



**REFEREE FITNESS
TESTING PROTOCOLS
2014**

Introduction

The game of lacrosse has seen a dramatic increase in the level of play by its participants. This is due in part to the increased level of fitness of the players and the supreme conditioning each player undertakes to be able to participate at an elite level. To that end, referees too must train in much the same fashion as a player would – speed, strength, agility, and aerobic capacity. Gone are the days where officials can begin to prepare for the championship the month before it is scheduled, nor can an official coast through a game with a minimal amount of effort. It is full on from start to finish, often in hot and humid conditions with games on successive days.

For these reasons the Federation of International Lacrosse has developed in conjunction with Steve Smith of Smith Training Systems, a fitness protocol that enables referees to be tested to an international standard. These tests are based on international fitness standards and therefore all referees can be compared for relative levels of fitness.

All referees attending a World Championship will have to undertake this fitness test prior to the games. According to current policy, only those referees who have passed the test at that location will be eligible to officiate in the Blue Division and there must be at least one referee on the field who has passed this test for all Red Division games.

The pass rate for each test is shown in this document. Should any of these be changed by the FIL Officiating Committee, all National Governing Bodies will be notified no later than six months from the World Championship.

Please plan to arrive at the World Championship ready to take this test and avoid any potential disappointment.

Don Blacklock, FIL Chair of Officiating for Men's Lacrosse would like to personally thank Steve Smith for his hours of devotion in the development of this protocol. For without his contributions, this protocol would not have been developed to the level it has.

Preparation:

It is important that officials begin to prepare for the test well in advance of the World Championship for which they are competing. Officials will find that they not only need to be fit, but will score higher if they are familiar with the testing protocol and how to take each of the individual tests. In many instances psychology plays a very important role in achieving higher results. It is highly recommended that the official organizes a mock test in their local area before taking the test at the World Championship.

The FIL has consulted Salford University on the effects flying might have on the performance of individuals taking the test. Salford has advised that given the referees are expected to arrive in good physical shape and that there will be 24-48 hours of recovery time after flying, there should only be a negligible impact on the success of an athlete taking the test. For those that are flying long distances it is well documented that flying cause’s dehydration. Therefore, it is important that the athletes continually hydrates themselves before, during and after flying. Alcohol and caffeine are diuretics and could compound the effects of dehydration.

It is suggested that the athlete continues with their fitness regime after landing at the game’s location to help stave off any effects of jet lag or stiffness from flying. It is highly recommended that a professional fitness consultant be contacted who may be able to offer further personalized advice.

Exercise Ranking and Weighting:

The fitness test is comprised of seven individual tests. Each test is weighted according to the validity they have for refereeing lacrosse.

Test	Test Rank	Test Weight
RAST	1	20%
MSFT	2	20%
35 Metre Sprint	3	20%
Illinois	4	15%
T Test	5	15%
Sit & Reach	6	5%
Canadian Crunch	7	5%

Whilst the Sit and Reach and Canadian Crunch tests are weighted relatively low, they do play an important part in overall fitness as they help to demonstrate an athlete’s core strength and flexibility. It is widely accepted that if an athlete possesses these characteristics, they will be less likely to suffer from injuries. It has become apparent that many of our referees have suffered many calf, hamstring, and lower back injuries at previous world events and it is felt that if the referee trains properly in advance of the tournament and prepares themselves accordingly for the fitness test, that many of these injuries could be avoided.

Exercise Grading:

Each element of the fitness protocol are industry standard, all of which can be performed and benchmarked prior to arrival at the event. The tests results are broken into 6 categories. These categories have been given a value of 0-5 as can be seen below. In order to pass each test, a mark of Fair (2) needs to be attained. It is anticipated that referees at a World Championship level should easily be able to meet or exceed this standard.

