

CARDIORESPIRATORY FITNESS TEST

Version 10:10 eng – © Health Accountant Stefan Lundström, stefan@ekodemos.se, +46 18 101022

This test measure, with quite good precision, the most important individual objective healthfactor. This cardiorespiratory fitness test is made in Sweden and is validated on a Swedish workforce, men and women at the age of 20-65.

There are similar questionnaires in research papers, two examples is published in "Medicine and Science in Sports and Exercise" and "Resarch Quartely for Exercise and Sport". George JD, et al., "Non-exercise VO₂max estimation", MSSE, March 1997, 29(3) pp. 415-23 and Bradshaw, D, et al , "An accurate VO₂max Non-exercise Regression Model for 18-65-year-old-adults" RQES, December 2005, Vol 76, No.4, pp426-432

The cardiorespiratory endurance is measured by a person's maximal oxygen consumption - VO₂max. VO₂max is reached when a person is no longer able to increase the amount of oxygen consumed, although the workload for large muscle groups is raised. VO₂max is mainly limited by the hearts ability to contract and the size of the left ventricle. These characteristics can easily be affected by cardiovascular training, regardless of age (there is evidence of 80-year olds with considerable improved cardiorespiratory fitness due to training).

The "Testvalue" in this test is calculated as the amount of consumed oxygen in milliliters per kilogram body mass per minute VO₂max (ml / kg x min).

"Testvalue" is a comparable measurement that can be related to a person's overall cardiovascular health and is therefore used in several large longitudinal health studies. One of the most important studies in this case is Blair, S, et al, "Physical Fitness and All-Cause Mortality", JAMA, November 1989-Vol 262, No 17, sid 2395-2401.

Cardiovascular training is the most potent and most timeefficient way of coping with stress, therefore there is a very strong correlation between "Testvalue" and the most common reasons for premature death in cardiovascular disease.

For individuals with very poor cardiorespiratory fitness, i.e. a maximum oxygen consumption of less than 28 (ml / kg x min), it's usually a swift process to reach normal levels eg 35-40 (ml / kg x min). The time spent is two to three 30-40 minute sessions of cardiovascular training per week. The benefits will be considerable. Your health consultant or personal trainer is there to guide and help you set up a suitable training program according to your needs and special requests.

Before we get started, you must state the following:

My weight is approx.: _____ kg. My height is: _____ m.
(morning weight without clothes)

The last page in this folder contains a VO₂max calculation that you can carry out on your own for free. The result is fairly good if your real value is about 20-75. Values between 50-75 is however very dependent on your running skills! There is also a commercial application built on this test, including a more precise algorithm. If you want a complete health screening done on your organization at the cheapest possible cost, then implement this test + questions about smoking, general health and stress in your Employee Attitude Survey, to get this material - please contact Stefan Lundström (above).

Physical Activity Rating (PAR)

Select the number that best describes your overall physical activity for the previous 6 MONTHS:

(In alternative 4-10 you have a heartrate about at least 120 bpm, this is somewhat hard, talking in long sentences is no longer easy.)

- 0 **Inactive:** avoid walking or exertion almost always.
- 1 **Light activity now and then:** walk for pleasure, routinely use stairs, occasionally exercise sufficiently to cause heavy breathing or perspiration.
- 2 **Some activity:** 10 to 50 minutes per week of moderate activity; such as golf, cleaning the house, walking for exercise.
- 3 **Normal activity:** 1 hour per week or more of moderate activity witch then make me warm through the whole body.
- 4 **Some structured exercise:** I am doing cardiovascular training each week, most of the times in a training outfit, about 30 min each time.
- 5 **Some structured exercise:** I am doing cardiovascular training every week, always in a training outfit, running 2-5 miles or other cardio 30-60 min per week.
- 6 **Structured exercise:** I am doing cardiovascular training every week running 5-10 miles or other cardio 1-3 hours per week. It will then cause heavy breathing or perspiration.
- 7 **Vigorous activity:** I am doing cardiovascular training every week, running 10-15 miles or other cardio 3-6 hours per week.
- 8 **Vigorous activity:** I am doing cardiovascular training every week, running 15-20 miles or other cardio 6-7 hours per week.
- 9 **Vigorous activity:** I am doing cardiovascular training every week, running 20-25 miles or other cardio 7-8 hours per week.
- 10 **Vigorous activity:** I am doing cardiovascular training every week, running more than 25 miles or other cardio at least 8 hours per week.

