



Fitness Testing Guidelines for Players and Umpires

Compiled for NNZ by

Mathew Kritz

Lead Strength and Conditioner Silver Ferns

&

Greg Thompson

Lead Strength and Conditioner NZ U21

March 2010



NETBALL NEW ZEALAND
Poitarawhiti Aotearoa

Introduction

These guidelines are for netball players of all ages and abilities and have been grouped into categories depending upon age and playing level. While not everyone has access to electronic timing equipment and vertical jump equipment there are alternatives that can be used to ensure coaches, trainers and players can gauge the progress of players through the course of a season or career. Use the appropriate tests for the age and level that your players are playing at as described in the following sections of these guidelines.

Standards for umpires are also included; however, as there is limited information regarding the appropriate levels required of umpires for the recommended tests, these are guidelines only. Currently, NNZ requires only the Beep test for umpires involved in the ANZ Championships and other NNZ national events. NNZ hopes to obtain more accurate information for these tests for umpires over the next 2 years and will update regions and centres when these have been confirmed.

Fitness Testing Schedule

The purpose of fitness testing is:

- To assess the physical strengths and weaknesses of your players at various stages throughout the season so that appropriate training can be implemented,
- To assess the players following a period of training to measure whether they have improved to the required standards,
- To determine whether a player is ready for the physical demands of representative play especially in tournament situations where there is play on consecutive days,
- To assess whether a player has returned to previous fitness levels following an injury or a period away from training or playing.

When to Test

Therefore the timing of fitness testing needs to be determined based on the areas stated above. The following is a guideline as to when fitness testing could be conducted.

Secondary School/U17/U19/U21 Player

- Early February once school gets back and preseason training has commenced to get initial assessment of players.
- Immediately before the competition starts to review the training and assess whether players have improved and are ready for the competitive season.
- Prior to age group teams being selected or once age group teams have been selected.

Senior Club Player

- Early February at the start of preseason training.
- Immediately before the season commences.

Netball New Zealand Fitness Testing Protocols

Senior Representative Player

- When representative squad has been selected and training for National Champs has begun.
- Immediately before first competition game or tournament.

National Under 21 Representative Player

- When in squad camps.
- Prior to trials.
- During regional visits.

Silver Ferns

- When in squad camps.
- During regional visits.
- As scheduled in annual plan.

Umpires

- At the commencement of preseason training
- Immediately before competition starts
- If umpiring representative games then could test again immediately prior to representative season commencing.

What to Test

Which of the tests to use to assess your players depends on the access to equipment and suitably qualified personnel to conduct the tests. Some of the tests can be conducted by a school and/or club coach while others may need to have certified personnel to administer them.

If you have access to electronic timing lights within your region i.e. netball region owns them or you can borrow them from other local sports organisations such as the rugby union, university, or Sport Canterbury etc then it is recommended that you assess the players speed and acceleration as part of your testing battery. If you do not have access to timing lights then do not include speed testing in your testing battery.

Secondary school/U17/U19/U21 Player

- Aerobic test – either Yo-yo test, beep test or 1500m run.
- Strength endurance tests (note if you do not have access to a weight room then may be only able to do press ups, wall pass and prone bridge)
- Lower body power tests

Senior Club Player

- Repeated speed test (Octorepeater test)
- Aerobic test– either Yo-yo test, beep test or 1500m run.
- Strength endurance tests
- Lower body power tests

Netball New Zealand Fitness Testing Protocols

Senior Representative Player

- All tests

National U21 Player

- All tests

Silver Ferns

- All tests

Umpires

- Speed and acceleration test
- Repeated speed (Octorepeater test)
- Aerobic test.
- Note no requirement to assess strength endurance or leg power.

Fitness Testing Preparation

Where possible adhere to the following guidelines around fitness testing to ensure a valid result is achieved:

- Give the players at least 48 hours notice prior to testing so that the athletes are reasonably fresh and are not fatigued from training hard the day before testing.
- Conduct all testing (except the 1500m run) in an indoor netball court or gymnasium so that the weather conditions are eliminated.
- Where possible avoid conducting testing early in the morning. Allow at least two-three hours after the athlete has gotten up from sleeping so that the body has had time to wake up.
- Conduct a thorough warm up prior to conducting speed and acceleration testing to ensure that there are minimal chances of injury and to physically and mentally prepare the body for optimal performance.
- Make sure that the player has had something substantial to eat at least 90 minutes before beginning the warm up to ensure that their energy levels are high especially if conducting a series of tests in one day.
- Conduct all subsequent testing at the same venue with the same equipment so that there is good consistency with results from test to test.

