TEST REPORT
EN ISO 20345
PERSONAL PROTECTIVE EQUIPMENT—SAFETY FOOTWEAR

Report Number.....:	AOC250421009S
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Testing location/ address.....:	Room 202, 2nd Floor, No.12th Building of Xinhe Tongfuyu Industrial Park, Fuhai Street, Baoan District, Shenzhen, Guangdong, China
Applicant's name.....:	Taizhou Xingfeng Import&Export Co., Ltd
Address.....:	4F, Wenling Times Square Business Centre, 1239# Middle Wanchang Road, Wenling, Zhejiang, China
Test specification:	
Standard..... :	EN ISO 20345:2022
Test procedure.....:	Type testing
Non-standard test method.....:	N/A
Test Report Form No.....:	EN ISO 20345A
Test Report Form(s) Originator..... :	N/A
Master TRF.....:	2023-12
Test item description.....:	SAFETY SHOES
Trade Mark.....:	No mark
Manufacturer's name.....:	Taizhou Xingfeng Import&Export Co., Ltd
Manufacturer's address.....:	4F, Wenling Times Square Business Centre, 1239# Middle Wanchang Road, Wenling, Zhejiang, China
Factory's name.....:	Wenling Yixin Electronic Co., Ltd
Factory's address.....:	Xinhe Industrial Zone, Wenling City, Zhejiang, China
Model/Type reference.....:	ZP-01

List of Attachments (including a total number of pages in each attachment):

1) Photo attachment, 1 pages.

Summary of testing:

1. The submitted samples were tested and found to compliance with requirements of the standard EN ISO 20345:2022.

Possible test case verdicts:

- test case does not apply to the test object..... : N/A

- test object does meet the requirement..... : P (Pass)

- test object does not meet the requirement..... : F (Fail)

Testing..... :

Date of receipt of test item..... : 2025-04-15

Date (s) of performance of tests..... : 2025-04-15 to 2025-04-21

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

General product information:

