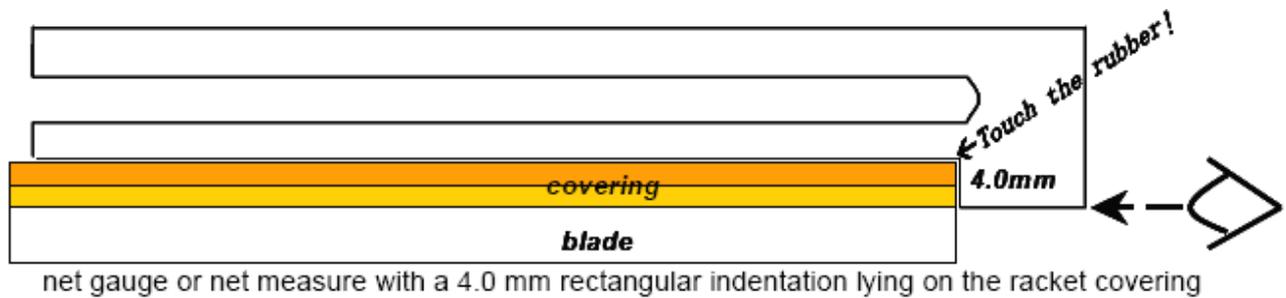
Umpires can make an initial thickness measurement with the net gauge. The net-gauge measures the height of the net (= 152.5mm) and the thickness of the rubber (≤ 4.0 mm)



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.



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 04.5 and 05.0 mm.

When a racket tester 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 (see page 12).

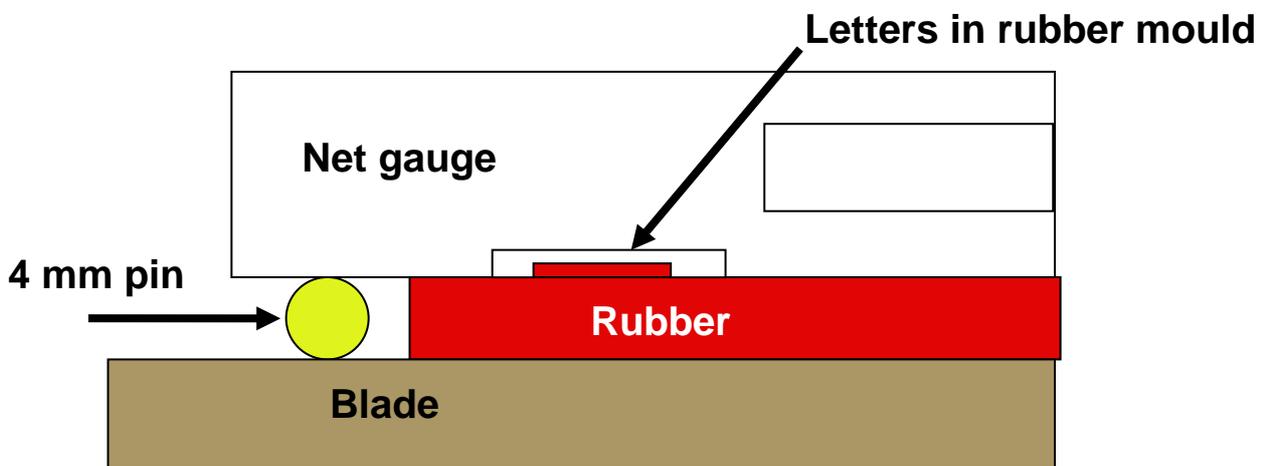
Thickness measurement with manual devices