Criteria	Criterion Value	Result
Excellent	5	Pass
Very Good	4	Pass
Good	3	Pass
Fair	2	Pass
Poor	1	Fail
Very Poor	0	Fail

			Pass						
Test	Variable	Measure	Excellent	Very good	Good	Fair	Poor	Very Poor	
Illinois Agility	Male	Seconds	<15.2	16.1-15.2	18.1-16.2	18.3-18.2	>18.3		
		Rating	12	10.5	9	7.5	6		
	Female	Seconds	<17.0	17.9-17.0	21.7-18.0	23.0-21.8	>23.0		
		Rating	12	10.5	9	7.5	6		
Canadian Crunch Test	Male	Repetitions	>60	50-59	40-49	30-39	<30		
		Rating	6	5	4	3	2		
	Female	Repetitions	>50	40-49	30-39	20-29	<20		
		Rating	6	5	4	3	2		
T-Test	Male	Seconds	<11.1	11.3-11.8	11.9-12.7	12.8-14.0	>14.0		
		Rating	10	8	6	4	2		
	Female	Seconds	<11.1	11.3-11.8	11.9-12.7	12.8-14.0	>14.0		
		Rating	10	8	6	4	2		
35m Sprint	Male	Seconds	<4.8	4.80-5.09	5.10-5.29	5.30-5.60	>5.60		
		Rating	12	10	8	6	4		
	Female	Seconds	<5.30	5.30-5.59	5.60-5.89	5.90-6.20	>6.20		
		Rating	12	10	8	6	4		
Sit & Reach	Male	Centimetres	17-27		Jun-16	-8 to -1	-19 to -9	<-20	
		Rating	6		5	3	2	1	
	Female	Centimetres	21-30		11-20	-7 to 0	-14 to -8	<15	
		Rating	6		5	3	2	1	
RAST	Male	Fatigue index	<10	10.1-15	15.1-20	20.1-25	>25.1		
		Rating	14	12	10	8	6		
	Female	Fatigue index	<10	10.1-15	15.1-20	20.1-25	>25.1		
		Rating	14	12	10	8	6		
Multi Stage Fitness Test	50-59 years	ml/kg/min	41.0-47.0		36.7-40.9	33.8-36.6	30.2-33.7	<30.2	
		Rating	7		6	5	4	3	
	40-49 years	ml/kg/min	44.1-50.3		39.9-44.0	36.8-39.9	33.0-36.7	<33.0	
		Rating	7		6	5	4	3	
	30-39 years	ml/kg/min	46.8-52.4		42.4-46.7	38.9-42.3	35.4-38.8	<35.4	
		Rating	7		6	5	4	3	
18-29 years	ml/kg/min	48.2-53.9		44.2-48.1	41.0-44.1	37.1-40.9	<37.1		
	Rating	7		6	5	4	3		

If for medical reasons a participant cannot take an individual test, then they will be excused from that test, however they will receive a score of zero for that component. Please advise the testers prior to the start of the fitness testing of the tests you will not be participating in. The FIL expects that all referees should be capable of achieving a minimum score of 2 on the test. The teams have been training for several months now for the privilege of competing at the World Championship. The referees need to be fitter than the players, given that the referees do not have an opportunity for substitution.

TESTING ORDER

The tests should be conducted in the following order.

- Functional Warm-up (10-15 minutes)
- 1. Illinois Agility
- 2. Canadian Crunch Test
- 3. T-Test
- 5-minute break**
- 4. 35m Sprint
- 5. Sit & Reach
- 6. RAST
- 15-minute break**
- 7. Beep Test

Where this testing order is not practical for logistical reasons, it is advised that the above order should be followed as close as possible.

Functional Warm Up

All participants should do a functional warm up to reduce the possibility of injury and to help increase their performance on the earlier tests. The following is an example of a functional/dynamic warm up that could be used.

- 1. 5 minutes light aerobic activity, jogging preferred
 - 2. Walking lunges: 10 per leg, 2 times
 - 3. X-over lateral lunges: 10 per leg, 2 times
 - 4. Deep squats: 15
 - 5. Squat jumps: 10
 - 6. High knees: 10 meters, 2 times
 - 7. Butt kickers: 10 meters, 2 times
 - 8. Side shuffles: 10 meters, 2 times (left & right)
 - 9. X-overs: 10 meters, 2 times (left & right)
 - 10. Cariocas (grapevines): 10 meters, 2 times (left & right)
 - 11. Forwards/Backwards sprints: 10 meters, 2 times
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Canadian Crunch Test

Objective

The objective of this test is to monitor the development of the athlete's abdominal strength.