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Clause	Requirement + Test	Result - Remark	Verdict
5	**Basic requirements for safety footwear**		--
5.1	General		--
	Safety footwear class I,class II and hybrid footwear (depending on production method)shall conform to the basic requirements given in Table 2 .Customized safety footwear (3.18)shall conform the requirements given in Table2 and Annex A.		P
5.2	Design		P
5.2.1	General		P
	Footwear shall conform to one of the designs given in Figure 4.		P
5.2.2	Height of upper		P
	The height of the upper,measured in accordance with ISO 20344:2021,6.2,shall be as given in Table 4.		P
5.2.3	Heel area		P
	The heel area is defined by the rear (10±2)%of the total length ofthe footwear (upper and outsole, measured along the test axis according to ISO 20344:2021,Figure 12)and a minimum height given in Table8 ,design A.		P
	For all class I and II footwear other than design A and marked with the category of protection “SB” (see Table 20)the heel area shall be closed.This area of the upper shall not contain any holes other than to form seams.		P
5.3	Whole footwear		P
5.3.1	Constructional performance		P
5.3.1.1	Construction		P
	When an insole is used,it shall not be possible to remove it without damaging the footwear.If there is no insole,a permanently attached insock/footbed shall be present which cannot be removed without damaging the footwear and/or the insock/footbed.		P
5.3.1.2	Upper/outsole bond strength		P
	Footwear shall be tested in accordance with the method described in IS020344:2021,5.2.The bond strength shall be not less than 4,0 N/mm,unless there is a tearing of the outsole,in which case thebond strength shall be not less than 3,0 N/mm.The test is not applicable when the bond has been made by mechanical attachment,e.g.using nails or screws or stitching.		P
5.3.2	Toe protection		P
5.3.2.1	General		P
	Toecaps shall be incorporated into the footwear in such a manner,that it cannot be removed without damaging the footwear.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Class I footwear shall have a vamp lining or an element of the upper that serves as a lining.In addition, the toecaps shall have an edge covering extending from the back edge of the toecap to at least 5 mm beneath it and at least 10 mm in the opposite direction.		P
	Metallic toecaps shall fulfil the requirements given in ISO 22568-1:2019,4.2.		N/A
	Non-metallic toecaps shall fulfil the requirements given in ISO 22568-2:2019,4.2.		N/A
5.3.2.2	Internal length		P
	Toecaps shall fulfil the requirements given in Table 5,when tested according to ISO 20344:2021,5.3.2.1.		P
5.3.2.3	Width of toecap flange		P
	The width ofthe flange of metallic toecaps shall not be greater than 12 mm,when tested according to ISO 20344:2021,5.3.2.2.		P
	The width of the flange of non-metallic toecaps shall not be greater than 15 mm,when tested according to ISO 20344:2021,5.3.2.2.		P
5.3.2.4	Corrosion resistance		P
5.3.2.4.1	Class I footwear and hybrid mounted footwear		N/A
	Metallic toecaps shall notexhibit more than three areas of corrosion,none of which shall measure more than 2 mm in any direction when tested in accordance with the method described in ISO 20344:2021, 5.6.2.		N/A
5.3.2.4.2	Class I and hybrid moulded footwear		N/A
	When tested in accordance with ISO 20344:2021,5.6.2.1.a metallic toecap shall exhibit not more than three areasof corrosion,none of which shall measure more than 2 mm in any direction.		N/A
5.3.2.5	Behaviour of toecaps (thermal and chemical)		P
	Whennon-metallic toecaps are subject to each single one of the treatments according to IS020344:2021, 5.6.2,the clearance under the toecap,at the momentof impact,shall not be less than the appropriate value given in Table 6.In addition,the non-metallic toecap shall not develop delamination or sharp edges or any cracks passing through the material (i.e.through which light can be seen).During the assessment of the non-metallic toecap designed with perforations the criteria whether light can be seen shall not be applied to the perforation.		P
5.3.2.6	Impact resistance		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For safety footwear tested in accordance with the method described in ISO 20344:2021,5.4,at an impact energy of (200±4)J,the clearance under the toecap at the moment of impact shall be in accordance with Table 6.In addition,the toecap shall not develop delamination or any cracks,which go through the material,i.e.through which light can be seen.During the assessment of toecaps designed with perforations,the criteria whether light can be seen,shall not be applied to the perforation.		P
5.3.2.7	Compression resistance		P
	For safety footwear tested in accordance with ISO 20344:2021,5.5,the clearance under the toecap at a compression load of (15±0,1)kN shall be in accordance with Table 6.In addition,the toecap shall not develop delamination or any cracks,which go through the material,i.e.through which light can be seen. During the assessment of toecaps designed with perforations,the criteria whether light can be seen, shall not be applied to the perforation.		P