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

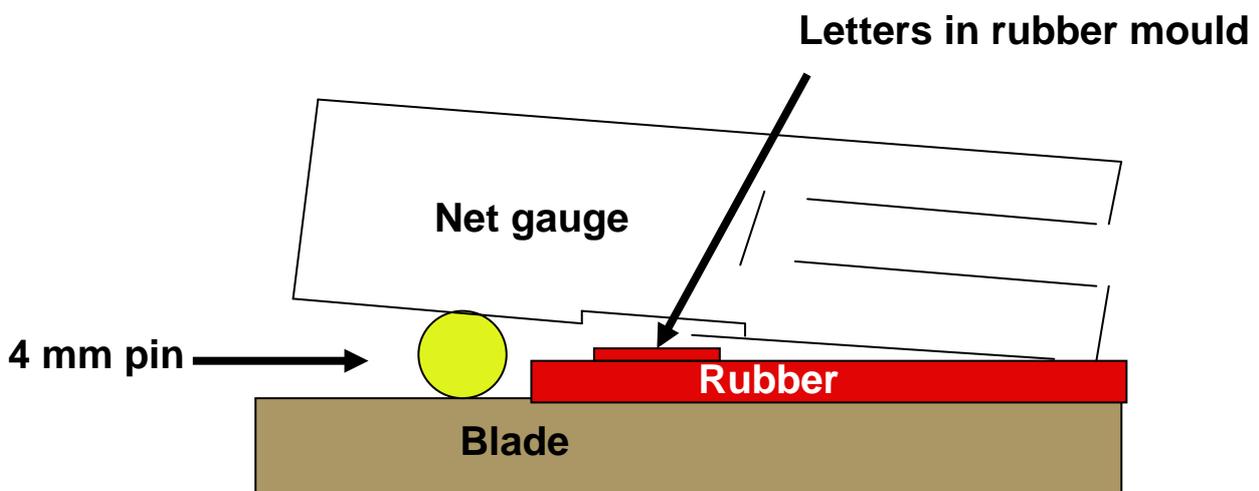
- Place a metallic piece of a pin with a diameter of 4.0 mm in the zone of the blade between the handle and the end of the rubber.
- Then across the rubber, place a ruler (which could be a net gauge) with a slot avoiding the height of the letters in the rubber mould (as shown below).

There are several possible results:

- 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.

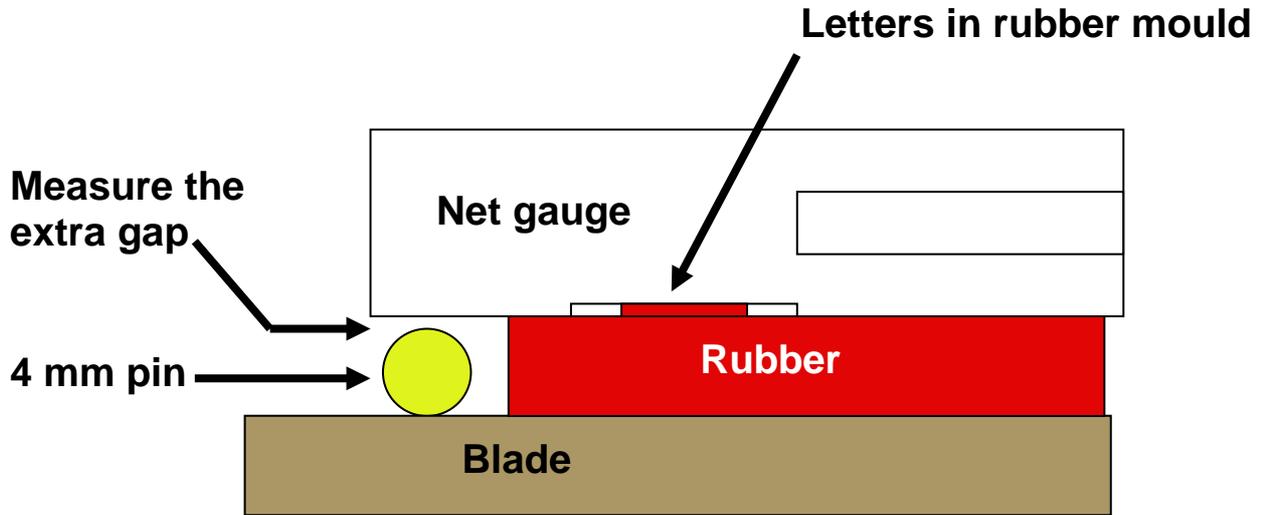


- If the ruler touches the pin and the far side of the rubber (as shown below), it is less than 4.0 mm thick and the result should be recorded.

