ISO 8996:2021-12 (E)

Ergonomics of the thermal environment - Determination of metabolic rate

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 The units ... **1**

5 The four levels of methods for estimating the metabolic rate ... **1**

6 Level 1, Screening: classification of metabolic rate by categories ... **3**

7 Level 2, Observation ... **3**
7.1 Evaluation of metabolic rate for a given activity ... 3
7.2 Evaluation of the mean metabolic rate over a given period of time ... 4
7.3 Accuracy ... 4

8 Level 3, Analysis ... **4**
8.1 Evaluation of metabolic rate using heart rate ... 4
8.1.1 Principle of the method ... 4
8.1.2 Determination of the (*HR*–*M*) relationship for purely dynamic muscular work ... 5
8.1.3 Evaluation of the metabolic rate as a function of *HR* in real situations ... 6
8.2 Evaluation of metabolic rate by accelerometry ... 7

9 Level 4, Expertise ... **8**
9.1 Evaluation of metabolic rate by measurement of oxygen consumption rate ... 8
9.1.1 Partial and integral method ... 8
9.1.2 Evaluation of metabolic rate from oxygen consumption rate ... 10
9.1.3 Evaluation of oxygen uptake ... 11
9.1.4 Calculation of metabolic rate ... 13
9.2 Evaluation of metabolic rate by the doubly labelled water method for long term measurements ... 13
9.3 Evaluation of metabolic rate by direct calorimetry — Principle ... 14

Annex A (informative) **Evaluation of the metabolic rate at level 1, Screening** ... **15**

Annex B (informative) **Evaluation of the metabolic rate at level 2, Observation** ... **17**

Annex C (informative) **Evaluation of the metabolic rate at level 3, Analysis** ... **21**

Annex D (informative) **Evaluation of the metabolic rate at level 4, Expertise** ... **23**

Annex E (normative) **Correction of the heart rate measurements for thermal effects** ... **25**

Bibliography ... **27**