5.3.3	Leak proofness		P
	When tested in accordance with ISO 20344:2021,5.7 there shall be no leakage of air.For design A of class II footwear with open heel area and/or perforations,this requirement is not applicable.		P
5.3.4	Specific ergonomic features		P
	The footwear shall be considered to satisfy the ergonomic requirements,if the questionnaire given in ISO 20344:2021,5.1 is completed and all answers are positive.		P
	If the footwear is rigid in accordance with ISO 20344:2021,8.5,then question 4.3 of ISO 20344:2021, Table 2 is not applicable.		N/A
5.3.5	Slip resistance		P
5.3.5.1	Genera		P
	This basic requirement is applicable to conventionally soled footwear.		P
	For footwear designed for special purposes containing spikes,metal studs or similar and for use for very special workplaces (soft ground e.g.sand,sludge,forestry timber,etc.)this test is not applicable. This type of footwear shall be marked with symbol “Q” (for "not tested")according to this standard.		P
5.3.5.2	Slip resistance on ceramic tile floor with sodium lauryl sulphate (NaLS)solution		P
	Footwear resistant to slip on a ceramic tile floor with NaLS shall fulfil the requirements of Table7 when tested in accordance with ISO 20344:2021,5.14.		P
5.3.6	Innocuousness		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Safety footwear shall not adversely affect the health or hygiene of the user.Safety footwear shall be made of materials such as textiles,leather,rubbers or plastics that pose no risk to the wearer health and hygiene.The materials shall not,in the foreseeable conditions of normal use,release or degrade to release substances generally known to be toxic,carcinogenic,mutagenic,allergenic,toxic to reproduction or otherwise harmful.		P
	For all leather parts tested in accordance with ISO 20344:2021,6.9,the pH value shall be not less than 3,2.If the pH value is below 4,the difference Figure shall be less than 0,7.		P
	For all leather parts tested in accordance with ISO 20344:2021,6.11,the quantity of chromium VI shall not exceed 3,0 mg/kg.		P
5.3.7	Seam strength		P
	The materials of area A and B (see Figure 6)maybe connected by stitching,welding or other suitable methods.When tested according to ISO 20344:2021,5.25 the connection shall fulfil a strength of at least 10 N/mm.		P
5.4	Upper		P
5.4.1	General		P
	The materials used in the upper of footwear shall be assessed according to their type and the type of footwear.		P
5.4.1.1	Class I footwear,determination of the area where upper requirements apply		P
	The area where upper requirements apply shall be assessed by measuring from the horizontal surface beneath the outsole (as "H"is measured in Figure 6).Any materials in the upper below the height defined in Table 8 shall meet the requirements of the upper (see Table 2).		P
	All upper materials shall fulfil the requirements given in 5.4.2 to 5.4.7.		P
	When other than upper materials exist in the footwear above the heights given in Table 8,they shall meet the tear strength (5.5.2)and abrasion resistance (5.5.3)requirements for lining.In the case of leather materials,they shall also meet the requirements for pH value and for chromium VI content (5.3.6).		P
5.4.1.2	Hybrid footwear,determination of the area where upper requirements apply		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The Area A,shall be measured as H,between the lowest point of the top of the visible polymer (or rubber)part and the ground (see Figure 6)and shall have a minimum height corresponding to the values given in Table 8 for design B.All materials in this area shall meet the requirements of the upper (see Table 2).		P
5.4.2	Thickness		P
	When tested in accordance with ISO 20344:2021,6.1,the minimum thickness of the upper shall be at least at any point in accordance with Table 9.		P
5.4.3	Tear strength		P
	When tested in accordance with ISO 20344:2021,6.3,the tear strength shall be in accordance with Table 10.		P
5.4.4	Tensile properties		P
	When tested in accordance with ISO 20344:2021,6.4,the tensile properties shall be in accordance with Table 11.		P
5.4.5	Flexing resistance		P
	Tested in accordance with ISO 20344:2021,6.5,the flexing resistance shall be in accordance with , Table 12.No damages,like e.g.pinholes and cracks,shall be visible to the unaided eye.		P
5.4.6	Water vapour permeability and coefficient		P
	Footwear shall comply with one of the following criteria's:		P
	The water vapour permeability of upper materials shall be at least 0,8 mg/(cm^2 • h)and the water vapour coefficient shall be at least 15 mg/cm^2 when tested in accordance with ISO 20344:2021,6.6, 6.7 and 6.8.A maximum area of 10%of non-watervapour permeable materials is acceptable when measured according to ISO 20344:2021,6.2.3.		P
	If the upper contains an area of maximum 25%of non-water vapour permeable material,measured according to ISO 20344:2021,6.2.3,all remaining materials shall fulfil a water vapour permeability of at least 2,0 mg/(cm^2 • h).		P
5.4.7	Resistance to hydrolysis		P
