

# ICC REGULATIONS FOR THE REVIEW OF BOWLERS REPORTED WITH SUSPECTED ILLEGAL BOWLING ACTIONS

## TERMS OF REFERENCE

(As amended by CEC at its meeting in July 2013)

### DEFINITIONS

In these Regulations the following words and phrases have the following meanings:

**Home Board** means the national board or association which the Player plays for when representing his country at cricket.

**Host Country** means the country in which the relevant Match takes place.

**Illegal Bowling Action** means a bowling action which contravenes Law 24.2 (as read with Law 24.3) of the Laws of Cricket.

**Match** means a match defined as International Cricket in accordance with paragraph 1.1.1 below.

**Match Referee** means the referee appointed for the relevant Match.

**Player(s)** means a cricketer who participates or has participated in International Cricket.

**Umpire** means the umpire appointed for the relevant Match.

## 1 INTRODUCTION

### 1.1 These Regulations:

- 1.1.1 Detail the process for dealing with Players suspected of bowling in a manner which constitutes an Illegal Bowling Action in any of the following Matches (collectively defined as International Cricket):
  - a) Tests, One Day and Twenty20 Internationals (Men's and Women's); and
  - b) Matches other than those set out above which form part of the following ICC events:

ICC U19 CWC, ICC World Cricket League 1-8 inclusive, ICC CWC Qualifier, ICC World T20 Qualifier, ICC U19 CWC Global Qualifier, ICC Intercontinental Cup and Shield and any other event organised or sanctioned by the ICC from time to time to which the ICC deems it appropriate that these Regulations should apply.
- 1.1.2 Provide for an additional mechanism for the reporting of Players suspected of bowling in a manner which constitutes an Illegal Bowling Action at the ICC U19 CWC and the ICC CWC Qualifier.
- 1.1.3 Provide for certain minimum requirements to be followed by ICC Members relating to Players suspected of bowling in a manner which constitutes an Illegal Bowling Action in their domestic matches.

- 1.2 Nothing contained herein shall override an Umpire's responsibility and discretion to apply Law 24 of the Laws of Cricket.

## 2 TESTS, ONE-DAY AND TWENTY20 INTERNATIONALS

If in a Match as set out in paragraph 1.1.1(a) above, a Player is called by an Umpire under the provisions of Law 24.2 or is suspected by an Umpire or the Match Referee of bowling with an Illegal Bowling Action, the following procedure shall apply.

**Note:** Umpires and Match Referees, in deciding whether to cite a Player under these Regulations, should use the naked eye viewing the action live and/or on television at normal speed. Slow motion television replays should only be used to confirm initial suspicions.

### 2.1 Reporting Procedure

- 2.1.1 At the conclusion of the relevant Match, the Umpire(s) and/or Match Referee shall write a report (the Match Officials' Report) detailing their concerns about the bowling action of the relevant Player including, where relevant, whether those concerns relate to the Player's bowling action generally or whether they relate to one or more specific types of delivery.
- 2.1.2 If the Match Officials' Report is written by the Umpires it shall be passed to the Match Referee.
- 2.1.3 Within 24 hours of the conclusion of the Match in which the Player is reported, the Match Referee shall furnish the Player's team manager and the ICC with a copy of the Match Officials' Report.
- 2.1.4 Once the Player's team manager and the ICC have been furnished with a copy of the Match Officials' Report and within 24 hours thereof, the Match Referee, through the Board of the Host Country, shall make a media statement to the effect that the Player has been reported as having a suspected Illegal Bowling Action and that he will be subject to the ICC review process as set out herein.
- 2.1.5 If the Match is a televised Match, upon receipt of the Match Officials' Report from the Match Referee, the ICC shall arrange for three copies of the television footage of the bowling spells of the Player in the relevant Match to be produced as soon as possible. Once these tapes have been received, the ICC shall immediately write to the Player's Home Board confirming that the Player has been reported for a suspected Illegal Bowling Action and enclosing the Match Officials' Report and two copies of the tape referred to above. The Board shall retain one copy for its own purposes and the other shall be forwarded to the Player. The third copy shall be retained by the ICC for the independent analysis and any BRG hearing referred to in paragraphs 2.2 and 2.3 below. If no television footage is available, upon receipt of the Match Officials' Report from the Match Referee, the ICC shall immediately write to the Player's Home Board confirming that the Player had been reported for a suspected Illegal Bowling Action and enclosing the relevant Match Officials' Report.

### 2.2 ICC independent analysis

- 2.2.1 If a Player is reported in accordance with paragraph 2.1.1 above, he shall be required to submit to an independent analysis of his bowling action (Independent Analysis) carried out as follows:
- 2.2.2 The ICC shall appoint on an annual basis a panel of human movement specialists.