Required Resources

To undertake this test you will require:

- Strips of tape
- Tape measure
- Metronome
- Assistant

How to conduct the test

- Set the metronome to 40 beats per minute
- Athlete to lie on their back with arms extended to your sides
- Place a strip of tape on the floor at the end of their fingertips
- Place another piece of tape 3 inches away from the first strip
- To perform a proper crunch, the athlete curls their rib cage toward their pelvis so their fingers move from one strip of tape to the next
- Athlete to perform as many crunches as possible to a 40 BPM metronome
- The test is completed when the athlete cannot execute another crunch in time with metronome
- Assistant counts the number of correctly completed crunches

Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

Performance Assessment

An excellent score for men is 60 and excellent score for women is 50 repetitions.

Males	Females	Rating
60+	50+	Excellent
50-59	40-49	Very Good
40-49	30-39	Good
30-39	20-29	Fair
<30	<20	Needs Improvement

Target Group

This test is suitable for active athletes but not for individuals where the test would be contraindicated.

Reliability

Reliability would depend upon how strict the test is conducted and the individual's level of motivation to perform the test.

Validity

There are no published tables to relate results to potential performance in competition.

T-Test

Objective

The objective of this test is to monitor the development of the athlete's abdominal strength.

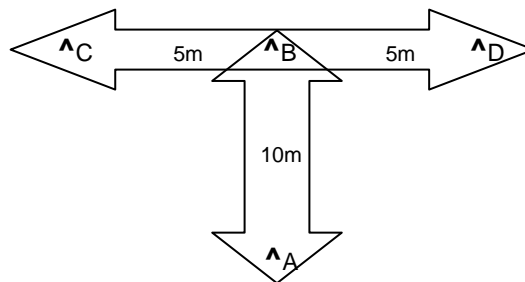
Required Resources

To undertake this test you will require:

- Four cones
- Stopwatch
- Flat surface with good traction
- Tape Measure

How to conduct the test

- Arrange the four cones in a 'T' formation, with two cones placed 10m apart from each other. From one of the two placed cones place the remaining two cones 5m lateral to each side.



- The athlete begins at point A to the right side of the cone.
- On the 'go' command, the athlete sprints forward to point B and proceeds just beyond the cone so that the athlete may change directions without touching the cone.
- The athlete then side-shuffles 5m to the left to point C and touches the base of the cone with the left hand. (Note: do not allow for cross-overs and always faces forward.)
- The athlete then side-shuffles 10m to the right to point D and touches the base of the cone with the right hand
- The athlete then side-shuffles 5m to the left to point B and proceeds just beyond the cone so that the athlete can change directions without touching the cone.
- The athlete then runs backwards to the left of the cones to point A where the timer will record the time to the nearest tenth of a second once the athlete passes the cone at point A.

Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

Performance Assessment

Ranking	Results
Excellent	< 11.1
Very Good	11.3-11.8s
Good	11.9-12.7s
Fair	12.8-14.0s
Needs Improvement	>14s

Target Group

This test is suitable for active athletes but not for individuals where the test would be contraindicated.

Reliability

Reliability would depend upon how strict the test is conducted and the individual's level of motivation to perform the test.

Validity

There are no published tables to relate results to potential performance in competition.