	For polyurethane uppers tested in accordance with ISO 20344:2021,6.10,no cracking shall occur before 150000 flex cycles.		P
5.5	Lining		P
5.5.1	General		P
	The requirements apply for all class I footwear.The requirements for class II and hybrid footwear(3.19) applydepending on their type (see Table 2).		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.2	Tear strength		P
	Determined in accordance with ISO 20344:2021,6.3,the tear strength of the lining shall be in accordance with Table 13.		P
5.5.3	Abrasion resistance		P
	Tested in accordance with ISO 20344:2021,6.12,the lining shall not develop any holes before the following number of cycles have been performed.		P
	For vamp and quarter lining:		P
	25600 cycles at dry condition;		P
	12800 cycles atwet condition.		P
	For lining used atheel area(5.2.3):		P
	51200 cycles at dry condition;		P
	25600 cycles at wet condition.		P
	When quarter lining and lining at heel area is ofthe same material,the requirements of lining at heel area apply.		P
5.5.4	Water vapour permeability and coefficient		P
	Tested in accordance with ISO 20344:2021,6.6,6.7 and 6.8,the water vapour permeability shall be not less than 2,0 mg/(cm2.h)and the water vapour coefficient shall be not less than 20 mg/cm2.		P
	No test is required,when lining material is present only in the heel area (5.2.3).When there is no stiffener or the stiffener is perforated,the material shall comply also WVP.		P
	There is no requirement to test unlined stiffeners.		P
5.6	Tongue		P
5.6.1	General		P
	The tongue need to be tested only,when the material,from which it is made or its thickness,or both, differs from that of the upper material.		P
5.6.2	Tear strength		P
	When tested in accordance with ISO 20344:2021,6.3,the tear strength of the tongue shall be in accordance with Table 14.		P
5.7	Insole,insock and footbed		P
5.7.1	Thickness		P
	When tested in accordance with ISO 20344:2021,7.1,the thickness of the insole or insock or insole/ insock combination (see Table 3)shall be not less than 2,0 mm.		P
5.7.2	Water permeability		P
	An insock is water-permeable when it lets waterthrough in 60 s or less,when tested in accordance with ISO 20344:2021,7.2.		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.3	Water absorption and desorption		P
	Tested in accordancewith ISO 20344:2021,7.2,the water absorption of the insole or insock shall be not less than 70 mg/cm^2 and the water desorption shall be not less than 80%of the water absorbed.		P
	When the insole is covered by a membrane lining,the test pieceshall be taken from both,the membrane liningand insole in combination.		P
5.7.4	Abrasion resistance		P
5.7.4.1	Insoles		P
	When non-leather insoles are tested in accordance with ISO 20344:2021,7.3,the minimum final thickness in the tested area after 400 cycles shall not be less than 66%of the original thickness (5.7.1).		P
5.7.4.2	Insocks		P
	For insocks tested in accordance with ISO 20344:2021,6.12,the wearing surface shall not develop any holes before the following number of cycles have been performed:		P
	25600 cycles at dry condition;		P
	12800 cycles at wet condition.		P
5.8	Outsole		P
5.8.1	General		P
	All basic outsole requirements (see5.8.2 to 5.8.7)shall be tested on materials in contact with the floor during footwear use.Testing materials of the outsole,not in contact with the floor,is not compulsory.		P
	Depending on the type of hybrid footwear (3.19),the requirements of class Ior class II footwear outsoles apply.		P
5.8.2	Design		P
5.8.2.1	Thickness		P
	When measured in accordance with ISO 20344:2021,8.2.3,the outsole thickness,d_1 and d_3 ,(see ISO 20344:2021,Figure 37,38 and 39)shall fulfil the requirements in Table 15.		P
	The thickness of the full outsole material d_4 of a mounted (cemented)outsole with cavities shall not be less than 2,0 mm (see ISO 20344:2021,Figure 40).		P
5.8.2.2	Cleated area		P
	With exception of the region under the flange of the toecap,at least the shaded area as shown in Figure 36 of ISO 20344:2021,8.2.2 shall have cleats,which are open to the sides.		P
5.8.2.3	Cleat height		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The outsole maybe either cleated or non-cleated.		P
	Class I and hybrid mounted footwear:outsoles with a cleat height of less than 2,5 mm are regarded as non-cleated.		P
	Class I footwear and hybrid moulded footwear:outsoles with a cleat height of less than 4,0 mm are regarded as non-cleated.		P
	When tested in accordance with ISO 20344:2021,8.2.3,the cleat height,d_2 (see ISO 20344:2021, Figure 37,38 and 39),shall fulfil the requirements in Table 15.		P
5.8.3	Tear strength		P
	When tested in accordance with ISO 20344:2021,8.3,the tear strength shall be not less than:		P
	8kN/m for a material with a density higher than 0,9 g/cm3;		P
	5 kN/m for a material with a density lower or equal to 0,9 g/cm^3 .		P
5.8.4	Abrasion resistance		P
	For outsoles of class I and hybrid mounted footwear tested in accordance with ISO 20344:2021,8.4,the relative volume loss shall be not greater than:		P
	For outsoles of class I and hybrid mounted footwear tested in accordance with ISO 20344:2021,8.4,the relative volume loss shall be not greater than:		P
