

ISO 20344:2021-10 (E)

Personal protective equipment - Test methods for footwear

Contents		Page
Foreword		viii
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	General testing parameters	2
4.1	Sampling.....	2
4.2	Conditioning before and during the test.....	3
4.3	Prerequisites on the testing procedure.....	3
4.4	Test report.....	3
5	Test methods for whole footwear	6
5.1	Specific ergonomic features.....	6
5.1.1	Sampling and conditioning.....	6
5.1.2	Test method.....	7
5.1.3	Test report.....	7
5.2	Determination of upper/outsole and sole interlayer bond strength.....	8
5.2.1	Principle.....	8
5.2.2	Test equipment.....	8
5.2.3	Sampling and conditioning.....	8
5.2.4	Test method.....	8
5.2.5	Test report.....	12
5.3	Determination of dimensions of toecap.....	12
5.3.1	Sampling and conditioning.....	12
5.3.2	Test method.....	12
5.3.3	Test report.....	12
5.4	Determination of impact resistance.....	12
5.4.1	Test equipment.....	12
5.4.2	Sampling and conditioning.....	16
5.4.3	Test methods.....	16
5.4.4	Test report.....	18
5.5	Determination of compression resistance.....	18
5.5.1	Test equipment.....	18
5.5.2	Sampling and conditioning.....	18
5.5.3	Test method.....	18
5.5.4	Test report.....	19
5.6	Behaviour of toecaps (thermal and chemical).....	20
5.6.1	Sampling and conditioning.....	20
5.6.2	Behaviour of toecaps (thermal and chemical).....	20
5.7	Determination of leak proofness.....	21
5.7.1	Test equipment.....	21
5.7.2	Sampling and conditioning.....	21
5.7.3	Test method.....	21
5.7.4	Test report.....	21
5.8	Dimensions of perforation resistant inserts.....	21
5.8.1	Sampling and conditioning.....	21
5.8.2	Test method.....	22
5.8.3	Test report.....	22
5.9	Determination of the perforation resistance of footwear with a metallic perforation resistant insert.....	23

5.9.1	Test equipment.....	23
5.9.2	Sampling and conditioning.....	23
5.9.3	Test method	24
5.9.4	Test report.....	24
5.10	Determination of the perforation resistance of footwear with a non-metallic perforation resistant insert.....	24
5.10.1	General.....	24
5.10.2	Test equipment.....	24
5.10.3	Sampling and conditioning.....	24
5.10.4	Test method	25
5.10.5	Test report.....	27
5.11	Behaviour of perforation resistant inserts (thermal and chemical).....	28
5.11.1	Sampling and conditioning.....	28
5.11.2	Behaviour of perforation resistant inserts (thermal and chemical).....	29
5.11.3	Test report.....	29
5.12	Determination of the flex resistance of perforation-resistant inserts.....	29
5.12.1	Sampling and conditioning.....	29
5.12.2	Test method	29
5.12.3	Test report.....	29
5.13	Determination of electrical resistance.....	30
5.13.1	Principle.....	30
5.13.2	Test equipment.....	30
5.13.3	Sampling and conditioning.....	30
5.13.4	Test method	31
5.13.5	Test report.....	31
5.14	Determination of footwear slip resistance.....	31
5.14.1	Sampling and conditioning.....	31
5.14.2	Test method	31
5.14.3	Test report.....	32
5.15	Determination of insulation against heat.....	32
5.15.1	Test equipment.....	32
5.15.2	Sampling and conditioning.....	33
5.15.3	Test method	33
5.15.4	Test report.....	33
5.16	Determination of insulation against cold.....	34
5.16.1	Test equipment.....	34
5.16.2	Sampling and conditioning.....	34
5.16.3	Test method	35
5.16.4	Test report.....	36
5.17	Determination of energy absorption of the seat region.....	36
5.17.1	Test equipment.....	36
5.17.2	Sampling and conditioning.....	38
5.17.3	Test method	38
5.17.4	Test report.....	38
5.18	Determination of resistance to water for whole footwear: trough test.....	38
5.18.1	Principle.....	38
5.18.2	Test equipment.....	38
5.18.3	Sampling and conditioning.....	39
5.18.4	Test method	39
5.18.5	Test report.....	40
5.19	Determination of resistance to water for whole footwear: dynamic test.....	40
5.19.1	Principle.....	40
5.19.2	Test equipment.....	40
5.19.3	Sampling and conditioning.....	40
5.19.4	Test method	40
5.19.5	Test report.....	42
5.20	Determination of impact resistance of a metatarsal protection.....	42
5.20.1	Test equipment.....	42
5.20.2	Sampling and conditioning.....	45
5.20.3	Test method	46
5.20.4	Test report.....	47
5.21	Determination of the dimension of the ankle protection.....	47

