



BC Alpine Fitness Testing Field Protocols

Revised June 2014

The following tests are important markers of athleticism in young athletes and relevant to the development of fitness in alpine ski racers. These tests outlined below can easily be standardized, therefore providing the coach with reliable data which can later be used for comparison. The tests which are chosen require minimal equipment.

Testing should be conducted 2-3 times per year (at a minimum testing should occur at the start of the preparation phase and at the end of preparation phase).

Reliable data and consistent testing procedures are critical. Factors to consider:

1. Follow the same order and protocols for each testing.
2. Perform the tests in a similar environment (gymnasium is recommended).
3. Provide adequate rest/recovery for each test (3-5 mins rest for power/strength/speed tests and 30 mins for tests requiring stamina).
4. It is *highly* recommended that athletes complete a health screen, such as the [PAR-Q \(Physical Activity Readiness - Questionnaire\)](#) prior to testing as part of athlete intake. See this link for information on this screening procedure.

It is important for the coach to recognize that fitness testing measures performance variables which are associated with athletic performance. It does not, however, address basic mobility and stability issues which are common among developing athletes. It is suggested that the club also incorporate a movement screen into their programs 2-3 times annually. A basic screen can be conducted by the club coach. For more advanced screening, such as the functional movement screen, a qualified professional may be sought.

There are various technologies available to increase both the accuracy and efficiency of test data collection. Specifically, the 'just jump' system is very useful when testing vertical jump with large groups of athletes, while a wireless brower timing system increases accuracy with the agility tests. Test kits are available through the Canadian Sports Institute or your local Pacific Sport regional provider.

Data can be collected using the standardized form found at www.bcalpine.com Once the data has been collated, please send your results to gordieb@bcalpine.com as these can be used to help update provincial normative data.



THE TESTS

- 1. Height**
 - a. Standing**
 - b. Seated**
- 2. Weight**
- 3. Squat Jump**
- 4. Standing Long Jump**
- 5. Agility - T-Test**
- 6. Penta Jump**
- 7. Max push-ups**
- 8. Box jump**
 - a. 60 second Test, 30cm (U14 and younger)**
 - b. 60 second Test, 40cm (U16)**
 - c. 90 second Test, 40cm (U18+)**
- 9. Multi-stage shuttle run**



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TEST DESCRIPTIONS AND PROCEDURES

1) Height

a) Standing Height

Apparatus: Measure tape

Description: Record athlete's height, without shoes, in cm.

- Heels should be firmly against the wall and flat on the floor
- Back and head should be against the wall
- Look straight ahead and take one deep breath in and hold it
- Measure height using a right angle.

b) Sitting Height

Apparatus: Measure tape

Description: Record athletes sitting height, in cm.

- Hips should be against the wall with legs straight out in front of them
- Back and head against the wall
- Look straight ahead and take one deep breath in and hold it
- Measure the height using a right angle.

2) Weight

Equipment: Scales

Description: Record the athlete's body weight in **kilograms**.

- The athletes should be dressed in minimal clothing (shorts and t-shirt) without shoes
- The Scale should be calibrated at 0 kg and validated with a fixed weight (e.g. 3x45lbs) to ensure accuracy. Also, the same scale should be used for each testing.

3) Squat jump

Component tested: Power - vertical

Apparatus: Chalk, black board if possible, or masking tape; tape measure (cm).

Description:

- Face sideways to the wall with chalk on finger tips or masking tape on index finger
- Stand tall with feet flat on the floor
- Reach as high as possible while looking forward to mark the spot where they will be measured from
- Perform a squat jump by sinking into a squat at 90 degree knee angle with hands on hips. Hold this position for 2 seconds. Following a coach prompt, the athlete jumps as high as possible, reaching up against the wall and making a 2nd chalk mark.
- The distance between mark #1 and mark #2 is the measure taken
- Perform the first jump on dominant side. Two attempts should be made (one on each side) and the greatest height on each side recorded.



4) Standing Long Jump

Component Tested: Power - horizontal

Apparatus: tape measure, non-slip floor for takeoff. Commercial Long Jump Landing Mats are also available. The take off line should be clearly marked.

Description:

- Place a box on the take-off mark. Start with the heels against the box and feet hip-width apart.
- A two-foot takeoff and landing is used, with swinging of the arms and bending of the knees to provide forward drive.
- Jump as far as possible, landing on both feet without falling backwards.
- The measurement is taken from the back of the heel closest to the take-off line. Record the longest distance jumped, the best of three attempts.

5) Penta Jump (5 consecutive jumps)

Component tested: coordination, eccentric control and power – bilateral stance. Coordination, stability and eccentric control – single leg stance.