	150 mm^3 for materials with a density greater than 0,9 g/cm^3 .		P
	For outsoles of class I and hybrid moulded footwear tested as described in ISO 20344:2021,8.4,the relative volume loss shall be not greater than 250 mm3.		P
5.8.5	Flexing resistance		P
	For outsoles tested in accordance with ISO 20344:2021,8.6,the cut growth shall be not greater than 4 mm after 30000 flex cycles.This requirementis not applicable for rigid outsoles (see ISO 20344:2021, 8. 5).		P
	Spontaneous cracks are acceptable,unless one of the following conditions occurs:		P
	deeper than 1,5 mm;		P
	longer than 4 mm;		P
	more than five in number;		P
	any damage of the metallic insert,if present.		P
5.8.6	Resistance to hydrolysis		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For polyurethane outsoles or outsoles with an outer layer composed of polyurethane tested in accordance with ISO 20344:2021,8.7,the cut growth shall be not more than 6 mm until 150000 flex cycles.		P
5.8.7	Interlayer bond strength		P
	Tested in accordance with ISO 20344:2021,5.2,the bond strength between the outer or cleated layer and the adjacent layer of multi-layer outsoles shall be not less than 4,0 N/mm.If there is tearing of the material,the bond strength shall not be less than 3,0 N/mm.		P
6	**Additional requirements for safety footwear**		--
6.1	General		P
	Additional requirements can be necessary for safety footwear depending upon risks to be encountered at the workplace.In such cases,safety footwear shall conform to the appropriate additional requirements and corresponding marking given in Table 16.		P
6.2	Whole footwear		P
6.2.1	Perforation resistance		P
6.2.1.1	Determination of perforation force		P
6.2.1.1.1	General		P
	Footwear offering perforation resistance shall meet one of the following requirements.		P
6.2.1.1.2	Metallic perforation-resistant inserts (Type P)		P
	For footwear tested in accordance with ISO 20344:2021,5.9,the lowest value required to perforate the outsole unit shall be not less than 1100 N.		P
6.2.1.1.3	Non-metallic perforation-resistant inserts and insoles(Type PL)		P
	For footwear with non-metallic inserts (type PL)tested in accordance with ISO 20344:2021,5.10.4.2.2. no perforation shall occur at any of the four measurements.In addition,no separation of the layersshall Occur during all tests,e.g.tent effect.		P
6.2.1.1.4	Non-metallic perforation-resistant inserts and insoles(Type PS)		P
	For footwear with non-metallic inserts (type PS)tested in accordance with IS020344:2021,5.10.4.2.1 the average value of the force required to perforate the outsole unit shall be not less than 1100 N.No single value shall be lower than 950 N.		P
6.2.1.2	Construction		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The perforation resistant insert shall be built into the bottom of the footwear in such a manner,that it cannot be removed without damaging the footwear.		P
	Metallic perforation resistant inserts shall lie beneath the flange of the safety toecaps and shall not be attached to them.		P
	Non-metallic inserts incorporated as a layer into the outsole shall not be skived at all.		P
	Non-metallic inserts that also function as an insole:		P
	may lie above the flange of the safety toecap;		P
	shall not be skived apart from the following exception:		P
	they maybe skived where they are covering the toecap flange (Figure7a),maintaining a minimum thickness of 2 mm in the skived area(Figure 7b).		P
6.2.1.3	Dimensions		P
	The perforation-resistant insert dimensions shall be measured according ISO 20344:2021,5.8.		P
	The perforation-resistant inserts shall be of such a size,that,with exception of the heel area,the maximum distance between the line represented by the feather edge of the last and the edge of the insert (X)is 6,5 mm.In the heel area,the maximum distance between the line represented by the feather edge of the last and the insert(Y)shall be 17 mm (see ISO 20344:2021,Figure 15).		P
	Metallic perforation-resistant inserts shall have not more than three holes with a maximum diameter of 3,0 mm to attach it to the bottom of the footwear.The holes shall not lie in the shaded area 1 (see ISO 20344:2021,Figure 15).Holes in the shaded area 2 shall be disregarded (see ISO 20344:2021, Figure 15).		P
6.2.1.4	Behaviour of perforation-resistant inserts		P
6.2.1.4.1	Flex resistance of perforation-resistant inserts		P
	When tested in accordance with the method described in ISO 20344:2021,5.12,the perforation resistant inserts shall exhibit no visible signs of cracking,disintegration or delamination after having been subjected to at least 1×106(one million)flexion cycles.		P
6.2.1.4.2	Corrosion resistance of perforation-resistant metallic inserts		P
6.2.1.4.2.1	Class I footwear and hybrid mounted footwear		P
	When tested in accordance with the method described in ISO 20344:2021,5.11.2 metallic inserts shall not exhibit more than three areas of corrosion,none of which shall measure more than 2 mm in any direction.		P
6.2.1.4.2.2	Class II footwear and hybrid moulded footwear		P