- 2.2.3 The members of this panel shall have the credentials, equipment and facilities to conduct analysis of the bowling actions of Players in accordance with the ICC Standard Analysis Protocols (Annexure 1 hereto).
- 2.2.4 The Independent Analysis shall be carried out by a member of the ICC panel of human movement specialists referred to in paragraph 2.2.2 above (the Appointed Specialist), appointed by the ICC in consultation with the Player's Home Board. The Appointed Specialist shall not be domiciled in the country which the Player represents in International Cricket.
- 2.2.5 The Independent Analysis shall be carried out as soon as reasonably possible but, in any event, within 21 days of receipt by the Player's Home Board of the notice referred to in paragraph 2.1.5 above. See paragraph 2.2.15 below for Players reported during ICC events.
- 2.2.6 The Independent Analysis shall be carried out in accordance with the ICC Standard Analysis Protocols and shall take into account the Match Officials' Report. If the Player expresses any concern or complaint regarding the circumstances or conduct of the Independent Analysis, he should make these known to the Appointed Specialist before the conclusion of the Independent Analysis. The Appointed Specialist should make a written note of the relevant concern or complaint which should be agreed with the Player.
- 2.2.7 The ICC shall be responsible for determining the time and place at which the Independent Analysis shall be carried out and shall ensure that the Player, through the Player's Home Board, is given reasonable notice thereof. All travel and accommodation arrangements shall be made by the ICC in consultation with the Player's Home Board.
- 2.2.8 In the event of the Player failing to submit to the Independent Analysis as required above, such failure will be regarded as an admission that he bowls with an Illegal Bowling Action and he shall be immediately suspended from bowling in International Cricket until such time as he so submits and satisfactorily participates in an Independent Analysis.
- 2.2.9 Within 14 days of the date for the carrying out of the Independent Analysis, the Appointed Specialist shall furnish the ICC with a written report (hereinafter referred to as the Independent Assessment) in the form as set out in the ICC Standard Analysis Protocols. Where the Independent Assessment concludes that the Player employed an Illegal Bowling Action during the Independent Analysis, it should indicate whether the Player employed an Illegal Bowling Action generally or in respect of specific type(s) of delivery only and whether, in the Appointed Specialists opinion, such conclusion is not inconsistent with the relevant video evidence. Where the Independent Assessment concludes that the Player did not employ an Illegal Bowling Action during the Independent Analysis, it should, where relevant, indicate whether, in the opinion of the Appointed Specialist, the Player's bowling action during the Independent Analysis was materially different to his action in the Match in respect of which he was cited (whether generally or in respect of the specific type(s) of delivery (if any) identified in the Match Officials' Report). The Independent Assessment should also include any notes of concerns or complaints of the Player made under paragraph 2.2.6 above. See paragraph 2.2.15 below for Players reported during ICC events.

- 2.2.10 Immediately upon receipt of the Independent Assessment by the ICC, the ICC shall furnish the Players Home Board with a copy thereof.
- 2.2.11 Subject to paragraph 2.2.12 below, in the event that the Independent Assessment concludes either that (i) the Player employed an Illegal Bowling Action during the Independent Analysis and that such conclusion is not inconsistent with the relevant video footage or that (ii) the Player's bowling action during the Independent Analysis was materially different to his action in the Match in respect of which he was reported, the Player shall immediately be suspended from bowling in International Cricket until such time as he has submitted to a fresh Independent Analysis in accordance with the provisions set out in paragraph 2.4 below, and in which fresh Independent Analysis it is concluded that he has remedied his action. The suspension shall become operative from the date of receipt by the Player's Home Board of a copy of the Independent Assessment in accordance with paragraph 2.2.10 above.

**Note:** The ICC Standard Analysis Protocols contains reference to a level of acceptable elbow extension. Should the Independent Assessment conclude that the Player's bowling action exhibits a degree of elbow extension of the bowling arm higher than the said acceptable level, the action of the Player shall be deemed to be an Illegal Bowling Action. It should be noted that in order for the Player's bowling action to be classified as a legal action, the degree of elbow extension recorded for each and every delivery must be within the level of acceptable elbow extension.

- 2.2.12 In circumstances where the Independent Assessment concludes that the Player employed an Illegal Bowling Action during the Independent Analysis in respect of a specific type of delivery only, the Player will be allowed to continue bowling in International Cricket but subject to the warning (Warning) that should he continue to bowl any of the specific type(s) of delivery for which he has been found to have an Illegal Bowling Action, he will run the risk of being cited a second time.

In these circumstances a further report resulting in an Independent Analysis concluding that the Player has employed an Illegal Bowling Action will result in the immediate suspension of the Player from bowling in International Cricket and such suspension shall be considered a second suspension under the provisions of paragraph 2.5 below.

**Note:** This is intended to cover the circumstances where a Player employs a different technique to deliver a specific type of delivery e.g. propelling the ball out of the back of the hand to produce a "googly" or "doosra". It is not intended to cover the situation where the same basic technique is used to produce a different type of delivery e.g. more effort to produce a bouncer or a yorker.

- 2.2.13 Subject to the provisions of paragraph 2.2.8 above, throughout the period up to the date of receipt by the Player's Home Board of the Independent Assessment, the Player shall be permitted to continue bowling in International Cricket. At any time throughout this period the Player is subject to being called on the field by the Umpire(s) in accordance with Law 24.2 and the consequences of such Law must apply. During this period a further Match Officials' Report will however have no consequence.

- 2.2.14 In the event that the Player does not accept the conclusions of the Independent Assessment he shall be entitled to a hearing of the Bowling Review Group (BRG) as set out in paragraph 2.3 below.
- 2.2.15 In the event of a Player being reported during an ICC CWC (Men or Women), ICC World T20 (Men or Women), ICC World Test Championship, ICC CWC Qualifier or the ICC World Twenty20 Qualifier, the Independent Analysis shall be carried out and the Independent Assessment furnished on an expedited basis. In this respect, every reasonable effort shall be made for the Independent Analysis to be carried out and the Independent Assessment furnished within a period of 7 days from the date of receipt of the Match Officials' Report.