Speed, Acceleration and Quickness Tests

5m, 10m & 20m Straight Line Sprint Test

Purpose: To assess the player's straight line quickness, speed and acceleration.

Protocol:

- Where possible use dual beam timing lights. Single beam lights will suffice if no others are available but they are not as accurate over short distances.
- Place the lights at the start line, 5m, 10m, and 20m lines ensuring that there is at least 15-20m run out past the lights at both ends.
- Place a piece of tape on the floor 50cm from the start light. The athlete must start with their toe immediately behind this line (see photo A).
- The athlete must start the test from a stationary position with no rocking or swaying (see photo B).
- The athlete begins their sprint once the tester indicates that the timing equipment has been zeroed and ready to record their score.
- The athlete then sprints thru all three lights and slowly walks back to the start during their recovery.
- Each athlete gets three attempts with approximately three minutes rest in between sprints.
- The best time recorded is the time taken.
- Use the recording sheets attached at the end of these guidelines to record all your results.

Equipment: Electronic timing lights, tape measure, tape, recording sheet, flat, non-slip indoor surface.



Photo A – the athlete starts the sprint with their toe on tape 50cm from start line.



Photo B - the athlete must start from a stationary position with no rocking or swaying.

Note it is a waste of time attempting these tests without electronic timing equipment as using a hand held stopwatch is too inaccurate for such short distance tests.

2 x 20m & 4 x 10m Agility Sprint Test

Purpose: To assess the player's ability to change direction and accelerate and decelerate. These tests are also part of the Octorepeater test and need to be conducted prior to commencing the Octorepeater test (see below).

Netball New Zealand Fitness Testing Protocols

Protocols:

Option A – With electronic timing lights (recommended)

- Where possible use dual beam timing lights. Single beam lights will suffice if no others are available but they are not as accurate over short distances.
- Leave the lights at the start line as for the 5m, 10m & 20m tests above but remove the other three sets of lights so that you only have one set of lights at the start/finish line.
- Place a piece of tape on the floor 50cm from the start light. The athlete must start with their toe immediately behind this line.
- Place another piece of tape on the floor 10m and 20m from the start line that is easily seen by the athlete.
- The athlete must start the test from a stationary position with no rocking or swaying.
- The athlete begins their sprint once the tester indicates that the timing equipment has been zeroed and ready to record their score.
- The athlete sprints down to the 20m line/tape placing their foot on or over the line and then turns and sprints back to the start line running through the lights (2 x 20m test).
- The athlete has approximately three minutes rest then sprints to the 10m line/tape placing their foot on or over the 10m line/tape and sprints back to the start line where they place their foot on the start line and then repeat the sprint back to the 10m line/tape and back through the lights at the start line (4 x 10m test).
- Each athlete gets one attempt at each of the 2 x 20m and 4 x 10m tests only. However the athlete may get a second attempt if they feel that their first effort was not a good one.
- Record the athletes times on the recording sheets provided at the end of these guidelines.

Equipment: Electronic timing lights, tape, tape measure, recording sheets, flat, non-slip surface.

Option B – without electronic timing lights

- The tests can be performed as above with the use of a hand held stopwatch. If you are using a stopwatch the tester will then tell the player to “go” starting the stopwatch at the same time and stopping the watch as the player crosses the finish line.

Repeated Speed or Anaerobic Tests

Octorepeater Test

Purpose: To assess the player's ability to perform repeated maximal sprints that incorporate a change of direction.

Protocols:

The Octorepeater test consists of eight sprints starting at 25 second intervals. The players complete 4 x (2 x 20) sprints and 4 x (4 x 10) sprints alternating between the 2 x 20m and 4 x 10m sprints. The player must first complete the 2 x 20m sprint and 4 x 10m sprint described above before completing the Octorepeater test. This is important in determining their fatigue rating over the test.

