



R&A Rules Limited
and
United States Golf Association

PROTOCOL FOR MEASURING IMPACT AREA MARKINGS
OF GOLF CLUBS

Rev. 2.0
1 December 2020

Revision	Date	Details
1.0	Dec-2008	Reference to 'hybrids' removed from paragraph two. The impact area of a hybrid club will be determined on a case by case basis.
1.1	Dec-2009	Various updates including units (from 0.0030" to 0.0030 in ² /in), clarification that grooves must be parallel throughout the impact area, that 3.7.4 do not apply to putters and drivers and that 3.7.5 and 3.7.6 only applies to clubs with claimed, marked or measured lofts of 25 degrees or greater.
1.2	Mar-2009	Inserted reference to outlier control for removal of anomalies and spurious measurements. Clarified that inconsistencies in groove width, spacing or cross-section with the intent to unduly influence the movement of the ball are not permitted.
2.0	1-Dec-2020	Updated references to The Equipment Rules. Reformatted step numbering and section titles to be consistent with other protocols.

1 Scope

This protocol describes the method used to determine the conformance of impact area markings to the Equipment Rules, Part 2, Section 5 (c), as administered by R&A Rules Ltd (The R&A) and the United States Golf Association (USGA).

2 Test Protocol

2.1 Calculation of groove parameters

- a. Ensure that the area to be measured is free from debris. Any paint/coating on the face or in the impact area markings may be removed.
- b. Measure the groove profile
 - i. The profile shall be measured in an orientation which is perpendicular to the grooves on the club face.
 - ii. The profile should include as many grooves as practical within the impact area.
- c. Determine the edge points of the grooves;
 - i. The edge points of a groove are defined as the point where a line, inclined at 30° to the land area of the club face, is tangent to the edge of the groove (Figure 1)

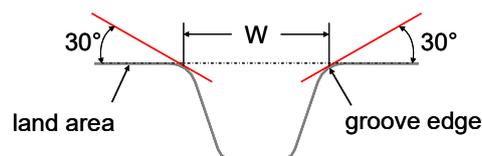


Figure 1: The 30° method for determining the edge points of a groove.

- ii. If the edge point defined using the 30° method occurs at a location that is more than 0.003 in. (0.0762 mm) below the land area, then the edge points shall be the points on the groove that are 0.003 in. (0.0762 mm) below the land area
- d. Calculate the groove width (W), separation (S_1 and S_2), depth (D) and area (A) of each groove from the groove profile (Figure 2)
 - i. The groove width is the distance between the edge points of the groove.
 - ii. The groove separation is the distance of the land area between the edge points of adjacent grooves.
 - iii. The groove depth is the perpendicular distance between an extension of the land area and the lowest point of the groove profile.
 - iv. The area of the groove is the area bounded by the groove profile and the line connecting the edge points.

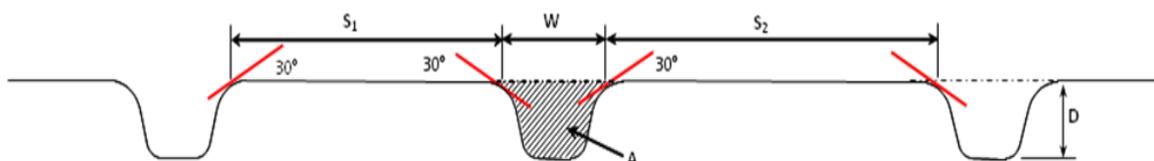


Figure 2: Groove parameters to be measured from the groove profile.

- e. For each groove, calculate $A/(W+S)$, Area divided by (Width plus Separation), using the smaller of the adjacent separation values for that groove.

- f. Calculate the sharpness of the groove edges, on both sides of the groove (upper and lower), using the two circles method
- i. A circle having a radius of 0.010 in. (0.254 mm) is drawn tangent to the sidewall and the adjacent land area. A second circle, concentric with the first and having a radius of 0.011 in. (0.2794 mm) is also drawn (Figure 3).

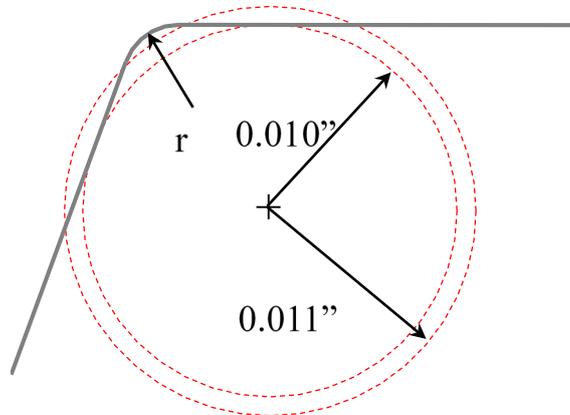


Figure 3: Arrangement of concentric circles.

- ii. If the edge does not protrude from the outer circle (Figure 4), then the edge radius is conforming.