### 2.3 Bowling Review Group Hearing

- 2.3.1 Upon receipt of an application for a BRG hearing in accordance with paragraph 2.3.2 below, the ICC shall appoint a BRG as follows:
- The BRG shall comprise the following persons: A current member of the ICC Code of Conduct Commission (in the Chair and with the casting vote only), a current ICC referee, an ex-international player, an ex-international umpire and a human movement specialist. The ICC General Manager – Cricket shall be an ex-officio member of the BRG.
  - The Chairman of the ICC Cricket Committee shall be responsible for appointing the Chairman of the BRG from the current members of the ICC Code of Conduct Commission. Once appointed, the Chairman of the ICC Cricket Committee and the Chairman of the BRG shall be responsible for selecting the other members of the BRG in accordance with paragraphs 2.3.1 c), d) and e) below.
  - The ex-international player and umpire shall be appointed from the list of Full Member Boards' bowling advisors established in accordance with paragraph 5.1 below.
  - The human movement specialist shall be appointed from the ICC panel of human movement specialists referred to in paragraph 2.2.2 above. The human movement specialist shall not be the Appointed Specialist.
  - It is preferable that at least one of the BRG shall be a qualified legal practitioner. In the event of the BRG, as appointed in accordance with the above provisions, not including a legal practitioner then a legal practitioner shall be appointed to the BRG in an advisory capacity only and he shall not have a vote.
  - The quorum for any hearing of the BRG shall be four persons provided that the Chairman and the human movement specialist shall be included therein.
  - No member of the BRG shall be domiciled in the country which the Player represents in International Cricket.
- 2.3.2 The Player seeking a hearing of the BRG shall lodge with the ICC Head of Legal written notice thereof within 14 days of the date of receipt by the Player's Board of the Independent Assessment. The BRG hearing will be held as soon as reasonably possible and, in any event, within 21 days of receipt by the ICC of the Player's written notice referred to above.

- 2.3.3 The BRG hearing shall be held in person and not by telephone or video conference, although the BRG may, in its discretion, admit evidence at the hearing in any form.
- 2.3.4 The ICC shall be responsible for arranging the appointment of the BRG in accordance with paragraph 2.3.1 above and for determining in consultation with the Chairman of the BRG the time and place for the hearing. The ICC shall ensure that the Player, through the Player's Home Board, is given reasonable notice thereof.
- 2.3.5 The Player shall attend the hearing. However, if the Player has received notice of the hearing in terms of paragraph 2.3.4 above and fails to attend the hearing, the hearing may at the absolute discretion of the Chairman of the BRG, proceed in the absence of the Player.
- 2.3.6 The Player shall be entitled to a representative who shall be entitled to attend the hearing.
- 2.3.7 The BRG hearing shall be conducted in accordance with the usual principles of natural justice.
- 2.3.8 The BRG will consider the following:
- a) The video evidence referred to in paragraph 2.1.5 above.
  - b) The Match Officials' Report.
  - c) The Independent Assessment together with any image based evidence accompanying such assessment.
  - d) Any further evidence that the Player and/or his representative wishes to present in the Player's defence. This may include a written report, a verbal submission, any expert evidence and image based evidence.
  - e) Any written or video evidence that the Player's Home Board wishes to be considered on behalf of the Player.
- 2.3.9 The Player and/or his representative shall be entitled to question any person called to give evidence in the course of the hearing on any issue relevant to the hearing. The members of the BRG shall be entitled to question the Player and/or any person called to give evidence on the Player's behalf.
- 2.3.10 After all the evidence and argument has been presented, the BRG shall adjourn the hearing to deliberate on its decision.
- 2.3.11 The BRG shall reach a decision by a simple majority vote. The Chairman of the BRG has the casting vote.
- 2.3.12 The BRG shall decide whether or not the Player has an Illegal Bowling Action and that (i) the suspension of, or the Warning to, the Player be maintained, or (ii) the suspension of, or the Warning to, the Player be lifted. The BRG must, in each case, set out the reasons why the decision has been reached, including a summary of the evidence on which the decision was based.
- 2.3.13 The ICC will communicate the decision of the BRG in writing to the Player, through his Home Board, within 48 hours of the hearing being adjourned in accordance with paragraph 2.3.10 above.
- 2.3.14 Subject to the right of the Player to re-assessment in accordance with paragraph 2.4 below, the decision of the BRG shall be final and binding.

## 2.4 Re-assessment of Player's bowling action

- 2.4.1 A Player who has been suspended from bowling in International Cricket under these Regulations shall be permitted under the supervision and with the consent of his Home Board to continue to play domestic cricket.
- 2.4.2 Subject to the provisions of paragraph 2.4.5 and paragraph 2.5 below, a Player who has been suspended from bowling in International Cricket under these Regulations, may at any time apply to the ICC for a re-assessment of his bowling action.
- 2.4.3 Such re-assessment shall be carried out in the same manner as the Independent Analysis referred to in paragraph 2.2 above save that the purpose of the comparison between the re-assessed action and the action of the Player as employed in the Match in which he was reported shall be to determine the extent, if any, of the improvement to his bowling action.
- 2.4.4 In the event of such re-assessment concluding that the Player has remedied his bowling action and that his bowling action is no longer an Illegal Bowling Action the Player's suspension shall be lifted and he shall be permitted to continue bowling in International Cricket forthwith.
- 2.4.5 The BRG shall have the discretion to specify a fixed period before the expiry of which the Player shall not be entitled to approach the ICC for a re-assessment of his bowling action in terms hereof. Such discretion shall only be exercised in the instance of a frivolous application for a BRG hearing and the maximum period so specified shall be 1 year.
- 2.4.6 The Independent Assessment resulting from the re-assessment will stand in the place of the original Independent Assessment, and the provisions of paragraphs 2.2.10, 2.2.11, 2.2.12 and 2.2.14 and paragraph 2.3 will apply in respect of it.

