

# ISO 16976-4:2023-02 (E)

## Respiratory protective devices - Human factors - Part 4: Work of breathing and breathing resistance: physiologically based limits

---

Contents	Page
Foreword .....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Symbols and abbreviated terms .....	2
5 Pressure and volume changes during breathing .....	3
5.1 Pressure and volume changes in the absence of an RPD .....	3
5.2 The effect of RPD flow resistance on pressure and volume changes while using an RPD .....	6
5.3 The effect of RPD with static pressure on pressure and volume changes while using an RPD .....	6
5.4 The effect of RPD flow resistance and static pressure on pressure and volume changes while using an RPD .....	7
5.5 Effects of high static pressure .....	7
6 Work of breathing (WoB) .....	8
6.1 Physiological work versus physical work .....	8
6.1.1 General .....	8
6.1.2 Static work .....	8
6.1.3 Elastic work .....	8
6.1.4 Positive and negative physical work .....	9
6.2 Calculations of inspiratory WoB .....	9
6.3 Calculations of expiratory WoB .....	9
6.4 Calculations of total WoB .....	10
6.4.1 Calculations of the wearer's WoB while using an RPD .....	10
6.4.2 Calculations of WoB for an RPD only .....	10
6.5 Breathing resistance .....	11
6.6 Physiologically acceptable WoB .....	11
7 Other respiratory loads .....	13
7.1 Static load .....	13
7.2 Elastic loads .....	13
7.3 Other loads .....	13
7.4 How respiratory loads add up .....	13
8 Summary .....	14
Bibliography .....	15