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Clause	Requirement + Test	Result - Remark	Verdict
	When tested in accordance with ISO 20344:2021,5.6.2.1 the metallic insert shall exhibit not more than three areas of corrosion,none of which shall measure more than 2 mm in any direction.		P
6.2.1.4.3	Stability against ageing and environmental influence of non-metallic perforation-resistant inserts		N/A
	When non-metallic inserts are subject to each single one ofthe treatments according to ISO 20344:2021, 5.11.2 they shall conform to the requirements of either 6.2.1.1.3 or6.2.1.1.4.		P
6.2.2	Electrical properties		P
6.2.2.1	Partially conductive footwear		P
	When measured in accordance with ISO 20344:2021,5.13,after conditioning in a dry atmosphere (see ISO 20344:2021,5.13.3.2 a),the electrical resistance shall be not greater than 100kΩ.		P
6.2.2.2	Antistatic footwear		P
	When measured in accordance with ISO 20344:2021,5.13,after conditioning in a dry and wet atmosphere (see ISO 20344:2021,5.13.3.2 a)and b]),the electrical resistance shall be for both conditions above 100 k2 and less than or equal to 1000 MQ.		P
6.2.3	Resistance to inimical environments		P
6.2.3.1	Heat insulation of outsole complex		P
	For footwear tested in accordance with ISO 20344:2021,5.15,with the temperature of the hotplate,Thp at (150±5)℃,the temperature rise (final temperature,T,minus initial temperature,T)on the upper surface of the insole or insock,if present,after (30±1)min shall be not higher than 22℃.		P
	After (30±1)min the footwear shall not show any sign of degradation as described in IS020344:2021, A.2.		P
	Except for the insock,the insulation shall be incorporated in the footwear in such a manner,that it cannot be removed without damaging the footwear.		P
6.2.3.2	Cold insulation of outsole complex		P
	For footwear tested in accordance with ISO 20344:2021,5.16,the temperature decrease on the upper surface of the insole or insock,if present,shall be not more than 10℃.		P
	Except for the insock,the insulation shall be incorporated in the footwear in such a manner that it cannot be removed without damaging the footwear.		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.4	Energyabsorption of seat region		P
	For footwear tested in accordance with ISO 20344:2021,5.17,the energy absorption of the seat region shall be not less than 20 J.		P
6.2.5	Waterresistance		P
	To determine water resistance of safety footwear two alternative test methods are available.		P
	No water penetration inside the footwear shall be detected when tested according to one of the following test methods:		P
	ISO 20344:2021,5.18.		P
	ISO 20344:2021,5.19.Rigid footwear withaflexingangle lower than22° shall be testedinaccordance with ISO 20344:2021,5.18.		P
6.2.6	Metatarsal protection		P
6.2.6.1	Construction		P
	The metatarsal protective device shall be such that,under impact,the resulting forces are distributed over the outsole,the toecap and as large a surface of the foot as possible.		P
	The metatarsal protective device shall be attached to the footwear in such a manner,that itcannot be removed without damaging the footwear.		P
	The metatarsal protective device shall fit the shape of the footwear at the inner and outer side of the foot and the device shall overlap the toecap by a minimum of 5 mm and lean on it.		P
6.2.6.2	Impact resistance of metatarsal protective device		P
	Tested in accordance with ISO 20344:2021,5.20,the minimum clearance at the moment of impact,shall be in accordance with Table17.		P
	Thedevice shall be supported by the toecap during the metatarsal impact test and shall remain in place above the toecap after testing.		P
6.2.7	Ankle protection		P
	The ankle areas shall be protected at least on the outer side of the footwear.Additional protection on the inner side is optional.Ankle protectors,placed in the footwear,do not necessarily need to be of a unified shape,but they shall match,when tested according to ISO 20344:2021,5.21,at least the circular sizes given in Table 18.		P
	Tested in accordance with ISO 20344:2021,5.22,the mean value of the test results shall not exceed 10 kN and no single value shall exceed 15 kN.		P
6.2.8	Cut resistance		P
6.2.8.1	Design		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	Cut resistant footwear shall have a minimum upper height as design B (see Clause 4 and 5.2.2).Cut-resistant footwear shall also comply with the requirements of 6.2.1.		P
6.2.8.2	Dimensions and construction of protective area		P
	When determined according to ISO 20344:2021,5.23.2 cut resistance footwear shall have a protective area extending from the feather edge to at least 30 mm above it and from the toecap to the heel end of the footwear.It shall extend beyond the rear end of the toecap by at least 10 mm.		P
	The protective material shall be permanently attached to the footwear.When different materials are used forprotection against cutting,they shall either be attached to each other or overlap.		P
6.2.8.3	Resistance to cutting		P
	Tested according to ISO 20344:2021,5.23.3 the footwear complies,if the cut-resistant index is not less than 2,5 or blade dulling is reported.		P
6.2.9	Scuff cap abrasion		P
	When tested in accordance with reference to ISO 20344:2021,5.24.2,the scuff cap shall not develop any hole through the full thickness before 8000 cycles have been performed.		P
6.2.10	Slip resistance		P
	In addition to the basic slip resistance requirements (5.3.5.2),the following additional floor conditions can be tested.		P
	Slip resistance on ceramictile floor with glycerine.When tested in accordance with ISO 20344:2021, 5.14,safety footwear resistant to slip on a ceramic tile floor with glycerine shall fulfil the requirements of Table 19.		P
6.3	Upper —Water penetration and absorption		P