35m Sprint or Speed Test

- **Description / procedure:** The purpose of this test is to determine maximum running speed. It involves running a single maximum sprint over a set distance, with time recorded. The test is conducted over 35 meters. The starting position should be standardized, starting from a stationary position, with no rocking movements. If you have the equipment (e.g. timing gates), you can measure the time to run each split distances (e.g. 5, 10, 20m) during the same run, and then acceleration and peak velocity can also be determined. It is usual to give the athletes an adequate warm-up and practice first, and some encouragement to continue running hard past the finish line. The average of two (2) trials is used for scoring, allowing for full recovery between attempts.
- **Equipment required:** measuring tape or marked track, stopwatch or timing gates, markers.
- **Target population:** sprinters, team sport athletes.
- **Reliability:** Reliability is greatly improved if timing gates are used. Also weather conditions and running surface can affect the results, and these conditions should be recorded with the results. If possible, set up the track with a crosswind to minimize the effect of wind.
- **Norms:** the rating system below is for a 35m sprint test.

Rating	Men	Women
Excellent	< 4.80	< 5.30
Very Good	4.80 - 5.09	5.30 - 5.59
Good	5.10 - 5.29	5.60 - 5.89
Fair	5.30 - 5.60	5.90 - 6.20
Needs Improvement	> 5.60	> 6.20

- Time to run 35m (in seconds)

Sit and Reach Test (Flexibility)

- **Description / procedure:** This test involves sitting on the floor with legs out straight ahead. Feet (shoes off) are placed flat against the box. The tester holds both knees flat against the floor. The athlete leans forward slowly as far as possible and holds the greatest stretch for two seconds. Make sure there is no jerky movements and that the fingertips remain level and the legs flat.
- **Scoring:** The score is recorded as the distance before (negative) or beyond (positive) the toes. Repeat twice and record the best score. The table below gives you a guide for expected scores (in cm) for adults

	men	women
Super	> +27	> +30
Excellent	+17 to +27	+21 to +30
Good	+6 to +16	+11 to +20
Average	0 to +5	+1 to +10
Fair	-8 to -1	-7 to 0
Poor	-19 to -9	-14 to -8
Very poor	< -20	< -15

- **Equipment required:** sit and reach box (or a ruler can be used, held between the feet)
- **Validity:** This test only measures the flexibility of the lower back and hamstrings, and is a valid measure of this.
- **Reliability:** The reliability will depend on the amount of warm-up allowed, and whether the same procedures are followed each time. Most norms are based on no previous warm-up.
- **Advantages:** This is the most commonly used test of flexibility, so there is lots of data for comparison. Also, it is a cheap, easy and quick test to perform.
- **Disadvantages:** Variations in arm, leg and trunk length can make comparisons between individuals misleading.
- **Other comments:** Lower back flexibility is important because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain.

RAST (Anaerobic Capacity)

Objective

The Running-based Anaerobic Sprint Test (**RAST**) was developed at the University of Wolverhampton (United Kingdom) to test an athlete's anaerobic performance. RAST is similar to the Wingate Anaerobic 30 cycle Test (WANT) in that it provides coaches with a measurement fatigue index. The Wingate test is more specific for cyclists whereas the RAST provides a test that can be used with athletes where running forms the basis of the movement.

Required Resources

To undertake this test you will require:

- 400 meter track - with a 35 meter marked section on the straight
- Two cones to mark the 35 meter section
- Stop watch
- An assistant

How to conduct the test

The athlete:

- Undertakes a 10 minute warm session
- Has a 5 minute recovery
- Completes six 35-meter runs at maximum pace (10 seconds allowed between each sprint for turnaround)

The assistant

- Records the time taken for each 35-meter sprint to the nearest hundredth of a second.
- Makes appropriate calculations

Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

Calculations

- Fatigue Index = (Greatest Differential ÷ Fastest Sprint) x 100

Example

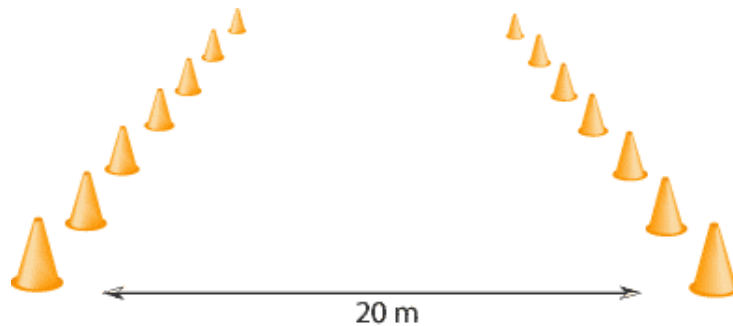
Sprint	Time (secs)	Differential
1	4.52	
2	4.75	0.23
3	4.92	0.40
4	5.21	0.69
5	5.46	0.94
6	5.62	1.10

