

THE HANDBALL REFEREE

Shuttle Run Test and Training Advice

Shuttle Run Test

With this progressive, accumulative running test the basic endurance, the aerobic and anaerobic threshold and the corresponding heart rates to each level are determined.

Material needed for the test:

- 20 metres distance for running
- Heart rate monitors for each person taking part in the test
- Implements for measuring lactat .
- Audio cassette or computer programme for giving the right speed at the test: The advantage of an audio cassette is that it can be used very easily at different venues, you only need a cassette player. The disadvantage is that the tape can stretch and then become inaccurate, though an adaptation of the running distance is possible. The advantage of a computer programme is the very high accuracy.

Test procedure:

After having done all the preparations (putting on the heart rate monitors, warming up, preparing for taking blood samples) the first level starts at a speed of 7,5 km/h, the tested persons cover the distance of 20 metres at an even speed. At the end of the 20 metre zone one foot should be placed on or behind the 20 metre mark when turning around.

Each level lasts 3 minutes. A blood sample is taken from the earlobe, the heart rate is registered. After a rest of 1,5 minutes the next level (9 km/h) begins. This sequence must be completed 4-5 times depending on the condition of the tested person. 4 levels are necessary for a representative lactat-performance-diagram, the fifth level is only necessary if the anaerobic threshold is not reached after the fourth level. The test shouldn't be a maximal load test.

Referees bear a lot of responsibility. Their task is not just to lead the game rule-consistently, they take an active part in shaping the game. Correctness, discretion, keeping cool and not to forget a good body condition can be decisive for a game.

A referee's performance is not just assessed by the knowledge of the rules, but particularly by his/her psychologic-physical capability. Concentration, reactivity and also his/her appearance depend on his/her current physical and mental condition. Therefore referees have to – as important protagonists on the playing court – prepare for each game as serious as the players.

Training advice:

Handball has changed significantly over the past years. The games has become faster, more dynamic, more attractive and also riskier. Therefore it does not just take a different philosophy of the game, but also a different physical preparation of the

players. Today the development of strength, speed and aerobic endurance are in the focus. They are – in combination with technique and tactics – the precondition for a dynamic and attractive game.

Also the referees have to adapt to these changes and have to be aware of their condition more than ever. Speed, endurance and also strength (a decisive factor at every acceleration) have to be developed optimally, not least because of the fact that a referee, in contrast to a player, cannot be replaced during the game and therefore cannot take a rest.

In this context the interaction between psychological and physical fitness has to be pointed out. Deficits in the physical education have a direct effect to the psychological capability (stress, concentration, reaction, attention, etc.). Even experienced referees cannot compensate physical problems with their experience.

The training of a referee is due to the significance of particular strength factors clearly prescribed. At first the creation of a general endurance is in the focus. Endurance is the base for all other training measures.

In dependence of the current lactate output curve, from where you can see the merits and shortcomings, the emphases in the endurance training are different. Referees with a weak development of the aerobic barrier have to focus their training on the basics (extensive endurance), those having weaknesses in the anaerobic barrier have to train more in the intensive area. On the basis of long-time observations and analyses the following standard values have been established in order to classify the endurance of a referee:

Aerobic barrier	(2,0 mmol/l)	8,5 km/h
Anaerobic barrier	(4,0 mmol/l)	10,0 km/h

On the basis of the attached test results each referee can directly see if the reference values have been achieved, respectively in which part he/she has his/her individual weaknesses that need to be improved.

The different endurance training ranges are:

Regeneration/compensation A0	mostly used for recovery after heavy training effort
Extensive Endurance training A1	typical training for lipometabolism, therefore you can train intensively in this area
Extensive Endurance training A2	training on an aerobic basis that releases carbohydrates and fat
Intensive Endurance training A3	training in the area of carbohydrates, at which the release of carbohydrates can be compensated aerobically (with the aid of oxygen)
Anaerobic Endurance A4	training on the endurance limit

As mentioned before, the general endurance is the most important precondition for a referee's capability and has to be trained all-the-year. This is particularly important because already after a few weeks rest the capability in the endurance area decreases heavily. The shortest duration of the training goes from 60 to 90 minutes. There should be at least 3 training units per week in this area. The heart-rate works as an indicator of intensity. Improvements are expected within 8-12 weeks.

If, however, the anaerobic barrier is developed inadequately it has to be improved with runs in the area of intensive endurance.

The respective individual heart-rate values can be taken from the table.

In case there are any questions concerning the training, do not hesitate to contact me.

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Good luck for the training!