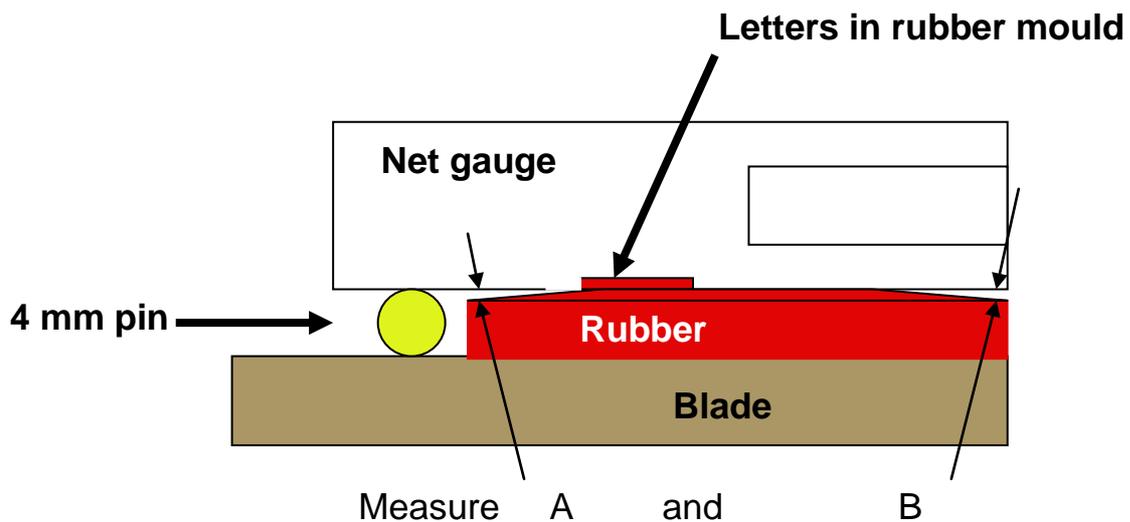


- If the ruler touches the rubber, but not the pin, the rubber is too thick (as shown below). The gap between the ruler and the pin can be measured using a thickness gauge. The

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 tester 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

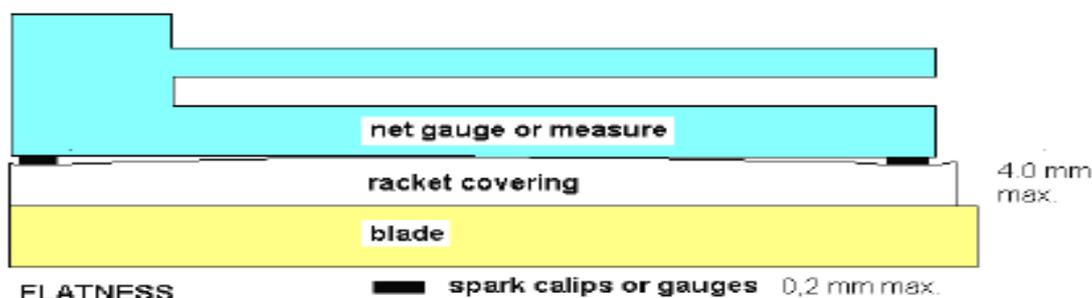
9.3 Powdering

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

9.4 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.



9.5 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;
3. Check the thickness of both sides, taking into account that, in case one of the sides has been found to be convex (a bubble) in the previous tests, the reading of the flatness test must be added to the final result of the thickness reading for this side of the racket, to determine the final thickness of this side. For concave sides, the reading with the thickness device shall be final.

9.6 Gloss measurement

Both sides of the racket should be matt in order not to distract the opponent, to dazzle the spectators or the TV cameras. The umpire must check the gloss of a racket covering or its base and report to the referee if a rubber is so shiny as to permit the shape of a light-source to be distinguished in its reflection or if the white big letters on a dark coloured net gauge held perpendicularly to the covering can easily be read at an angle of about 45°.

Gloss measurement by ASTM procedure D523:

1. The referee or the racket tester may measure the gloss of pimples-in rubbers by using ASTM procedure D523:
2. A 60° gloss-checker must give values less than 24%.
3. The gloss checker cannot measure the gloss of pimples-out rubbers.

9.7 Other Measurements

The racket covering may not be post-treated, for instance coated; otherwise it must be reported to the referee. However it is very difficult to determine if the rubber has been post-treated. The lack of friction, fine fissures in the top sheet, a special sound or bounce may be indicators, or a comparison with a standard authorized rubber sheet may be helpful.

With an 8x or 10x magnifying glass including a 0.1 mm scale it is possible, but difficult, to measure the height and the diameter of the pimples.