Apparatus: Tape measure, meter stick, masking tape

Set up: Measure a distance of ~15 meters on the ground. Tape the measure to the ground, marking each meter past 8m. Place a box on the take-off mark. The athlete starts with the heels against the box and the feet hip-width apart.

Description – bilateral stance:

- Start with heels against the box and feet hip-width apart.
- Jump as far as possible, landing on both feet without falling backwards and land solidly on both feet.
- Perform 5 consecutive jumps in a continuous motion with no pauses.
- Two official attempts.
- Measurement is taken from the heel that is furthest back
- If athlete moves forward or loses balance on landing, the test result does not count and must be repeated.

Description – single leg stance:

- Stand on one leg with the heel against the box. A single foot take-off is used.
- Perform 5 consecutive jumps in a continuous motion with no pauses.
- The athlete *does not* need to stick the landing as this can result in serious stress to the ankle joint. Stride out of the final jump after the 5th jump.
- Two official attempts.
- The tester must eye where the heel made contact on the final jump and measure



from this point.

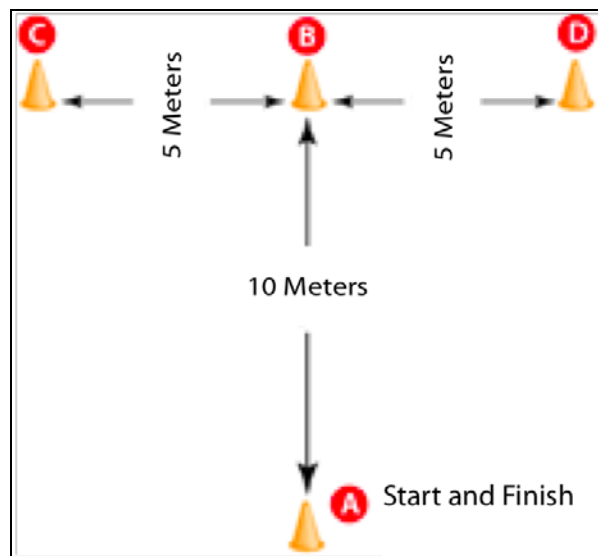
6) Agility - T-Test

Component tested: Coordination/agility.

Apparatus: 4 pylons or cones, stopwatch, flat surface (gym or track)

Description:

- Set out four cones in a T pattern as illustrated in the diagram below. The length and width of the course is 10 metres.
- Start at cone A with the foot at or behind the 1st cone.
- On command ('Ready, Set, Go'), jump to his/her feet, sprint to and go around cone B to the left.
- Then shuffle sideways to cone C, touching the cone with left hand.
- The athlete then shuffles sideways to the right to cone D and touches cone D with their right hand.
- Then shuffle back to the center, go around cone B and sprints backwards to finish at cone A. The timer is stopped as they pass cone A.
- Face the same direction throughout the test.
- The athlete cannot cross one foot in front of the other while shuffling; this should be recorded as a fail.



Safety: Instruct athletes to keep their center of mass over their feet when sprinting backwards. Falls are common during this test. Also ensure that the finishing area is clear of people and objects and that the surface is dry and free of debris.



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8) Max Push ups

Component tested: Upper body endurance, core stability

Apparatus: Metronome

Description:

- Start the metronome at 60 bpm (1 beat per second).
- The athlete must keep good form and maintain a rhythm with the metronome until failure (form, fatigue or out of rhythm).
- Each beep of the metronome signals either the down or up position (2 beeps = full push-up, no resting at top or bottom).
- The hands are placed just outside the shoulders when the athlete is lying flat on their chest (thumbs touching shoulders), fingers pointing forward, back straight and neck & head stays in line with the torso.
- The athlete must come down until there is a 90 degree angle between the forearm and biceps each time.
- If the athlete gets ahead of the beeps, the repetition will not be counted. Repetitions may be counted if the athlete gets behind the beeps provided good form is maintained.
- Record the number of repetitions completed.