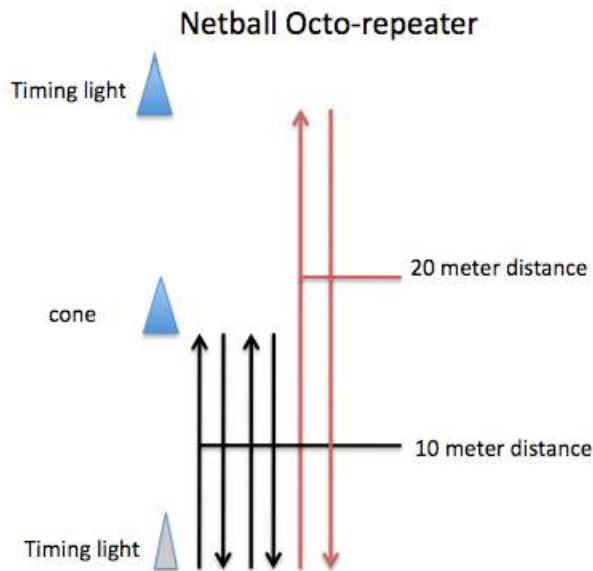
Option A – With electronic timing lights (recommended)

- Where possible use dual beam timing lights. Single beam lights will suffice if no others are available but they are not as accurate over short distances.
- Set up one set of lights on the start finish line only (as for the 2 x 20m and 4 x 10m sprints above).
- Place a piece of tape on the floor 50cm from the start light. The athlete must start with their toe immediately behind this line.
- Place another piece of tape on the floor 10m and 20m from the start line that is easily seen by the athlete.
- The athlete must start the test from a stationary position with no rocking or swaying.
- The first sprint starts when the tester tells the player to go. The tester then starts their stopwatch so that they know when to tell the player to do their subsequent sprints every 25 seconds. The recording sheet has the start times for each sprint to assist the tester.
- They then sprint out to the 20m line and back through the lights.
- They then have the remainder of the 25 second period as recovery before the tester tells them to go for the next sprint.
- They then sprint out and back to the 10m line twice thus completing a total of 4 x 10m sprints in succession.
- They then have the remainder of the 25 second period as recovery before the tester tells them to go for the next sprint.
- They continue to alternate between the 2 x 20m sprint and the 4 x 10m sprint until they have completed four of each sprint or eight sprints in total.
- Record all sprint times in the recording sheet attached to these guidelines.

Option B – Without electronic timing lights

- The test can be performed with a hand held stopwatch if no timing lights are accessible. The tester starts the watch when the player is told to "go" for each sprint and stops it when they cross the finish line.
- The tester will need to have two stopwatches. One to record each individual sprint and one to use as the overall timer for the 25 second interval periods.

Netball New Zealand Fitness Testing Protocols



Calculating the Results

Follow these steps to calculate the player's results:

Total Time

- Add up the time for all eight sprints to get the player's total time. This total time can be used as a guide for further improvement i.e. if their total time decreases on subsequent tests then their repeated sprint ability has improved.

Fatigue Rating

- The fatigue rating signifies the players drop off or decrement in performance over the eight sprints i.e. as they fatigue they will run each sprint slower. The greater the fatigue rating the poorer the athlete is at recovering between sprints. A lesser fatigue rating on subsequent tests indicates that the athlete has improved their repeat sprint ability because they are running each sprint at closer to their maximum with less of a drop off in performance.
- To calculate the fatigue rating follow these steps:
 - Multiply the player's 2 x 20m sprint time by four.
 - Multiply the player's 4 x 10m sprint time by four.
 - Add these two times together to get the player's "perfect time".
 - Use the following formula to calculate fatigue rating:
 - **(Total time – perfect time) / perfect time** e.g. 75 sec – 70 sec / 70 sec = 7.14% fatigue

Equipment: Electronic timing lights, tape, tape measure, recording sheets, stopwatch(s), flat non-slip surface.

Note that it takes two people to conduct the Octorepeater test – one to record results onto recording sheet and one to conduct test and time 25 second intervals between sprints.

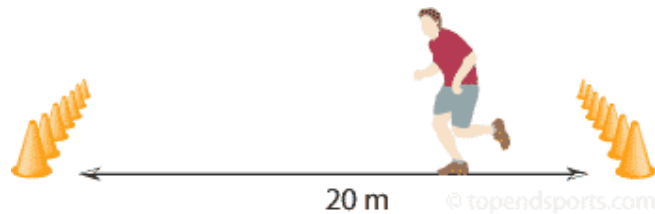
Aerobic Testing Protocols

Any of the following tests can be used to assess the player's aerobic fitness levels:

Beep Test (Multistage Fitness Test)

Purpose: To assess the player's aerobic fitness through the use of a continuous, graduated shuttle run test.

