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At the request of **Lindström & Nilsson AB, Nylännesgatan 8, 512 53 Svenljunga, Sweden** *laboratory tests have been performed and issued:*

TEST REPORT

No.: 458-1/19

Client code: 061/19 ***Work order:*** 173-1/19

GENERAL DATA

Date of receipt: 15.03.2019 ***Date of test end:*** 27.05.2019

Sample type: FOOTWEAR

Data provided by a customer: Footwear for firefighters
Article: FIREMAN

Sampling: On delivered samples

Sample description: Red / black colour, sizes 39, 42 and 48

Laboratory mark of sample: 487-1/19

TEST RESULTS

TEST PARAMETER *Test method*	*Requirements acc. to HRN EN ISO 15090:2012 [2] HRN EN ISO 20345:2012 [3] HRN EN 50321-1:2018 +A1:2018 [4]*	*RESULT*
1. WHOLE FOOTWEAR, code II [1]		
1.1 Upper height – design D, (cm) *HRN EN ISO 20344:2012, c.6.2*	size 39: min. 27,0 size 42: min. 28,0 size 48: min. 30,0	**31,0** **31,5** **35,0**
1.2 Seat region *HRN EN ISO 20345:2012, c.5.2.3*	shall be closed for design B, C, D and E	**closed seat region**
1.3 Specific ergonomic features *HRN EN ISO 20344:2012, c.5.1*	- Is the inside surface of the footwear free from rough, sharp or hard areas that caused you irritation or injury - Is the footwear free of features that you consider make wearing the footwear hazardous? - Can the following activities be performed without problems: walking, climbing stairs, kneeling/crouching down	**- Inside surface of the footwear is free from rough, sharp or hard areas** **- Footwear is free of features that can make wearing the footwear hazardous** **- Following activities can be performed without problems: walking, climbing stairs, kneeling / crouching down**

TEST PARAMETER *Test method*	*Requirements acc. to* *HRN EN ISO 15090:2012* [2] *HRN EN ISO 20345:2012* [3] *HRN EN 50321-1:2018 +A1:2018* [4]	*RESULT*
1.4 Leakproofness *HRN EN ISO 20344:2012, c.5.7*	no leakage of air	size 39: **no leakage of air** size 48: **no leakage of air**
1.5 Insulation against heat *HRN EN 15090:2012, c.7.1;* *HRN EN ISO 20344:2012, c.5.12*	for HI_3: - at 250°C after 10 minutes temperature increase in footwear max. 42°C; - without damaging after 40 min.	size 39: **30,0 °C without damaging of footwear pass HI_3** size 48: **30,0 °C without damaging of footwear pass HI_3**
1.6 Slip resistance (on ceramic floor (Eurotile 2) with (NaLS lubricant), (coefficient of friction) [5] *HRN EN ISO 20344:2012, c.5.11;* *HRN EN ISO 13287:2012*	SRA: cond. A min. 0,28; cond. B min. 0,32	size 39: **0,42** / **0,35** size 42: **0,38** / **0,33** size 48: **0,38** / **0,33**
1.7 Energy absorption of seat region, (J) *HRN EN ISO 20344:2012, c.5.14*	E: min. 20	left / right size 39: **43,1** / **37,8** size 42: **42,7** / **47,8** size 48: **45,4** / **37,7**
1.8 Flame resistance *HRN EN 15090:2012, c.7.3;* *HRN EN ISO 15025:2016*	- afterburn and afterglow time < 2 s; - without cracks on upper material; - without ignition and melting on upper more than half of thickness; - without seam opening; - no cracks on outsole higher than 10 mm and 3 mm deep - upper/sole separation more than 15 mm long and 5 mm wide; - fasteners shall be closed	**- afterburn and afterglow time 0 s;** **- without cracks on upper** **- without ignition and melting** **- no seams** **- without cracks on outsole** **- without upper/sole separation** **- no fasteners**
1.9 Toe protection, general *HRN EN ISO 20345:2012, c.5.3.2.1*#	- shall not be removed without damaging the whole footwear - overlapping with lining thickness > 1 mm - protected toecap end > 5 mm under the toecap > 10 mm and outside the toecaps	**- can not be removed without damaging the whole footwear** **- overlapping with lining thickness > 1 mm** **- protected toecap end > 5 mm under the toecap > 10 mm and outside the toecaps** **- metallic toecap**
1.10 Internal length of toecap, (mm) *HRN EN ISO 20344:2012, c.5.3*	size 39: min. 38 size 42: min. 39 size 48: min. 42	left / right **45,0** / **45,0** **50,0** / **50,0** **55,0** / **55,0**