My PAR value: _____

Physical Endurance (PE)

How fast could you nowadays cover a distance of 5 kilometers (3,1 miles) and NOT become breathless or overly fatigued? Circle the appropriate number (any number, 1 to 28). Be realistic! (If you are not able to walk this distance at all – this test will not work for you.)

- 1 I could walk the entire distance at a *slow* pace it will take 1 hour or more.
- 2 I could walk the entire distance at a *normal* pace.
- 3 I could walk the entire distance at a *fairly good* pace.
- 4 I could walk the entire distance at a *fast* pace.
- 5 I could walk the entire distance at a very *fast* pace.

Options 6-9 is for those who could jog this distance (3,1 mile – 5 km)

- 6 I could jog the distance at a very *slow* pace, it takes about 41-42 min.
- 7 I could jog the distance at a *slow* pace it takes about 38 min.
- 8 I could jog the entire distance at a *medium* pace it takes about 34-35 min.
- 9 I could jog the entire distance at a *medium* pace it takes about 31 min.

Options below is for the well trained, the times is at maximum race speed

- 10 I could run the entire distance at a *fast* pace it takes about 25 min.
- 13 I could run the entire distance at a *fast* pace it takes about 23 min.
- 17 I could run the entire distance at a very *fast* pace it takes about 21 min.
- 21 I could run the entire distance at a very *fast* pace it takes 19 min.
- 24 I could run the entire distance at a very *fast* pace it takes 18 min.
- 28 I could run the entire distance at a very *fast* pace it takes 17 min.

My PE value: _____

The Swedish Equation

1. Your BMI is = Bodymass in kg / length (in meters) / length (m) (again): _____
Exempel: 82kg / 1,84m / 1,84m ≈ BMI 24,2

2. FAB value is (from previous page): _____ PE value is: _____
Exempel: FAB=7 Exempel: FU=13

$$\text{Testvalue} = 49 - (0,8 * \text{BMI}) + (0,7 * \text{FAB}) + (1,4 * \text{FU}).$$

This equation has a correlation with physical measured values between $r=0,70$ and $r=0,93$. In the 60 and 70:s there was a big difference between men and women in this kind of tests. Today, that is no longer relevant because women of today has a level of stress from work and home in a way that leads to accumulation of fat in the traditional male areas (abdominal fat). Men of today has also a significant lower percentage of muscles and higher levels of fat and therefore we could not observe a significant difference between middleaged men and women in our study. Young, very active males (18-27) must however add 3-5 in this equation.

Example calculus

$$\begin{array}{r} 49 - (0,8 * 24,2) + (0,7 * 7) + (1,4 * 13) \approx 53 \\ 49 - 19,4 + 4,9 + 18,2 \approx 53 \end{array}$$

Your own testvalue is probably close (+/-3) to:

$$49 - (0,8 * \text{BMI}) + (0,7 * \text{FAB}) + (1,4 * \text{FU}) = \text{Your testvalue!}$$
$$49 - (\quad) + (\quad) + (\quad) = \text{ca } \underline{\quad}$$

3. *Calculate and write the product inside the 3 parenthesis above first!*

Evaluation (this test may not be accurate on you and perhaps your real value is lower or higher):

<34 Normally there is a health risk linked to this level of cardiofitness

20-22 Seek medical advice in order to evaluate your poor level of cardio fitness. About 3 out of 10 people with this value never lives to celebrate their 65:th birthday, is this test accurate on your health there is a severe health risk (cardiovascular disease) linked to your cardio fitness.

23-27 Seek medical advice in order to evaluate your poor level of cardiofitness. If this test accurate on your health there is about twice the risk for cardiovascular disease linked to your cardio fitness. Seek medical advice and advice from a personal trainer.

28-34 Your fitness level put you in high risk for developing diabetes, metabolic syndrome and coloncancer. Seek medical advice or advice from a personal trainer.

≥35 Normally there is no health risk linked to this level of cardiofitness

But in order to stay this fit during the entire middle age there are age related limits:

17-29-year old should have at least testvalue 48

30-39- year old should have at least testvalue 44

40-49- year old should have at least testvalue 41

50-59- year old should have at least testvalue 37

60-65- year old should have at least testvalue 35.

The reason for this is that even if you are doing the same kind of exercise, your body will respond less with older age