Protocol:

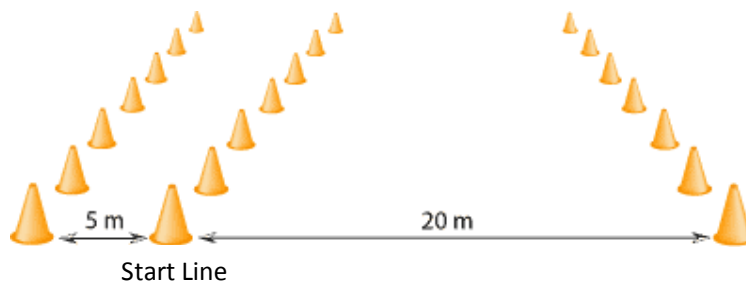


- This test involves continuous running between two lines 20m apart in time to recorded beeps. The test subjects stand behind one of the lines facing the second line, and begin running when instructed by the CD. The subject continues running between the two lines, turning when signalled by the recorded beeps. If the line is not reached in time for each beep the subject is warned and they must try to catch up with the pace within the next beep or shuttle. The test is stopped if the subject fails to reach the line for two consecutive ends.
- Conduct the beep test indoors on a wooden or rubber floor surface.
- Use existing lines spaced 20m apart or place tape on the floor indicating the turning lines. If you cannot place tape on the floor then place a cone or similar marker on the floor that indicates the turnaround point.

Equipment: Flat non-slip surface, beep test CD, stereo/CD player, recording sheets, tape or cones, tape measure.

Yo-Yo Intermittent Recovery Test Level One

Purpose: To assess the player's aerobic fitness and ability to sustain continuous efforts over an extended period of time.



Netball New Zealand Fitness Testing Protocols

Protocols:

- Use cones to mark out three lines as per the diagram above; 20 meters and 5 meters apart. The subject starts on or behind the middle line, and begins running 20 m when instructed by the test CD. The subject turns and returns to the starting point when signalled by the recorded beep. There is a active recovery period of 10 seconds interjected between every 20 meter (out and back) shuttle, during which the subject must walk or jog around the other cone and return to the starting point.
- A warning is given when the subject does not complete a successful out and back shuttle in the allocated time, the subject is removed from the test when they do not complete two successive shuttles.
- Use the recording sheet attached to these guidelines to record the player's result.

Equipment: Yo-Yo test CD, CD player/stereo, tape measure, tape or cones, recording sheets, flat non-slip surface.

1500m Continuous Run

Purpose: to assess the player's aerobic running fitness.

Protocols:

- Where possible complete the test on an artificial surface 400m track so that the surface remains constant in all weather conditions. A grass 400m track is the next best option if no artificial surface available. If you do not have access to a 400m track then an out and back course of 750 metres on a safe piece of road or similar can be used.
- The players complete 3 ¾ laps or 1500m around the 400m track starting at the 100m on the first lap and completing a further three laps.
- The tester tells the players when to start and starts their stopwatch at the same time.
- Record the player's time as they complete the 1500m run on the recording sheet attached to these guidelines.

Equipment: 400m track, stopwatch, recording sheet.

Lower Body Power Tests

Vertical Jump Test

Purpose: to assess the player's lower body power and their maximum vertical jump ability using both legs and each leg individually.

Protocols:

Option A – Using a Vertec Jump Tester (recommended)

Double leg jump

- The player stands underneath the Vertec with both feet flat on the floor. They then reach up, with their inside hand, as high as possible and move the furthestmost finger of the Vertec away (see photo C). Note the shoulders do not have to remain square i.e. get them to reach as high as possible lifting the shoulder of the reaching arm. The number on the next finger i.e. the one directly above the last one moved, is recorded as the standing reach height (see photo D).
- The player then performs a countermovement jump by bending the ankles, knees and hips and then immediately jumps as high as possible attempting to move as many fingers of the Vertec as possible i.e. reach for the highest finger possible (see photo E).
- The number on the next finger above the last one moved is recorded as the maximum jump height (see photo F).
- Subtract the standing reach height from the maximum jump height to get the actual height jumped.
- Perform three repetitions with around 30 seconds between each one using the best result.



Photo C – the athlete reaches as high as possible using the inside hand.



Photo D – the number on the vertec finger at the top of the athlete's reach is the standing reach height.



Photo E – the player jumps as high as possible attempting to move as many fingers away as possible.



Photo F – the number on the finger above the last one moved by the athlete is the jump height.

Single leg jump

- Using the same standing reach height as above the athlete stands on one leg (the leg nearest to the vertec) and performs a countermovement jump landing on both legs.
- Subtract the standing reach height (as used in the double leg jump) from the height jumped to get your single leg jump height for that leg.
- Perform the same process for the other leg.