	When tested in accordance with ISO 20344:2021,6.13,the water penetration,expressed as the mass increase of the absorbent clothafter (60±1)min,shall not be higher than 0,2gand the water absorption shall not be more than 30%.		P
	Within the area as specified in 5.4.1.1 non-functional and decorative stitching and perforations shall not be present on footwear,unlessthey fulfil the requirements of 6.2.5.		P
6.4	Outsole		P
6.4.1	Resistance to hot contact		P
	When tested in accordance with ISO 20344:2021,8.9,outsoles shall not melt and shall not develop any cracks when bent around the mandrel.		P
6.4.2	Resistance to fuel oil		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	When tested in accordance with ISO 20344:2021,8.8.2.1,the increase in volume of all visible outsole materials shall be not greater than 12%.		P
	If,after testing the test piece shrinks by more than 1 %in volume or increases in hardness by more than 10 Shore A hardness units,a further test piece shall be taken and tested in accordance with the method described in ISO 20344:2021,8.8.2.2.The cut growth shall be not greater than 6 mm before 150000 flex cycles.		P
6.4.3	Ladder grip		P
6.4.3.1	Mechanical properties		P
	All materials in contact with a ladder rung shall fulfil the requirements given in 5.8.4.		P
6.4.3.2	Design		P
	The outsole shall conform the requirements of 5.8.2.1,5.8.2.2 and 5.8.2.3 for cleated outsoles.		P
6.4.3.3	Cleat height in the waist area		P
	When measured according to ISO 20344:2021,8.2.4 and Figure 41 the outsole shall have transverse cleats'd'with a height of at least 1,5 mm in the waist area.		P
6.4.3.4	Heel breast		P
	When measured according to ISO 20344:2021,8.2.4 and Figure 41 the outsole shall have an inclined- breast heel.Distance'a'(the waist area)shall be at least35 mm,angle α shall be between 90° and 120° and dimension'b'shall be at least 10 mm.		P
6	**Evaluation of conformity**		--
6.1	General		P
	The conformity of a component or kit with the requirements of this European Standard and with the stated values (including classes) shall be demonstrated by:		P
	a) initial type testing, see 6.2; and		P
	b) factory production control by the manufacturer, including inspection and testing of products sampled from production in accordance with a prescribed plan by the manufacturer, see 6.3.		P
	For the purposes of testing, components or kits may be grouped into families if the selected property/properties is/are common to all components within that family.		P
	A family of welded steel components may be characterized by the parent material and the welding process used. Materials of lower strength and materials which are more weldable may be included in the same family.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	A family of welded aluminium components may be characterized by the material group and the welding process applied whereby 7xxx alloys cover all other alloys, 6xxx alloys cover 5xxx alloys and 3xxx alloys, 5xxx alloys and 3xxx alloys may be regarded as one group.		P
	Non-welded components in the same execution class may be treated as a family.		P
6.2	Initial type testing		P
6.2.1	General		P
	Initial type testing is the complete set of tests or other procedures, determining the performance of samples of products representative of the product type. The intention is to demonstrate and assess that the manufacturer has the capabilities to provide structural components and kits according to this European Standard. The assessment is related to two possible tasks performed by the manufacturer:		P
	a) Initial type calculation (ITC) to assess the structural design capabilities, where the manufacturer shall declare structural characteristics governed by design of the component;		P
	b) Initial type testing (ITT) to assess the manufacturing capabilities.		P
	Initial type testing shall be performed:		P
	1) at the commencement of the production of a new component or the use of new constituent products (unless a component of the same family);		P
	2) at the commencement of a new or modified method of production if this would affect a characteristic subject to evaluation;		P
	3) if production is changed to a higher execution class.		P
	In case of type testing of components or kits for which initial type evaluation in accordance with this standard has already been performed, type evaluation may be reduced:		P
	if it has been established that the performance characteristics compared with the already evaluated components or kits have not been affected; or		P
	in accordance with the rules for grouping into families or direct extended application of test results.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	If components are used whose characteristics have already been determined by the component manufacturer on the basis of conformity with other product standards (e.g. manufacturing using constituent products declared as conforming to a European Technical Specification), these characteristics need not be reevaluated, provided the characteristics of constituent products and components used in the manufacturing process maintain their declared characteristics. Constituent products and components CE marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with the CE marking.		P
6.2.2	Characteristics		P
	All characteristics for which the manufacturer provides a declaration shall be determined using initial type testing, with the following exceptions:		P
	a) reaction to fire of a component which may be assessed indirectly by controlling the component’s constituent products;		P
	b) release of dangerous substances which may be assessed indirectly by controlling the content of the component’s constituent products;		P
	c) durability of all characteristics, which is ensured by correct specification to avoid corrosion or to limit its effect by a prescriptive requirement for corrosion protection of the components.		P