Fatigue Index = (1.10 ÷ 4.52) x 100 = 24.33%

<10%	EXCELLENT
10.1%-15%	VERY GOOD
15.1%-20%	GOOD
20.1%-25%	FAIR
>25.1%	NEEDS IMPROVEMENT

20 meter Shuttle Run Test (Aerobic Capacity)
(Multistage Fitness Test also known as a Beep Test)

The multistage fitness test, also known as the 20 meter shuttle run test, beep or bleep test.



- **Description:** This test involves continuous running between two lines 20m apart in time to recorded beeps. For this reason the test is also often called the 'beep' or 'bleep' test. The time between recorded beeps decrease each minute (level). There are several versions of the test, but one commonly used version has an initial running velocity of 8.5 km/hr, which increases by 0.5 km/hr each minute.
- **Scoring:** The athlete's score is the level and number of shuttles reached before they were unable to keep up with the tape recording. This score can be converted to a VO₂max equivalent score.
- **Equipment required:** Flat, non-slip surface, marking cones, 20m measuring tape, pre-recorded CD or audiotape, CD or tape player, and recording sheets.
- **Target population:** Suitable for sports teams and school groups, but not for populations in which a maximal exercise test would be contraindicated.
- **Validity:** There are published VO₂max score equivalents for each level reached. The correlation to actual VO₂max scores is high.
- **Reliability:** Reliability would depend on how strictly the test is run, and the practice allowed for the subjects.
- **Advantages:** Large groups can perform this test all at once for minimal costs. Also, the test continues to maximum effort unlike many other tests of endurance capacity.
- **Disadvantages:** Practice and motivation levels can influence the score attained, and the scoring can be subjective. As the test is usually conducted outside, the environmental conditions can often affect the results.
- **Variations:** You will find that there are several different variations of this test, and you should ensure that you have norms relevant to the correct test. Another shuttle type of test is the Aero test, which is like the bleep test but each bleep is 0.05 km/h quicker than the last one and there are no levels. It is a 20m-shuttle run and each 20m counts as a score of one.
- **Other considerations:**
 - As the audiotapes may stretch over time, the tapes need to be calibrated which involves timing a one-minute interval and making adjustment to the distance between markers. The recording is also available on compact disc, which does not require such a stringent calibration, but should also be checked occasionally.

- This test goes by many names, though one needs to be careful as the different names also may signify that these are different versions of the test. Therefore you need to be wary when comparing results or comparing to norms.

Level	Shuttles	running speed (km/h)	time per shuttle (s)	Total level time (s)	Cumulative Time (min:seconds)	Distance per level (m)	Cumulative Distance (m)
1	7	8.0	9.00	63.0	1:03	140	140
2	8	9.0	8.00	64.0	2:07	160	300
3	8	9.5	7.58	60.6	3:08	160	460
4	9	10.0	7.20	64.8	4:12	180	640
5	9	10.5	6.86	61.7	5:14	180	820
6	10	11.0	6.55	65.5	6:20	200	1020
7	10	11.5	6.26	62.6	7:22	200	1220
8	11	12.0	6.00	66.0	8:28	220	1440
9	11	12.5	5.76	63.4	9:32	220	1660
10	11	13.0	5.54	60.9	10:32	220	1880
11	12	13.5	5.33	64.0	11:36	240	2120
12	12	14.0	5.14	61.7	12:38	240	2360
13	13	14.5	4.97	64.6	13:43	260	2620
14	13	15.0	4.80	62.4	14:45	260	2880
15	13	15.5	4.65	60.4	15:46	260	3140
16	14	16.0	4.50	63.0	16:49	280	3420
17	14	16.5	4.36	61.1	17:50	280	3700
18	15	17.0	4.24	63.5	18:53	300	4000
19	15	17.5	4.11	61.7	19:55	300	4300
20	16	18.0	4.00	64.0	20:59	320	4620
21	16	18.5	3.89	62.3	22:01	320	4940

Multistage Fitness Test Table

The following is a table of predicted maximum oxygen uptake values (VO2 Max) for the Multistage Fitness Test. It was developed by the Department of Physical Education and Sports Science Loughborough University, 1987.