Netball New Zealand Fitness Testing Protocols

- You can compare the heights jumped for each leg to identify whether there is any discrepancy between individual leg power.



Photo G – the athlete stands on the leg nearest the vertec for the single leg jump. They then face the other way and stand on the other leg to test both legs.

Option B – Using Chalk or a Pen against the wall

Double leg jump

- The player stands side on to a wall with their feet flat on the ground and reaches up as high as possible, with the hand closest to the wall, while holding a piece of chalk. They make a mark on the wall with the chalk. This is called the standing reach height.
- The athlete then stands away from the wall and leaps vertically using a countermovement jump as high as possible using both arms and legs to assist in projecting the body upwards. The player marks the wall with the chalk at the highest point of the jump.
- Measure the difference in distance between the standing reach height and the height marked. This distance is the height jumped. The best of three attempts is recorded.

Single leg jump

- Using the same standing reach height as above the athlete stands on one leg and performs a countermovement jump landing on the same leg.
- Subtract the standing reach height from the height jumped to get your single leg jump height for that leg.
- Perform the same process for the other leg.
- You can compare the heights jumped for each leg to identify whether there is any discrepancy between individual leg power.

Equipment: Vertec, recording sheets, chalk, tape measure.

Horizontal Jump Test

Purpose: To assess the players lower body power and their ability to jump horizontally for maximum distance.

Protocols:

- The player stands with their toes on a line marked on the court (photo H). They then swing their arms back while bending their knees and hips (photo I) and jump as far as possible forward landing on both feet (photo J).
- The player stays in the finish position until the measurement has been taken.
- Measure the distance from the start line to the player's heels where they landed. This is the distance jumped.
- Perform three attempts recording the best distance jumped.

Equipment – tape measure, recording sheet

Netball New Zealand Fitness Testing Protocols



Photo H – the athlete starts with their toes behind the line.



Photo I – the athlete swings the arms and bends the knees and hips to jump.



Photo J – the athlete lands on both feet in a controlled manner.

Strength Endurance Tests

Press Up Test

Purpose: To assess the player's upper body pushing strength and endurance.

Protocols:

- The player assumes the press up start position with their hands slightly wider than shoulder width and directly under the shoulders i.e. not in front or behind the shoulders, with palms flat on the ground. Their feet are slight spread about hip width apart. The body is held straight with no bowing or arching of the core area (Photo K).
- A partner, or the tester, places a closed fist on the ground, with the thumb side up, under the player's chest (Photo L).
- The player lowers their body by bending at the elbows, keeping their body straight, until their rib area touches their partner's hand and then fully extends the elbows until the arms are straight again (Photo M).
- The player continues doing as many press-ups in succession ensuring that they touch their partner's fist until they cannot do any more.
- Record the number of repetitions completed.

Equipment: Recording sheet



Photo K – the athlete in the start position



Photo L – the partner places a closed fist under the ribs which the athlete must touch.



Photo M – the athlete in the finish position.

Horizontal Pull Up Test

Purpose: To assess the player's upper body pulling strength and endurance.

Protocols:

- Place a weight lifting bar in a squat or power rack or use a Smiths Machine. Ensure that the bar is high enough so that when the player's arms are fully extended their body is just off the ground.
- The player grips the bar slightly wider than shoulder width using an overhand grasp. Their feet are flat on the floor and their knees are bent at approximately right angles. The player then lifts their hips so that their body is straight and their arms are fully extended so they are hanging from the bar (Photo N).
- They then pull their body toward the bar until their shoulders are above their elbows and then lower themselves back down until their arms are fully extended (Photo O).
- They keep doing as many repetitions as possible until they can no longer pull themselves above the height of their elbows.
- Record the number of repetitions completed.

Netball New Zealand Fitness Testing Protocols

Equipment: bar in a squat rack or Smiths machine, recording sheet.



Photo N – the player in the start position.



Photo O – the player in the finish position.

Prone Bridge Test

Purpose: To assess the player's core strength and endurance.

Protocols:

- The player assumes the start position with their elbows on the ground, feet approximately hip width apart and body straight with no arching or bowing. The hands can be grasped or placed flat on the ground. The head should be facing toward the ground and not looking forward (photo P).
- The player maintains a straight body for as long as possible ensuring that normal breathing is maintained. Once the player can no longer keep their body straight i.e. they excessively arch or bow then they are to stop the test.
- Record the time that the player maintains a good position.

Equipment: stopwatch, recording sheet.



Photo P – the player holds a position with body straight.

