

CANADIAN ALPINE SKI TEAM

Physiological Testing Protocols

J1/J2 Athletes

Weight

Record the athletes body weight in kilograms. Athletes should be dressed in minimal clothing (i.e. shorts/t-shirt) WITHOUT shoes and weight is recorded to the nearest decimal place.

Standing Height

Have the athlete stand against a wall WITHOUT shoes on. Be sure that heels, buttocks, shoulders and back of the head are all in contact with the wall. Using a set square, place at a right angle with the wall and in contact with the apex (highest point) of the head. The athlete should then take a big breath in and then step away from the wall while height is recorded. (Height is measured in centimeters to nearest 0.5cm e.g.: 165.5cm)

Leg Power (3 methods – basic, jump mat, opto jump)

1. VERTICAL JUMP (basic)

This test is to measure explosive power of the lower body.

Materials: Meter Stick, Wall and Masking Tape, OR chalk board and chalk

Procedure

1. Athlete starts facing sideways to a wall with a piece of 'doubled over' masking tape on tip of index finger. Standing erect with feet flat on floor, they reach as high as possible and stick the tape to the wall in line with the body. This provides a baseline from which the vertical jump height will be measured.
2. Next, the athlete places another piece of tape on the tip of the index finger.

The athlete will perform a jump by quickly sinking down to a 90 degrees knee angle and then jumping as high as possible, placing the tape on the wall. The distance between the two pieces of tape is recorded as the height of the jump. The greater of 2 attempts is recorded. Measure the jump height in centimeters (cm).

Calculate Leg Power using the following equation:

$$\text{Power (kg/m/s)} = \sqrt{4.9 \times \text{Body Mass (kg)} \times \text{Jump Height (m)}}$$

2. **VERTICAL JUMP** - Using the "Just Jump" System – set the display unit to measure 4 jumps.

The athlete stands on the mat with hands placed on the hips. The athlete must perform a series of 4 consecutive counter movement jumps. The goal of the test is to jump as high as possible with as little ground contact time as possible. However, the athlete must sink to a minimum knee flexion of 90 degrees at the bottom of each CMJ. Measure Average Tc (contact time), Jump height (inches) and the ratio between Tc (contact time) and Tf (flight time) and compute leg power with the equation provided below. Record the best of three (4jump) repeats.

$$\text{Leg Power (W/kg)} = (9.81)^2 \times \text{Tf} \times [(\text{Tc} + \text{Tf}) / (4 \times \text{Tc})]$$

Where Tf (flight time) is calculated as follows:

$$\text{Tf} = (\text{Tf}/\text{Tc}) \times \text{Tc}$$

Example Data: Tc - .59

Tf/Tc – 1.01

Ht – 17.1

therefore Tf - .60

$$\begin{aligned} \text{Leg Power (W/kg)} &= (9.81)^2 \times .59 \times [1.1859/2.36] \\ &= 28.8 \end{aligned}$$

3. **VERTICAL JUMP** - Using the "Opto Jump" System.

Set the system to record multiple jumps, and evaluate contact time (Tc) and flight time (Tf) simultaneously. Follow the same procedures as the "Just Jump" System to perform 4 consecutive counter movement jumps. After each trial calculate the average Tc and Tf. To compare data from the two systems a correction factor must be applied. Add 0.1 seconds to the average Tf score. Next, input the average Tc, and corrected average Tf values into the above equation to calculate Power in W/kg.

5 Consecutive Jumps

The purpose of this test is to measure coordination and explosive power through a series of 5 consecutive jumps.

Materials: Tape Measure (25m) non-slip surface with a marked starting point (box/bench).

Procedure

1. Athlete starts with both heels touching the box or bench.
2. Athlete jumps 5 consecutive times using both legs with no pause or stopping between jumps.
3. Distance is measured from the starting line to the back of the heels at the finish. The best of two attempts is recorded as the final result.
4. Perform each sequence on both legs, right leg only, left leg only. NOTE: when the athlete performs the 5 jumps on a single leg – they must initiate the test with the non-assessed foot perched on toe with the heel touching the box or bench.

90 second Box Test

The purpose of this test is to measure anaerobic capacity in an athlete through a series of consecutive lateral jumps.

Materials: 40cm box (40cm height x 35cm width x 60cm length), stopwatch, 2 people to be counters.

Procedure

1. The athlete will start standing sideways to the box (either on left or right side).
2. On the command 'Ready, Set, Go', the athlete jumps laterally up onto the box and then down off the other side. This is done continuously for 90 seconds.
3. The timer starts the watch on the 'Go' command. The timer will call out when 30, 60 seconds have gone by and will give a verbal cue of '15 seconds left' and 'stop' at 90 seconds.
4. Someone will stand at either end of the box with their foot in the handle to keep it steady and serve as counters. On the 'Go' command, the first counter will start counting-each time 2 feet touch the top of the box. When the timer shouts out '30 seconds', the counter records the number of touches under the 30second column. At the '60 seconds' cue the counter records the number of touches total under the 60second column.. Finally, upon the 'stop command' the counter records the total number of touches achieved in the 90second period.
5. The counter then should calculate out from the totals the number of contacts that occurred from 0-30sec, 30-60sec, and finally 60-90sec.

20m Shuttle Run – (AIS Version of Leger Boucher)

A very easy test to administer. Designed to measure VO₂ max without the necessity of expensive laboratory equipment. Each stage of the test is assigned a number- which is correlated to a predictive estimate of VO₂ max. The VO₂ Max is a measure of your aerobic capacity. This is important for skiers as they must have the ability to tolerate high training volumes during training and camps. A solid aerobic base is crucial when training at altitude.

Materials: Leger Boucher CD

<http://www.mentone-educational.com.au/product/>----to order the CD

CD player, Tape Measure (50m), pylons.

Procedure

1. Pylons or masking tape is set in 2 parallel lines 20m apart
2. The Leger Boucher test portion of the CD (track 3) commences after the athletes line up on the line.

3. Once the CD commences, the athletes begin running from line to line in sync with the beeps' on the CD.
4. If the athlete loses pace with the CD, they are issued a warning to maintain the pace. If an athlete falls short of the line twice in a row, the test is terminated

The last stage completed is recorded for the athlete. The athlete should try to reach the highest possible stage as the predicted value is based on a maximal effort. The test is best conducted by having each athlete work with a partner (one runs, the other records the final stage number).