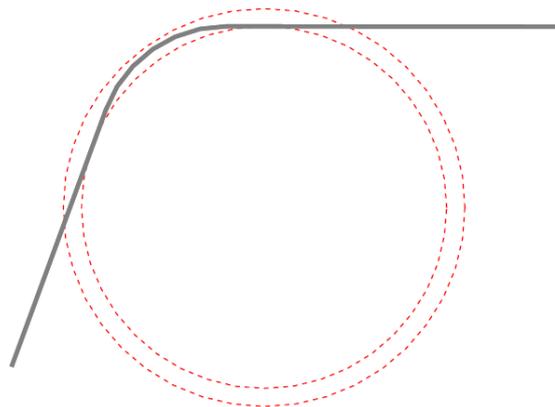


Figure 4: Edge does not protrude from outer circle.

- iii. If the edge protrudes from the outer circle, two lines are drawn from the centre of the concentric circles extending to the locations where the edge protrudes from the outer circle. The angle between these lines is the angle of protrusion (Figure 5).

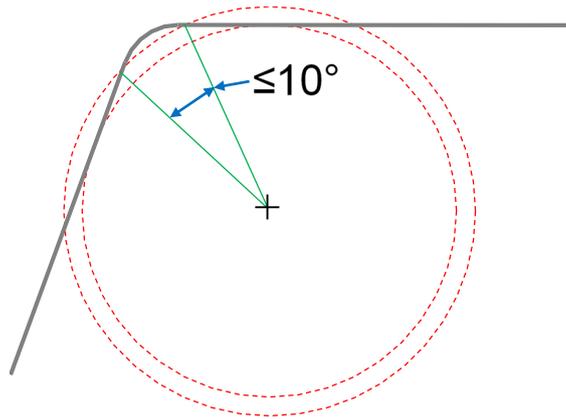


Figure 5: Maximum angular extent of edge protrusion determined by the angle of protrusion

Note. The same method for determining edge sharpness is also utilised for the evaluation of the sharpness of the edges of punch marks.

3 Determination of conformance status

- a. Groove Width
 - i. If 50% or more of the measured groove widths exceed 0.035 in. (0.889 mm) then the club is non-conforming.
 - ii. If any single measured groove width exceeds 0.037 in. (0.940 mm) then the club is non-conforming.
- b. Groove Depth
 - i. If 50% or more of the measured groove depths exceed 0.020 in. (0.508 mm) then the club is non-conforming.
 - ii. If any single measured groove depth exceeds 0.022 in. (0.559 mm) then the club is non-conforming.
- c. Groove Separation
 - i. If 50% or more of the measured groove separations are less than three times the maximum adjacent measured groove width, then the club is non-conforming.
 - ii. If any single measured groove separation is less than three times the maximum adjacent measured groove width minus 0.008 in. (0.203 mm) then the club is non-conforming.
 - iii. If 50% or more of the measured groove separations are less than 0.075 in. (1.905 mm) then the club is non-conforming.
 - iv. If any single measured groove separation is less than 0.073 in. (1.854 mm) then the club is non-conforming.
- d. Groove Consistency
 - i. If the range of measured groove widths exceeds 0.010 in. (0.254 mm) then the club is non-conforming.
 - ii. If the range of measured groove depths exceeds 0.010 in. (0.254 mm) then the club is non-conforming.
- e. Area over Width Plus Separation (applies to all clubs except for drivers)
 - i. If 50% or more of the measured values of $A/(W+S)$ are greater than 0.0030 in^2/in (0.0762 mm^2/mm) then the club is non-conforming.
 - ii. If the measured value of $A/(W+S)$ value for any single groove is greater than 0.0032 in^2/in (0.0813 mm^2/mm) then the club is non-conforming.

- f. Edge Radius (applies to all clubs with claimed, marked or measured lofts of 25 degrees or higher)
 - i. If 50% or more of the upper groove edges or 50% or more of the lower groove edges have an angle of protrusion greater than 10° , then the club is non-conforming.
 - ii. If any single groove edge protrudes more than 0.0003 in. (0.0076 mm) outside the outer circle, then the club is non-conforming.
- g. Punch Marks
 - i. If the area of any single punch mark exceeds 0.0044 in^2 (2.839 mm^2), then the club is non-conforming.
 - ii. If the distance between any adjacent punch marks (or between any punch marks and an adjacent groove) is less than 0.168 in. (4.267 mm), measured from centre to centre then the club is non-conforming.
 - iii. If the depth of any punch mark exceeds 0.040 in. (1.016 mm) then the club is non-conforming.
 - iv. For all clubs with the exception of driver, if the volume of punch marks in the impact area exceeds the allowable for an equivalent groove (that is, $0.0030 \text{ in}^3/\text{in}^2$ ($0.0762 \text{ mm}^3/\text{mm}^2$) of impact area covered by punch marks) then the club is non-conforming.
 - v. For all clubs with claimed, marked or measured lofts of 25 degrees or higher, if 50% or more of the punch mark edges have an angle of protrusion greater than 10° , then the club is non-conforming.
 - vi. For all clubs with claimed, marked, or measured lofts of 25 degrees or greater, if any single punch mark edge protrudes more than 0.0003 in. (0.0076 mm) outside the outer circle, then the club is non-conforming.

The profiles will be used to assess the requirements that the grooves must have a symmetrical cross-section, have sides which do not converge and in the case of clubheads with loft angle greater than or equal to 25 degrees, have a plain cross-section.

Note: All measurements will include appropriate outlier controls. Screening methods may be employed as appropriate.