## 2.5 Second and further reports

In the event of a Player being suspended from bowling in International Cricket under these Regulations for a second time within a period of 2 years from the date of the commencement of the first period of suspension, the Player shall be suspended from bowling in International Cricket for a minimum period of 1 year. Only after the expiry of this 1 year period will the Player be entitled to approach the ICC for a re-assessment of his action in accordance with paragraph 2.4 above. (See also paragraph 2.2.12 above)

## 2.6 Costs

- 2.6.1 The ICC will be responsible for the costs of the Independent Analysis and Assessment as well as the costs of the BRG hearing, including the costs incurred by the Player to attend thereat.
- 2.6.2 The Player and/or his Home Board shall be responsible for the payment of any costs of representation of the Player and for any subsequent re-assessments carried out at the Player's request.

## 3 MATCHES OTHER THAN TESTS, ONE-DAY AND TWENTY20 INTERNATIONAL MATCHES

If in a Match as set out in paragraph 1.1.1 (b) above, a Player is called by an Umpire under the provisions of Law 24.2 or is suspected by an Umpire or Match Referee of bowling with an Illegal Bowling Action, the following procedure shall apply.

**Note:** Umpires and Match Referees, in deciding whether to cite a Player under these Regulations, should use the naked eye viewing the relevant Player's bowling action live. Slow motion video footage should only be used to confirm initial suspicions.

### 3.1 Reporting procedure

- 3.1.1 At the conclusion of the relevant Match, the Umpire(s) and/or Match Referee shall write a Match Officials' Report detailing their concerns about the bowling action of the relevant Player, including, where relevant, whether those concerns relate to the Player's bowling action generally or whether they relate to one or more specific types of delivery.
- 3.1.2 If the Match Officials' Report is written by the Umpire(s) it shall be passed to the Match Referee.
- 3.1.3 Within 48 hours of the conclusion of the Match in which the Player is reported (within 24 hours in respect of a Match in the ICC CWC Qualifier, ICC World Twenty20 Qualifier and the ICC U19 CWC), the Match Referee shall furnish the Player's team manager and the ICC with a copy of the Match Officials' Re-port.
- 3.1.4 Once the Player's team manager and the ICC have been furnished with a copy of the Match Officials' Report and within 24 hours thereof, the Match Referee, through the ICC, shall make a media statement to the effect that the Player has been reported and that he will be subject to the ICC review process as set out herein.
- 3.1.5 Upon receipt of the Match Officials' Report from the Match Referee, the ICC shall immediately write to the Player's Home Board confirming that the Player has been cited for a suspected Illegal Bowling Action and enclosing a copy of the Match Officials' Report.
- 3.1.6 Such written confirmation referred to in paragraph 3.1.5 above shall require the Player to submit to, and the Player's Home Board to carry out, an analysis of that Player's bowling action (Home Board Analysis) as provided for below.

### 3.2 Home Board Analysis

- 3.2.1 If a Player is reported in accordance with paragraph 3.1.1 above, he shall be required to submit to an analysis of his bowling action which shall be carried out as follows:
  - 3.2.2 The Home Board Analysis shall be conducted by the group of bowling advisors appointed by the Player's Home Board in accordance with paragraph 5.1 below.
  - 3.2.3 The Home Board Analysis shall be carried out as soon as reasonably possible and the Player's Home Board shall furnish the ICC with a written report (Home Board Assessment) of the outcome of such analysis within 21 days of the receipt of the confirmation referred to in paragraph 3.1.6 above. See paragraph 3.2.9 below for Players reported during ICC events.

- 3.2.4 The Home Board Analysis need not involve the detailed analysis as prescribed in the ICC Standard Analysis Protocols but should as a minimum involve a genuine effort to assess the legality of the Player's bowling action taking into account the provisions of Law 24.3 of the Laws of Cricket and using the experience and technical bowling expertise of the appointed group of bowling advisors.
- 3.2.5 Where the Home Board fails to furnish a Board Assessment within the period prescribed in paragraph 3.2.3 above and remains in default of this provision despite notice by ICC requiring the Home Board to comply with this provision within a period of 10 days from the date of such notice, the Player shall automatically be suspended from bowling in International Cricket from the date of expiry of such notice period until such time as a Home Board Assessment has been properly furnished.
- 3.2.6 Where the Home Board Assessment concludes that the Player employs a legal bowling action, the Player shall be permitted to continue bowling in International Cricket.
- 3.2.7 Where the Home Board Assessment concludes that the Player employs an Illegal Bowling Action, the Player shall be immediately suspended from bowling in any International Cricket until such time as a further Home Board Assessment concludes that he has remedied his action.
- 3.2.8 Subject to the provisions of paragraph 3.2.5 above, throughout the period up to the date of receipt of the Home Board Assessment, the Player shall be permitted to continue bowling in International Cricket. At any time throughout this period the Player is subject to being called on the field by the Umpire(s) in accordance with Law 24.2 and the consequences of such Law must apply. During this period a further Match Officials' Report will however have no consequence.
- 3.2.9 In the event of a Player being reported during the ICC CWC Qualifier, ICC World Twenty20 Qualifier or the ICC U19 CWC, the Home Board Analysis should be carried out and the Home Board Assessment furnished on an expedited basis. In this respect, every reasonable effort shall be made for the Home Board Analysis to be carried out and the Home Board Assessment furnished within 7 days from the date of receipt of the Match Officials' report.