TEST PARAMETER *Test method*	*Requirements acc. to* *HRN EN ISO 15090:2012* [2)] *HRN EN ISO 20345:2012* [3)] *HRN EN 50321-1:2018* *+A1:2018* [4)]	*RESULT*	
1.11 ***Internal length of toecap, (mm)*** *HRN EN ISO 20344:2012, c.5.3*	size 39: min. 38 size 42: min. 39 size 48: min. 42	left **45,0** **50,0** **55,0**	right **45,0** **50,0** **55,0**
1.12 ***Impact resistance at 200 J (clearance under toecap), (mm)*** *HRN EN ISO 20344:2012, c.5.4*	size 39: min. 13,5 size 42: min. 14,0 size 48: min. 15,0	left **15,5** **16,0** **17,0**	right **15,5** **16,0** **17,0**
1.13 ***Compression resistance at 15 kN (clearance under toecap), (mm)*** *HRN EN ISO 20344:2012, t.5.5*	size 39: min. 13,5 size 42: min. 14,0 size 48: min. 15,0	left **14,0** **14,5** **15,5**	right **14,0** **14,5** **15,5**
1.14 ***Corrosion resistance of metallic toecap (corrosion area), (mm^2)*** *HRN EN ISO 20344:2012, c.5.6.1*	≤ 3 areas max. 2 mm in any direction	size 42: **0** size 48: **0**	
1.15 ***Penetration resistance, metallic inserts, (N)*** *HRN EN ISO 20344:2012, c.5.8.3*	P > 1100 N	left size 39: **1506** size 42: **1514** size 48: **1568**	right **1456** **1590** **1405**
1.16 ***Corrosion resistance of metallic insert (corrosion area), (mm^2)*** *HRN EN ISO 20344:2012, c.5.6.1*	≤ 5 areas max. 2,5 mm in any direction	size 42: **0** size 48: **0**	
1.17 ***Construction and dimensions of metallic inserts*** *HRN EN ISO 20344:2012, c.5.8.1*	it can not be removed without damaging the whole footwear; dimensions: x max. 6,5; y max. 17,0	left size 39: **x = 4,9 mm** **y = 8,3 mm** size 42: **x = 5,1 mm** **y = 9,4 mm** size 48: **x = 5,0 mm** **y = 14,7 mm**	right **x = 5,0 mm** **y = 8,2 mm** **x = 5,2 mm** **y = 10,5 mm** **x = 5,3 mm** **y = 14,0 mm** **(it can not be removed without damaging the whole footwear)**
1.18 ***Electrically insulation*** [7)] *HRN EN 50321-1:2018, c.6.3*	for class 0 / design D: proof test voltage: 5 kV current leakage: max. 5 mA peak voltage: 10 kV	**Class 0** **pass 5 kV** **1,52 / 1,45 mA**	

TEST PARAMETER *Test method*	*Requirements acc. to* *HRN EN ISO 15090:2012* [2] *HRN EN ISO 20345:2012* [3] *HRN EN 50321-1:2018* *+A1:2018* [4]	*RESULT*		
2. UPPER, rubber		size 39:	size 42:	size 48:
2.1 Thickness, (mm) *HRN EN ISO 20344:2012, c.6.1*	min. 1,50	**3,3**	**3,8**	**3,9**
2.2 Tear strength, (N) *HRN EN ISO 20344:2012, c.6.4*	≥ 180	**408,9**		
2.3 Resistance to flexing of a rubber upper, (number of flex cycles without upper cracking) *HRN EN ISO 20344:2012, c.6.5.2*	no cracking before 125000 flex cycles	**no cracking after 125000 flex cycles**		
2.4 Heat transmission on exposure to radiant heat, (°C) *HRN EN 15090:2012 c.7.2, HRN EN ISO 6942:2003, method B, at 20 kW/m²*	temperature increase ≤ 42 °C without damaging	**6,5** **without damage**		
2.5 Flame resistance of upper *HRN EN 15090:2012, c.7.3*	- afterburn and afterglow time < 2 s; - without cracks on upper material; - without ignition and melting on upper more than half of thickens; - without seam opening - fasteners shall be closed	**- afterburn and afterglow time 0 s;** **- without cracks on upper** **- without ignition and melting on upper** **- without seam opening** **- no fasteners**		
3. OUTSOLE, rubber, black		size 39:	size 42:	size 48:
3.1 Thickness (d_1), (mm) *HRN EN ISO 20344:2012, c.8.1.2*	≥ 3	**5,3**	**5,8**	**5,9**
3.2 Cleat height (d_2), (mm) *HRN EN ISO 20344:2012, c.8.1.2*	≥ 4	**5,6**	**5,9**	**6,2**
3.3 Thickness (d_3), (mm) *HRN EN ISO 20344:2012, c.8.1.2*	≥ 6	**14,4**	**14,5**	**14,9**
3.4 Cleated area *HRN EN ISO 20344:2012, c.8.1.1*	- front part 0,45 of total length - heel area 0,25 of total length - cleats are open to the side	**0,51** **0,26**	**0,50** **0,27**	**0,51** **0,27**
		cleats are open to the side		
3.5 Cleat height in waist area, (mm) *HRN EN ISO 20344:2012, c.8.1*	min. 1,5	**2,6**	**3,0**	**2,9**