9) Box Jump Test

Component tested: Anaerobic capacity

Apparatus: Reebok Stepper or Wood Box;

Stopwatch, 2 counters, 2 spotters, gym floor (no mats)

- a. **60 second Test, 20cm H x 35cm W box (U12)**
- b. **60 second Test, 30cm H x 35cm W box (U14)**
- b. **60 second Test, 40cm H x 35cm W box (U16)**
- c. **90 second Test, 40cm H x 35cm W box (U18+)**

**** It is recommended that discretion be used when assigning box height and test duration due to variances in maturation and fitness at this age.**

Description:

- Organize two spotters in case the athlete falls during the test. Have another 2 spotters at either end of the box to ensure the box doesn't move
- Athlete will start standing beside the box on the side they are most comfortable.
- On the command 'Ready, Set, Go', the athlete jumps laterally up onto the box and down onto the floor on the other side. This counts as one repetition. The athlete continues for the prescribed amount of time.
- Both feet must take off and land at same time – only these should be counted
- The timer starts the watch on the 'Go' command



- The spotters can also serve as counters.
- Record the number of touches *in each 30 second interval* (not cumulative) as well as the final total

11) Multi-stage shuttle run

Component tested: Aerobic power. Each stage of the test is assigned a number that correlates to a predictive estimate of VO_2 max (maximal oxygen uptake).

Apparatus: Gymnasium 25 meters long minimum, Cones or pylons to mark distance, tape measure, CD player, Leger Boucher CD, Masking tape

Description:

- The pylons are set in two parallel lines 20 meters apart with masking tape laid between the pylons.
- The Leger Boucher test commences when the athletes are lined up.
- The athlete follows the instructions and starts on the first beep. The goal is to reach the line at the other end of the gym by the next beep. It is important that athletes maintain rhythm and pace themselves accordingly.
- If the athlete loses pace with the beeps and gets behind, the administrator will give the athlete 2 chances to catch up. **When they fall short of the line twice in a row**, the athlete is stopped and the level recorded. (it is possible to miss one, get the second and miss the third and keep going as the athlete must miss two lines in a row to be stopped)

Note: Athletes cannot touch the walls at the end of the gym to help them turn. One foot must cross or touch the line each time. Predicted VO_2 max is based on maximum effort. It is very important that the athletes push themselves to the absolute limit.



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Level	VO2 Max	Level	VO2 Max	Level	VO2 Max	Level	VO2 Max
0	0	6.1	33.25	9.9	46.1	13.2	57.6
2.1	1	6.2	33.6	9. 10	46.45	13.3	57.9
2.2	22	6.3	33.95	9.11	46.8	13.4	58.2
2.3	22.2	6.4	34.3	10.1	47.1	13.5	58.45
2.4	22.4	6.5	34.65	10.2	47.4	13.6	58.7
2.5	22.8	6.6	35	10.3	47.7	13.7	59
2.6	23	6.7	35.35	10.4	48	13.8	59.3
2.7	23.2	6.8	35.7	10.5	48.35	13.9	59.55
2.8	23.6	6.9	36.05	10.6	48.7	13. 10	59.8
2.9	23.8	6. 10	36.4	10.7	49	13.11	60.1
3.1	24	7.1	36.75	10.8	49.3	13.12	60.35
3.2	24.4	7.2	37.1	10.9	49.6	13.13	60.6
3.3	24.6	7.3	37.45	10. 10	49.9	14.1	60.85
3.4	24.8	7.4	37.8	10.11	50.2	14.2	61.1
3.5	25.2	7.5	38.15	11.1	50.5	14.3	61.4
3.6	25.4	7.6	38.5	11.2	50.8	14.4	61.7
3.7	25.6	7.7	38.85	11.3	51.1	14.5	61.95
3.8	26	7.8	39.2	11.4	51.4	14.6	62.2
3.9	26.2	7.9	39.55	11.5	51.65	14.7	62.45
4.1	26.4	7. 10	39.9	11.6	51.9	14.8	62.7
4.2	26.8	8.1	40.2	11.7	52.2	14.9	62.95
4.3	27.2	8.2	40.5	11.8	52.5	14. 10	63.2
4.4	27.6	8.3	40.8	11.9	52.8	14.11	63.45
4.5	27.95	8.4	41.1	11. 10	53.1	14.12	63.7
4.6	28.3	8.5	41.45	11.11	53.4	14.13	64
4.7	28.7	8.6	41.8	11.12	53.7	15.1	64.3
4.8	29.1	8.7	42.1	12.1	54	15.2	64.6
4.9	29.5	8.8	42.4	12.2	54.3	15.3	64.85
5.1	29.8	8.9	42.7	12.3	54.55		
5.2	30.2	8. 10	43	12.4	54.8		
5.3	30.6	8. 11	43.3	12.5	55.1		
5.4	31	9.1	43.6	12.6	55.4		
5.5	31.4	9.2	43.9	12.7	55.7		
5.6	31.8	9.3	44.2	12.8	56		
5.7	32.2	9.4	44.5	12.9	56.25		
5.8	32.55	9.5	44.85	12. 10	56.5		
5.9	32.9	9.6	45.2	12.11	56.8		
		9.7	45.5	12.12	57.1		
		9.8	45.8	13.1	57.35		