### 3.3 ICC analysis

- 3.3.1 If a Player, having been reported for a suspected Illegal Bowling Action under paragraph 3.1.1 above but having been permitted to continue bowling in International Cricket following a Home Board Assessment concluding that his action is a legal action (following remedial action or otherwise), is reported under these Regulations a second time within a period of 2 years from the date of the first report, the ICC shall immediately write to the Player's Home Board confirming that a second report has been received and requiring the Player to submit to an analysis by the ICC (ICC Analysis) of his bowling action, as provided for below (See also paragraph 3.5.3 below – right to invoke procedure under paragraphs 2.2, 2.3 and 2.4):
- 3.3.2 The ICC Analysis shall be conducted by the ICC High Performance Manager (or the ICC Chief Referee should the High Performance Manager be part of the panel appointed under paragraph 4 below that has reported the Player) and a member of the panel of human movement specialists appointed in terms of paragraph 2.2.2 above.

- 3.3.3 The ICC Analysis shall be carried out as soon as reasonably possible but, in any event, within 21 days of receipt by the Player's Home Board of the confirmation referred to in paragraph 3.3.1 above. See paragraph 3.3.11 below for Players reported during an ICC event.
- 3.3.4 The ICC shall be responsible for arranging the time and place for the ICC Analysis and shall ensure that the Player, through the Player's Home Board, is given reasonable notice thereof.
- 3.3.5 The ICC Analysis need not involve the detailed analysis as prescribed in the ICC Standard Analysis Protocols but should, as a minimum, involve a genuine effort to assess the legality of the Player's bowling action taking into account the provisions of Law 24.3 and using the experience and technical expertise of the persons appointed to conduct the review. The Player's bowling action should be reviewed in both a practice and match environment.
- 3.3.6 In the event of the Player failing to submit to an ICC Analysis as required above, such failure will be regarded as an admission that he bowls with an Illegal Bowling Action and he shall be immediately suspended from bowling in International Cricket until such time as he so submits.
- 3.3.7 The persons appointed under paragraph 3.3.2 above to conduct the ICC Analysis, shall furnish a written report to the ICC Cricket Operations Manager (ICC Assessment) within 7 days of the conclusion of the ICC Analysis. The ICC Cricket Operations Manager shall upon receipt of the ICC Assessment immediately write to the Player's Home Board enclosing a copy of the ICC Assessment and confirming the outcome thereof. See paragraph 3.3.11 below for Players reported during ICC events.
- 3.3.8 Where the ICC Assessment concludes that the Player employs a legal bowling action, the Player shall be permitted to continue bowling in International Cricket.
- 3.3.9 Where the ICC Assessment concludes that the Player employs an Illegal Bowling Action, the Player shall be immediately suspended from bowling in any International Cricket for a period of 12 months. The suspension shall become operative from the date of receipt by the Player's Home Board of the confirmation referred to in paragraph 3.3.7 above.
- 3.3.10 Throughout the period up to the date of receipt of the ICC Assessment by the Player's Board, the Player shall be permitted to continue bowling in International Cricket. At any time throughout this period the Player is subject to being called on the field by the Umpire(s) in accordance with Law 24.2 of the Laws of Cricket and the consequences of such Law must apply. During this period a further Match Officials' Report will however have no consequence.
- 3.3.11 In the event of a Player being reported during the ICC CWC Qualifier, ICC World Twenty20 Qualifier or the ICC U19 CWC, the ICC Analysis should be carried out and the ICC Assessment furnished on an expedited basis. In this respect, every reasonable effort shall be made for the ICC Analysis to be carried out and the ICC Assessment furnished within 7 days from the date of receipt of the Match Officials' report.

#### 3.4 Costs

The Player's Home Board shall be responsible for the costs of the ICC Analysis which costs shall include the reasonable accommodation and travel costs of the persons appointed to the review panel as well as the professional fees of the human movement specialist.

### 3.5 Right of appeal against ICC assessment and right to re-assessment

- 3.5.1 Any Player who has been suspended from bowling from International Cricket in accordance with paragraph 3.3.9 above, shall, subject to the provisions of paragraph 3.5.2 and 3.5.3 below, have no right to a re-assessment of his bowling action or of appeal against the outcome of the ICC Assessment.
- 3.5.2 Upon the expiry of the 12 months suspension period referred to in paragraph 3.3.9 above, the Player shall be automatically eligible to bowl in International Cricket and no application for re-assessment shall be necessary.
- 3.5.3 Furthermore, upon being notified of the second report referred to in paragraph 3.3.1 above or of the period of suspension referred to in paragraph 3.3.9 above, the Player's Home Board may elect, at its cost, to follow the procedure outlined in paragraphs 2.2, 2.3 and 2.4 of these Regulations. In such a case, all costs including the costs of the Independent Analysis, any Bowling Review Group Hearing and any re-assessments shall be for the account of the Player's Home Board.