5.21.1	Sampling and conditioning	47
5.21.2	Test method	47
5.21.3	Test report	48
5.22	Determination of the shock absorption capacity of ankle protection materials incorporated into the upper	48
5.22.1	Principle	48
5.22.2	Test equipment	49
5.22.3	Sampling and conditioning	50
5.22.4	Test method	50
5.22.5	Test report	50
5.23	Determination of cutting resistance	51
5.23.1	Sampling and conditioning	51
5.23.2	Dimension of the cut resistant protective area	51
5.23.3	Test method	52
5.23.4	Test report	52
5.24	Scuff caps	52
5.24.1	Sampling and conditioning	52
5.24.2	Test method for the abrasion resistance of the scuff caps	52
5.24.3	Test report	52
5.25	Determination of seam strength	53
5.25.1	Sampling and conditioning	53
5.25.2	Test method	53
5.25.3	Test report	53
6	Test methods for upper, lining and tongue	53
6.1	Determination of thickness of upper	53
6.1.1	Sampling and conditioning	53
6.1.2	Test method	53
6.1.3	Test report	53
6.2	Measurement of the height of the upper	53
6.2.1	Sampling and conditioning	53
6.2.2	Test method for the complete upper	54
6.2.3	Test method for the determination of the area for non-water vapour permeable materials	54
6.3	Determination of tear strength of the upper, lining and/or tongue	56
6.3.1	Sampling and conditioning	56
6.3.2	Test method	56
6.3.3	Test report	57
6.4	Determination of the tensile properties of the upper material	57
6.4.1	Sampling and conditioning	57
6.4.2	Test method	57
6.4.3	Test report	58
6.5	Determination of upper flexing resistance	58
6.5.1	Sampling and conditioning	58
6.5.2	Test method	58
6.5.3	Test report	61
6.6	Determination of water vapour permeability (WVP)	61
6.6.1	Principle	61
6.6.2	Sampling and conditioning	61
6.6.3	Pre-treatment test method	61
6.6.4	WVP measurement	61
6.6.5	Test report	61
6.7	Determination of water vapour absorption (WVA)	62
6.7.1	Principle	62
6.7.2	Test equipment	62
6.7.3	Sampling and conditioning	62
6.7.4	Test method	62
6.7.5	Test report	64
6.8	Determination of water vapour coefficient (WVC)	64

6.8.1	Calculation of WVC.....	64
6.8.2	Test report.....	64
6.9	Determination of pH value.....	64
6.9.1	Sampling and conditioning.....	64
6.9.2	Test method.....	65
6.9.3	Test report.....	65
6.10	Determination of resistance to hydrolysis of upper.....	65
6.10.1	Sampling and conditioning.....	65
6.10.2	Test method.....	65
6.10.3	Test report.....	65
6.11	Determination of chromium VI content.....	65
6.11.1	Sampling and conditioning.....	65
6.11.2	Test method.....	65
6.11.3	Test report.....	66
6.12	Determination of abrasion resistance of lining and insock.....	66
6.12.1	Principle.....	66
6.12.2	Test equipment.....	66
6.12.3	Sampling and conditioning.....	67
6.12.4	Test method.....	67
6.12.5	Test report.....	68
6.13	Determination of water penetration and water absorption for upper.....	69
6.13.1	Principle.....	69
6.13.2	Test equipment.....	69
6.13.3	Sampling and conditioning.....	69
6.13.4	Test method.....	69
6.13.5	Test report.....	70
7	Test methods for insole, insock and footbed.....	71
7.1	Determination of insole, insock and footbed thickness.....	71
7.1.1	Sampling and conditioning.....	71
7.1.2	Test method.....	71
7.1.3	Test report.....	71
7.2	Determination of water absorption and desorption of insole and/or insock.....	71
7.2.1	Principle.....	71
7.2.2	Test equipment.....	71
7.2.3	Sampling and conditioning.....	72
7.2.4	Test method.....	72
7.2.5	Test report.....	73
7.3	Determination of abrasion resistance of insole.....	73
7.3.1	Principle.....	73
7.3.2	Test equipment.....	73
7.3.3	Sampling and conditioning.....	74
7.3.4	Test method.....	74
7.3.5	Test report.....	75
8	Test methods for outsole.....	75
8.1	General remarks.....	75
8.2	Determination of outsole dimensions.....	75
8.2.1	Sampling and conditioning.....	75
8.2.2	Determination of the cleated area.....	75
8.2.3	Outsole thickness and cleat height.....	76
8.2.4	Determination of cleat design in the waist area.....	78
8.3	Determination of tear strength of outsole.....	79
8.3.1	Sampling and conditioning.....	79
8.3.2	Test method.....	79
8.3.3	Test report.....	79
8.4	Determination of outsole abrasion resistance.....	79
8.4.1	Sampling and conditioning.....	79
8.4.2	Test method.....	79

8.4.3	Test report.....	79
8.5	Determination of footwear rigidity.....	79
8.5.1	Principle.....	79
8.5.2	Test equipment.....	80
8.5.3	Sampling and conditioning.....	80
8.5.4	Test method.....	80
8.5.5	Test report.....	82
8.6	Determination of flexing resistance of outsole.....	82
8.6.1	Principle.....	82
8.6.2	Test equipment.....	82
8.6.3	Sampling and conditioning.....	82
8.6.4	Test method.....	82
8.6.5	Test report.....	84
8.7	Determination of resistance to hydrolysis of outsole.....	84
8.7.1	Sampling and conditioning.....	84
8.7.2	Test method.....	84
8.7.3	Test report.....	84
8.8	Determination of resistance to fuel oil.....	84
8.8.1	Sampling and conditioning.....	84
8.8.2	Test methods.....	85
8.8.3	Test report.....	85
8.9	Determination of resistance to hot contact.....	85
8.9.1	Test equipment.....	85
8.9.2	Sampling and conditioning.....	88
8.9.3	Test methods.....	88
8.9.4	Test report.....	89
Annex A (informative) Assessment of footwear by the laboratory during testing of thermal behaviour.....		90
Annex B (informative) Footwear sizes.....		93
Bibliography.....		94