Level	Shuttle	VO2 Max	Level	Shuttle	VO2 Max
4	2	26.8	5	2	30.2
4	4	27.6	5	4	31.0
4	6	28.3	5	6	31.8
4	9	29.5	5	9	32.9
6	2	33.6	7	2	37.1
6	4	34.3	7	4	37.8
6	6	35.0	7	6	38.5
6	8	35.7	7	8	39.2
6	10	36.4	7	10	39.9
8	2	40.5	9	2	43.9
8	4	41.1	9	4	44.5
8	6	41.8	9	6	45.2
8	8	42.4	9	8	45.8
8	11	43.3	9	11	46.8
10	2	47.4	11	2	50.8
10	4	48.0	11	4	51.4
10	6	48.7	11	6	51.9
10	8	49.3	11	8	52.5
10	11	50.2	11	10	53.1
12	2	54.3	13	2	57.6
12	4	54.8	13	4	58.2
12	6	55.4	13	6	58.7
12	8	56.0	13	8	59.3
12	10	56.5	13	10	59.8
12	12	57.1	13	13	60.6
14	2	61.1	15	2	64.6
14	4	61.7	15	4	65.1
14	6	62.2	15	6	65.6
14	8	62.7	15	8	66.2
14	10	63.2	15	10	66.7
14	13	64.0	15	13	67.5

Level	Shuttle	VO2 Max	Level	Shuttle	VO2 Max
16	2	68.0	17	2	71.4
16	4	68.5	17	4	71.9
16	6	69.0	17	6	72.4
16	8	69.5	17	8	72.9
16	10	69.9	17	10	73.4
16	12	70.5	17	12	73.9
16	14	70.9	17	14	74.4
18	2	74.8	19	2	78.3
18	4	75.3	19	4	78.8
18	6	75.8	19	6	79.2
18	8	76.2	19	8	79.7
18	10	76.7	19	10	80.2
18	12	77.2	19	12	80.6
18	15	77.9	19	15	81.3
20	2	81.8	21	2	85.2
20	4	82.2	21	4	85.6
20	6	82.6	21	6	86.1
20	8	83.0	21	8	86.5
20	10	83.5	21	10	86.9
20	12	83.9	21	12	87.4
20	14	84.3	21	14	87.8
20	16	84.8	21	16	88.2

Aerobic Fitness (scores in ml/kg/min)

	<u>18-29 (yrs)</u>	<u>30-39 (yrs)</u>	<u>40-49 (yrs)</u>	<u>50-59 (yrs)</u>
Superior	>53.9	>52.4	>50.3	>47.0
Excellent	48.2-53.9	46.8-52.4	44.1-50.3	41.0-47.0
Good	44.2-48.1	42.4-46.7	39.9-44.0	36.7-40.9
Fair	41.0-44.1	38.9-42.3	36.8-39.9	33.8-36.6
Poor	37.1-40.9	35.4-38.8	33.0-36.7	30.2-33.7
Very Poor	<37.1	<35.4	<33.0	<30.2

Calculators

Simply enter the sprint times, weight, run time in minutes and in seconds in the appropriate boxes, highlight the results cell and select F9.

RAST Calculator		
Fatigue Index =	Slowest Sprint	5.55
10.119	Fastest Sprint	5.04

2.4 Km Run, VO2Max Calculator		
Males		
44.4773	body weight in pounds	175
Females	run time Minutes	12
40.7613	run time Seconds	21

Waiver of Liability

Each participant will be asked to sign a waiver of liability prior to the taking of the test.