## 4 ICC U19 CRICKET WORLD CUP AND CWC QUALIFIER

- 4.1 The ICC shall appoint an event bowling action review panel to attend each ICC U19 Cricket World Cup and CWC Qualifier (the Events).
- 4.2 The appointed panel shall consist of a member of the ICC panel of human movement specialists referred to in paragraph 2.2.2 above and two other bowling experts of suitable bowling or coaching experience.
- 4.3 This panel shall be responsible for identifying, in consultation with the Match officials appointed to the Events, any Players with suspected Illegal Bowling Actions.

**Note:** The panel (and Match officials), in deciding whether to cite a Player as set out above, should use the naked eye viewing the action live and/or on television at normal speed. Slow motion television replays should only be used to confirm initial suspicions.

- 4.4 At the conclusion of the Event, the panel shall submit a report to the ICC detailing its concerns about the bowling actions of any Players so identified.
- 4.5 Such report(s) shall be dealt with by the ICC in the same way as it would deal with a Match Officials' Report furnished to the ICC under the provisions of paragraphs 2.1.1 or 3.1.1 above and any Players so cited shall be treated in accordance with the procedures set out in paragraphs 2 or 3 above (as the case may be) save that the expedited procedures referred to in paragraphs 2.2.15, 3.2.9 and 3.3.11 shall not apply.

## 5 ICC MEMBER BOARDS POLICY

Each ICC Member Board shall formulate and implement a policy and strategy to deal with players with suspected Illegal Bowling Actions in its domestic cricket. Such policy and strategy shall as a minimum requirement:

- 5.1 Establish a group of bowling advisors comprising the following persons: An ex-international fast bowler, an ex-international spinner, an ex-international umpire and, if available, a human movement specialist. The persons appointed shall be the best available and shall preferably have appropriate coaching experience.

- 5.2 Establish a mechanism for identifying bowlers with suspected Illegal Bowling Actions. Primary responsibility for this shall be the umpires. In addition, for all national age group tournaments, a bowling action review panel (similar to the panel appointed in accordance with 4.2 above) shall be appointed by the Member Board to attend such tournaments with the task of identifying any players with suspected Illegal Bowling Actions.

**Note:** Umpires and those responsible for identifying players with suspected Illegal Bowling Actions, in deciding whether to cite a player as set out above, should use the naked eye viewing the bowling action live and/or on television at normal speed. Slow motion television replays should only be used to confirm initial suspicions.

- 5.3 Require that having identified a player with a suspected Illegal Bowling Action be it by way of an umpire's report or otherwise, such player shall be referred to the Member Board's group of bowling advisors for analysis and assessment.
- 5.4 Require that any player reported in accordance with this process shall not be selected by the Member Board as a player for any national representative team until such time as his bowling action has been assessed in accordance with paragraph 5.3 above and, in the event of such assessment confirming that the player has an Illegal Bowling Action, until such time as his bowling action has been remedied.

## 6 ICC ILLEGAL BOWLING ACTIONS DATABASE

The ICC shall be responsible for maintaining a database in which the names of all Players cited under these Regulations and the details and status of any Analysis and Assessments carried out in consequence thereof are recorded.

## ANNEXURE 1

### ICC Standard Analysis Protocols

#### Biomechanical Analysis of a Bowling Action

##### 1 INTRODUCTION

The ICC has introduced a revised process for the review of Players with suspected Illegal Bowling Actions (Bowling Review Process).

In order for the Bowling Review Process to be conducted in a fair and consistent manner, the following standard protocols for the collection of data and the assessment and analysis of bowling actions have been introduced.

The overall purpose of the report is to confirm the legality / or not, of the bowling action used by the relevant Players in Matches. Thus, the protocols are provided not only for how the bowling action should be analysed in the laboratory setting, but also highlight the need for a detailed comparison between the bowling action performed during the Match in which a Player was cited and the bowling action analysed in the laboratory.

The ICC has determined that it is the degree of elbow extension, as opposed to hyperextension or abduction / adduction that is prohibited. Elbow hyperextension and elbow abduction / adduction are involuntary movements that cannot be controlled by the individual during the bowling action. (See Paragraph 5.3 & Appendix A)

The conclusion of the report should be that having analysed the bowling action in the laboratory and having compared it to the bowling action as used in the supplied Match footage, in the opinion of the expert, the Player has faithfully reproduced his Match technique in the laboratory. A statement concerning the legality of the bowling action with respect of the amount of elbow extension measured and the 15 degree elbow extension tolerance threshold should then follow.

##### 2 VIDEO FOOTAGE FROM MATCH IN WHICH PLAYER CITED

The television video footage of the entire bowling spell(s) of the Player in the Match where the report was made shall be presented on a master tape. (ICC to supply Match footage. If possible, rear, frontal and lateral views of the action shall be provided.)

The master tape shall be converted to 50Hz / 60Hz (standard television footage is recorded at 25Hz) to enable more accurate evaluation of the Player's bowling action on the day the Player was actually cited.

Descriptive analysis during the Match footage should compare the actions of the Players e.g. positioning of feet, angle of run up, position of the torso, velocity of arm, velocity of delivery (95% of Match speed etc). These comparisons should be clearly presented in the report.