TEST PARAMETER *Test method*	*Requirements acc. to* *HRN EN ISO 15090:2012* [2)] *HRN EN ISO 20345:2012* [3)] *HRN EN 50321-1:2018* *+A1:2018* [4)]	*RESULT*		
3.6 Dimensions of waist area *HRN EN 15090:2012, c.6.7*		size 39: lenght a	size 42: angle α	size 48: heel breast b
	length (a) min. 35 mm size 39: angle (α) from 90° till 120° size 42: heel breast (b) min. 10 mm size 48:	**48,3** **58,3** **70,0**	**100** **102** **104**	**17,1** **19,4** **20,3**
3.7 Cleated design *HRN EN ISO 15090:2012, c.6.7.1*	without linear transverse valleys accros the sole	**no linear transverse valleys accros the sole**		
3.8 Density, (g/cm^3) *HRN ISO 2781:2008*	/	**1,18**	**1,18**	**1,18**
3.9 Tear strength, (kN/m) *HRN EN ISO 20344:2012, t.8.2*[#]	for densitiy > 0,9 g/cm^3 min. 8 for densitiy ≤ 0,9 g/cm^3 min. 5	**20,4**	**23,1**	**17,5**
3.10 Abrasion resistance, (relative volume loss, ΔV_{rel}, with sample density ρ = 1,18 g/cm^3), (mm^3) *HRN EN ISO 20344:2012, t.8.3;* *HRN EN 12770:2004*	≤ 250	**144**	**143**	**145**
3.11 Flexing resistance (cut growth), (mm) *HRN EN ISO 20344:2012, t.8.4*	max. 4 after 30000 flexing cycles	**n.a.** [6)]	**n.a.** [6)]	**n.a.** [6)]
3.12 Resistance to fuel oil (increase in volume), (%) *HRN EN ISO 20344:2012, t.8.6.1*	FO max. 12	**1,3**	**1,5**	**1,9**
3.13 Resistance to hot contact *HRN EN ISO 20344:2012, c.8.7*[#]	no melting or cracking when bent around the mandrel	**without damage** **pass**		
4. MARKING, rubber patch ***4.1 Proofnes of marking*** *HRN EN 50321-1:2018, c.5.3*[#]	durable, legible and without smear after rubbing with soapy water / isopropanol	**pass**		

1) Class II – All-rubber (i.e. entirely vulcanised) or all-polymeric (i.e. entirely moulded) footwear
2) Requirements acc. to HRN EN 15090:2012 Footwear for firefighters
3) Requirements acc. to HRN EN ISO 20345:2012 Personal protective equipment – Safety footwear
4) Requirements acc. to: HRN EN 50321-1:2018 + A1:2018 Live working – Footwear for electrical protection – Insulating footwear and overboots
5) Condition A – forward heel slip, condition B – forward flat slip
6) No applicable, not tested because flexing angle is < 45°
7) Tested in subcontractor laboratory Fakultet elektrotehnike i računarstva, Zavod za visoki napon i energetiku, Laboratorij visokog napona, Test report No. 1313-1/17-19 from 04.07.2019

Note: *The test results refer only to the delivered sample. Individual test values of each test parameter and additional information can be given on request. The test report shall not be reproduced except in full. Samples are kept for two years and records for five years. Accredited test methods are in flexible accreditation scope. Methods marked with # are not in the scope of accreditation.*
We can't be held responsible for the translation of this document.

Zagreb, 27.05.2019

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