Netball New Zealand Fitness Testing Protocols

Wall Pass Test

Purpose: to assess the player's ability to perform technically proficient passes under fatigue

Protocols:

- The player stands 3 meters from a wall and performs continuous chest passes for 1 minute.
- The number of passes completed in the minute is the athlete score.
- In addition to the number of passes the quality of the passes is equally important. Along with the pass count each player receives a quality score based on the scoring criteria below.

10 = maintains perfect form throughout the entire minute

8 = started perfect and slightly faded toward the end

6 = started with poor technique and maintained that technique throughout the entire minute

4 = started with poor technique and got worse

2 = technique is very bad

Please note

No standards are included for this test in the booklet. It is recommended that both the number of passes and the quality of the passing is recorded for each player. Improvement in both of these scores would be what you are looking for in subsequent testing.

Netball New Zealand Fitness Testing Protocols

Fitness Testing Standards

The following standards should be used as a guide only. They should be used as a target to get to if you are only just beginning to train for netball. If you reach the recommended target then you should continue to improve your performances and physical qualities and not be content to just reach the stated standards and not continue on.

If you are strong in one area of your physical profile and weak in another then you should spend more time on the areas that you are weak in to ensure that you eventually become a well rounded athlete who has limited weaknesses. For example if you do well in the beep test but can only do a few press ups and pull ups then you should spend more time improving your strength and endurance as opposed to neglecting this area and spending more time getting aerobically fit.

Some tests will have a positional target i.e. GK & GS while others will have a playing age and/or level e.g. secondary school player, and some will have both. You need to determine your playing level and also your preferred position and use this information to determine which standard for each test you are trying to achieve.

Speed, Acceleration & Quickness Minimum Standards

	5m	10m	20m
	All positions	All Positions	All Positions
Secondary School/U17/U19	< 1.15	< 2.00	< 4.0
Senior Club/U21 Rep	< 1.10	< 1.95	< 3.90
Senior Rep	< 1.10	< 1.90	< 3.90
ANZC franchise	< 1.05	< 1.85	< 3.75
Umpires (Male & Female)	< 1.10	< 1.90	< 3.75

Repeated Speed / Anaerobic Standards

	Octorepeater Total			Octorepeater Fatigue		
	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C
Secondary School/U17/U19	<85	<85	<80	< 10%	< 10%	5-8%
Senior Club/U21 Rep	<80	<80	<75	5-8%	5-8%	5-8%
Senior Rep	< 75	< 75	70-75	5-8%	5-8%	< 5%
ANZC franchise	< 75	< 72	< 70	5-8%	5-8%	< 5%
Umpires (Male)	< 70			5 – 8 %		
Umpires (Female)	< 75			5 – 8 %		

Netball New Zealand Fitness Testing Protocols

Aerobic Fitness Minimum Standards

	Beep Test			Yo-yo Test			1500m		
	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C
Secondary School/U17/U19	10	10.5	11	15.1	16.1	17.1	<7:30	<7:00	<6:30
Senior Club/U21 Rep	10	10.5	11	15.3	16.3	17.3	<7:15	<6:45	<6:30
Senior Rep	10.5	11	12	15.5	16.5	17.5	<7:00	<6:30	<6:00
ANZC franchise	11	11.6	12	16.1	17.1	18.1	<6:45	<6:15	<5:45
Umpires (Male)	12			17			< 6:00		
Umpires (Female)	10			15			< 7:00		
Please note current fitness testing requirements for umpires are as follows: NZAGC tournaments (U21, U19, U17) Beep test level 7 ANZC Beep test level 9									

Lower Body Power Minimum Standards

	Double Leg Vertical Jump			Single Leg Vertical Jump			Broad Jump		
	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C
Secondary School/U17/U19	40	40	40	30	30	30	150	150	150
Senior Club/U21 Rep	45	45	40	35	35	35	170	170	170
Senior Rep	50	50	45	40	40	35	190	190	190
ANZC franchise	50	50	50	40	40	35	200	210	200

Strength and Endurance Minimum Standards

	Press Ups			Horizontal Pull Ups			Prone Bridge		
	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C	GK/GS	GA/GD	WA/WD/C
Secondary School/U17/U19	15	15	15	5-8	8-10	10	1:00	1:00	1:30
Senior Club/U21 Rep	15	20	20	10	10	15	1:30	1:45	2:00
Senior Rep	20	25	25	15	15	15	1:30	1:45	2:00
ANZC franchise	20	25	30	15	15	20	2:00	2:15	2:30

Netball New Zealand Fitness Testing Protocols