##### 3 ANTHROPOMETRIC ASSESSMENT

**(Both the bowling & non-bowling arms) See Appendix A**

**Carry Angle:** The angle between the longitudinal axis of the upper arm and forearm, in the frontal plane. Note: The average range of carry angle for the human population is between 5°-15°.

**Hyperextension Angle:** The angle between the longitudinal axis of the upper arm and forearm, in the sagittal plane. (i.e. beyond full normal extension): Two measurements are required: a passive measurement, where there is no force applied and a second measurement where 'reasonable' force is applied.

When the second measurement for the hyperextension angle is measured, the Player is required to extend his arm back as far as possible. This is achieved by applying a „reasonable’ force, essentially the body weight of the bowler, leaning on each arm.

**Additional Physical Measurements:** Height, weight and assessment of general mobility of the shoulder, elbow and wrist joints.

**History of Previous Injuries:** A brief history of previous injuries should be determined as an aid in the biomechanical assessment - particular focus should be brought to the elbow and shoulder joints.

## 4 BOWLING ANALYSIS (INDOORS – LABORATORY CONDITIONS)

All biomechanical assessment shall be carried out with the Player bowling off his normal full run-up, on a correct length cricket pitch.

A minimum of three synchronised cameras (using optio reflective markers) operating at a minimum of 200 frames per second and a maximum of 250 frames per second (preferable) should be used to collect the data. The cameras and computer to be operated and positioned in appropriate positions to facilitate a subsequent three-dimensional analysis of the shoulder, elbow, wrist and ball.

Video data (50fps) should also be collected in order to allow synchronisation with the optio reflective computer animation data’. A minimum shutter speed of 1000Hz is required to prevent blurred images.

Calibration and accuracy procedures must be undertaken in the delivery space prior to data collection. Accuracy analysis should indicate that the 3D methods employed are accurate to within  $\pm 1^\circ$  (Note: A rigid bar (1m in length), with markers representing the shoulder, elbow and wrist ( $180^\circ$ ) can be used in the calibration procedures. The rod must be rotated in the same manner as a bowling arm. This should be repeated using a rigid bar representing a  $160^\circ$  angle. Accuracy analysis should again indicate that the 3D methods employed are accurate to within  $\pm 1^\circ$ ).

Optimal “levels of filter” must be used in the laboratory process. Ideally a laboratory environment using opto-reflective marker system will produce the environment with the least amount of error (Noise) and therefore less filtering can be used. This value or cut off frequency is calculated via the residual analysis method presented by Winter (1990) – (See Appendix B)

Warm up (player’s own) – but must include the bowling of a number of deliveries at Match pace prior to data collection. The Player to have no clothing on the torso, in order to enable the correct marker set to be placed on the bowling arm. (See Appendix C) Automatic digitisation of the marker set will enable joint centres to be determined during each delivery.

In respect of a fast bowler, six „normal’ – good length deliveries, six ‘yorkers’ and six ‘bouncers’ must be recorded. Six deliveries of each spin variation for the leg or off spin bowler must be recorded. Standard video cameras should be used to assess the position the ball lands, along with the amount of bounce and turn created with each delivery. This video should also be presented in the report.

Three-dimensional analysis of the bowling arm to begin from back foot contact, to include ‘arm horizontal’ maximum flexion, ball release and a minimum of 10 frames after ball release for each successful delivery.

The UPPER Arm is in the horizontal position in Figure 1b. “The horizontal position” i.e. The upper arm being level with shoulder and parallel to the ground.

The point of release is defined as the FIRST frame the BALL and HAND are NOT in contact. This is important as the exact time (frame – 250Hz) of release can potentially change results by three or four degrees. A marker (a piece of reflective tape) on the ball, a change in velocity of the ball, along with 50Hz video may all help with this process.



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Figure 1a: Arm Horizontal – NO



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Figure 1b: Arm Horizontal – YES

Every effort must be made to ensure that the Player is bowling as close to Match pace as possible. This can be measured after each delivery if the equipment is available (Radar Gun), or measured via the 3D data during analysis. If deliveries are not at a suitable speed (so as to represent Match conditions) then the data shall be invalid

## 5 PRESENTATION OF RESULTS

A summary of the results of each delivery to be presented in graphical or table format.

The presentation of the three-dimensional analysis of the bowling arm to begin from a minimum of 10 frames before the arm reaches horizontal, to include 'arm horizontal', 'maximum flexion', 'ball release' and a minimum of 10 frames after ball release.

The 'flexion-extension' and the 'abduction-adduction' curves should be presented separately. This data should be presented in graphical form. (The hyperextension component will show up in the flex-ext curve if it is present and there is no need to separate it. If it is present it will be shown as the curve going beyond 180 degrees or below 0 degrees, depending on which represents "straight arm")

The six trials for each type of delivery (e.g. Bouncer / Normal Length / Yorker), along with the average should be plotted on the same graph (i.e. 3 graphs, one each for the bouncer, normal length and yorker deliveries) to show conformity.

The average of the different types of delivery (e.g. Bouncer / Normal Length / Yorker) to be displayed along with the standard error reading.

Ball release speeds to be presented for each delivery.

Stick figure representation, to include pictures of the various key positions to aid in the presentation of the results. (Alternatively, an avi file may be provided.)

