

# PLYOMETRICS: SCIENCE & PRACTICE OF REACTIVE STRENGTH DEVELOPMENT

## Part 7

### Reactive strength testing & assessment

This section covers two main tests: the 10-5 Rebound Jump Test (10-5 RJT) and the Incremental Drop Jump Assessment.

#### Reactive Strength Index (RSI)

Reactive strength is often assessed by examining either jump height or the Reactive Strength Index (RSI) in drop jumps. The RSI is a simple ratio that combines two key metrics: how high an athlete can jump and how fast they can do it.

The RSI is calculated by dividing the height jumped by the ground contact time.

$$\text{RSI} = \text{Jump Height (m)} / \text{Ground contact time (s)}$$

For example, if an athlete jumps 50 cm with a contact time of 200 ms, their RSI would be 2.5 units.

$$0.5\text{m} / 0.200\text{s} = 2.5 \text{ units}$$

If you are using contact mats or other devices which capture “flight time” data in lieu of jump height, then jump height can be calculated via the following formulae.

This is derived from the Newtonian equation:

$$\text{Jump height (m)} = \frac{1}{2} [(9.81) * (0.5 \text{ FT})]^2$$

Where 9.81 = acceleration due to gravity  
and FT = flight time.

## 10-5 Rebound jump test

The 10-5 Rebound Jump Test was developed by Damien Harper. This test involves the athlete performing a single countermovement jump, followed by a series of 10 repeated bilateral jumps with fast ground contact times. The RSI is calculated for each of these jumps, and the five highest scores are averaged to give an overall RSI score.

Advantages of the 10-5 RJT:

- Quick and easy to set up and administer.
- Athletes can reliably perform the test with minimal practice.
- The test is versatile; by adjusting cues, you can focus on shorter or longer ground contact times, depending on the goal of the test.
- The test is self-limiting in terms of impact. The athlete's ability determines the height they jump and, consequently, the impact forces involved. This makes it safe for a wide range of athletes.

This test is particularly useful for assessing an athlete's ability to perform fast SSC actions repeatedly, which is crucial in many sports.

## Incremental drop jump assessment

The incremental drop jump assessment allows for the assessment of an athlete's reactive strength levels by progressively increasing drop height. During the test, athletes perform 2-3 drop jumps at increasing drop heights, with RSI calculated at

each height. This assessment helps create a reactive strength profile for each athlete to assist in identifying the drop height which optimally stimulates the athlete's reactive strength abilities in drop jump training.

**<1.5** RSI

- Low reactive strength ability
- Athlete unprepared for moderate intensity plyometrics
- Strength development & low-level plyometric techniques should be targeted

**1.5 - 2.0** RSI

- Moderate reactive strength ability
- Athlete prepared for moderate intensity plyometrics
- Reactive strength is an area for performance enhancement

**2.0 - 2.5** RSI

- Well established reactive strength ability
- Intensive plyometrics are appropriate

**2.5 - 3.0** RSI

- High level of reactive strength
- Diminishing training returns for some athletes in this range
- Critical analysis: Will greater reactive strength levels improve performance?

**>3.0** RSI

- World class reactive strength levels
- Limited capacity for further improvements in reactive strength

Normative data for male athletes

**<1.3** RSI

- Low reactive strength ability
- Athlete unprepared for moderate intensity plyometrics
- Strength development & low-level plyometric techniques should be targeted

**1.3 - 1.7** RSI

- Moderate reactive strength ability
- Athlete prepared for moderate intensity plyometrics
- Reactive strength is an area for performance enhancement

**1.7 - 2.0** RSI

- Well established reactive strength ability
- Intensive plyometrics are appropriate

**2.0 - 2.3** RSI

- High level of reactive strength
- Diminishing training returns for some athletes in this range
- Critical analysis: Will greater reactive strength levels improve performance?

**>2.3** RSI

- World class reactive strength levels
- Limited capacity for further improvements in reactive strength

## Normative data for female athletes



Example chart of RSI, jump height and contact time for the 10-5 RJT over time

## Practical guidelines and considerations

When using these tests, there are a few key guidelines to keep in mind:

- Experience level: The Incremental Drop Jump Assessment is best suited for athletes with well-established reactive strength levels. It's recommended to reserve this test for athletes who have already demonstrated solid performance in the 10-5 RJT.
- Drop height increments: Start with increments of 10-15 cm, with smaller increments (5-10 cm) at higher heights. Typically, 4-5 increments are sufficient.
- Quick “drop height” heuristic: If you lack the time for a full incremental assessment to set starting drop heights in the drop jump, a quick method is to take the average jump height from the 10-5 RJT and add 5 cm to it. This approach offers a practical starting point for determining drop jump heights for training.