## 6 ACCEPTABLE LEVEL OF ELBOW EXTENSION

This should be set at a maximum of 15 degrees 'Elbow extension' for all bowlers and types of deliveries. This specifically refers to extension of the forearm relative to the upper arm to the straight position. Elbow hyperextension or adduction is not included in the 15-degree tolerance threshold. It should be noted that in order for the action to be classified as a legal action, the degree of 'elbow extension' recorded for each delivery should be within the 15 degree limit.

## APPENDIX A - MOVEMENTS

**Flexion** - This movement takes place about a transverse axis and is a description of the movement that occurs when you move your arm forward. It is described as the approximation (moving closer together) of two ventral surfaces of the body e.g. flexing the elbow joint. There are a number of situations where this rule doesn't seem to apply e.g. at the ankle where the terms dorsi and plantar flexion are used to avoid confusion.

**Extension** - This movement is the opposite of flexion; it also takes place about a transverse axis and occurs when you approximate two dorsal surfaces e.g. straightening the elbow.

**Hyperextension** - An abnormal movement beyond the normal limit of extension, such as more than the 180 degrees of extension of the knee or elbow joints.

**Abduction and Adduction** - These movements take place about an antero-posterior axis and occur when the arm is taken sideways away from the body (abduction) and returned from such a position to the side of the body (adduction).

## APPENDIX B - FILTER LEVEL

When measurements are made using image-based analysis systems (Video and/or Automatic Tracking) they are contaminated with 'Noise' generated during the recording and digitising procedures. The sample signal can be considered to be the sum of the true signal, systematic noise and the random noise. The 'TRUE' signal can never be deduced from the measurements; only the best estimate of the signal.

There have been a number of techniques developed for the reduction of noise, including Butterworth filters, Quintic splines and cross-validated splines. Each of these techniques uses a mathematical function to approximate the data. The precise frequency components of the true signal are rarely known in sports biomechanics and some procedures must be adopted for the determination of the cut-off filter, or other smoothing parameter. The less noise in the system, the closer the raw data will represent the 'TRUE' signal, and the less smoothing will be required.

Ideally a laboratory environment using opto-reflective marker system will produce the environment with the least amount of error (Noise) and therefore a lower filtering value can be used. Optimal "levels of filter" must be used in the laboratory process. This value or cut off frequency is to be calculated for all bowling analysis using the residual analysis method presented by Winter (Biomechanics and Motor Control of Human Movement, 2nd edition, Wiley and Sons Publisher, 1990).

Previous work in this area has identified a Butterworth digital filter level of 12 – 14 Hz and a Woltring MSE of 20 – 25 cine appropriate. However a residual analysis, should be conducted for the bowler being analysed to derive the optimum filter level for the current data. Any significant different optimum filter level derived from the above values needs to be well justified and documented. Raw data should be graphed with filtered data and inspected by the expert to ensure the filtered curve closely reflects the raw data. These should be presented in the appendix to the report as background technical information for each analysis

## APPENDIX C - MARKER SET

### Cricket Upper Limb Model

The following guidelines are established to ensure conformity of elbow joint data across laboratories. Establishment of joint centres at the shoulder, elbow and wrist joints are therefore integral to this process.

#### Shoulder Joint

This joint centre should be determined from the recording of markers anterior, posterior and superior (acromion process) to the “joint centre of rotation”. The anterior and posterior markers should be placed such that a line between the two represents the shoulder axis of rotation (approximate midline of the upper arm). The shoulder joint centre (SJC) is then calculated as the centre of these three markers or from where a vertical line dropped from the acromion intersects the line between the anterior and posterior markers.

The position of the calculated SJC is then recorded in a static trial relative to the coordinate system of the triad located on the upper arm. During a bowling trial the SJC can then be reconstructed relative to the position of the upper arm triad during every frame. Optimisation or helical axis techniques may be used to calculate the shoulder centre, which may modify the markers used about this joint.

#### Elbow Joint

The elbow joint centre may be calculated using markers placed on the lateral and medial elbow epicondyles or using “epicondyle pointer trials” with the elbow flexed to 90°. If a marker based approach is used the markers should be as small as the resolution of the opto-electronic camera system will allow. Generally markers no bigger than 15mm in diameter are preferable. The position of the epicondyles should be reported with reference to a triad of markers placed on the upper arm. The elbow joint centre is then calculated as the mid point between these two reconstructed epicondyle virtual markers. This means that no joint markers are required during bowling trials to reduce errors associated with skin movement. The cameras only need to track the upper arm triad during the bowling action to know where the elbow and shoulder joint centres are. For a background reading in this area refer to Lloyd et al., (*Journal of Sports Sciences*, 2000, v12). Helical axis determination may also be applied at the elbow joint.

#### Wrist Joint

The wrist joint centre may be calculated using “pointer trials” or by placing markers on the styloid processes at the wrist during a static trial. If a marker based approach is used the markers should be as small as the resolution of the opto-electronic camera system will allow. Generally markers no bigger than 15mm in diameter are preferable. The position of the styloid processes should be calculated as reference points (i.e. three-dimensional co-ordinates) to a triad of markers placed on the forearm. This triad needs to be placed relatively close to the wrist joint centre to avoid excessive skin movement during pronation / supination. The markers on the styloid processes can then be removed prior to bowling data collection. The wrist joint centre is then calculated as the mid point between the styloid process markers or landmarks from the pointer trials.