6.2.3	Use of historical data		P
	Evaluations previously performed in accordance with the provisions of this European Standard (same component type, same characteristic(s), same test method, same sampling procedure, same system of attestation of conformity etc.) may be taken into account		P
6.2.4	Use of structural calculations for conformity assessment		P
	If structural calculations are used to determine characteristic or design values to be declared, the conformity evaluation of these characteristics (ITC) shall be based on the manufacturer's personnel resources (employed directly or by a sub-contractor), equipment and procedures used to perform structural calculations for the range of components to be manufactured.		P
	Procedures for the structural design process shall be documented and shall encompass handling of design assumptions, design methods, design calculations including any use of computer programs and results of the calculations with demonstration of procedures for corrective actions to be taken in case of non conformity.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	In cases where the manufacturer produces components in accordance with calculations and component specifications provided by the purchaser, the conformity evaluation shall check that the components or kits comply with the component specification.		P
6.2.5	Initial type calculation		P
	An initial type calculation carried out for a component can be used for documentation of subsequent manufactured components with the same performance characteristics. A new or revised type calculation shall be carried out if there is a change in one or more of the structural performance characteristics that are affected by a change in the design brief of the component.		P
6.2.6	Sampling, evaluation and conformity criteria		P
	The number of samples to be evaluated representing a component or family of components shall be in accordance with Table 1 .		P
6.2.7	Declaration of performance characteristics		P
	All performance characteristics given in Table 1 shall be declared by the manufacturer of the component. NPD may be declared if this complies with the method for declaration, or if there are no requirements for the performance characteristic where the component shall be used.		P
6.2.8	Recording of results from evaluations		P
	The results from all Initial Type Evaluations shall be recorded and held by the manufacturer for at least five years.		P
6.2.9	Corrective actions		P
	If corrective actions are needed to satisfy the requirements of this European Standard, the corrective actions shall be carried out as given in EN 1 090-2 for steel components and EN 1 090-3 for aluminium components.		P
6.3	Factory production control		P
6.3.1	General		P
	The manufacturer shall establish, document and maintain a factory production control (FPC) system to ensure that products placed on the market conform to the declared performance characteristics.		P
	The FPC system shall consist of written procedures, regular inspections and tests and/or assessments and the use of results to control the component’s constituent products, equipment, the production process and the manufactured component.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	A FPC system conforming to the requirements of EN ISO 9001 and made specific to the requirements of this European standard shall be considered to satisfy the above requirements.		P
	The results of inspections, tests and assessments stated in the manufacturer`s FPC system shall be recorded. The action to be taken if control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer’ s FPC procedures.		P
	The assessment of FPC shall be as Annex B.		P
6.3.2	Personnel		P
	The responsibility, authority and the relationship between personnel that manage, perform or verify work affecting product conformity, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-conformity from occurring, actions in case of non-conformities and to identify and register any conformity problems.		P
	The FPC system shall describe measures to ensure that personnel involved in activities influencing the conformity of the components have adequate qualifications and training for the range of components and execution classes to be exercised by the manufacturer.		P
6.3.3	Equipment		P
	Weighing, measuring and testing equipment influencing the conformity of the components shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.		P
	Equipment used in the manufacturing process shall be regularly inspected and maintained to ensure that use, wear and failure does not cause significant inconsistency in the manufacturing process.		P
	Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’ s written procedures. The records shall be retained for the period defined in the manufacturer’ s FPC procedures.		P
6.3.4	Structural design process		P
	In the case of structural design carried out by the manufacturer, the FPC system shall ensure compliance with the design brief, identify the procedures for checking the calculations and those individuals responsible for the design.		P
	The records shall be sufficiently detailed and accurate to demonstrate that the manufacturer's design responsibilities have been carried out satisfactorily. A record of the documents shall be retained for a period defined in the manufacturers FPC procedure.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.5	Constituent products used in manufacture		P
	The manufacturer shall implement a written inspection procedure for checking and recording that constituent products conform to the specification, and for tracing that they are correctly used in component manufacture. The requirements for traceability of constituent products given in EN 1 090-2 and EN 1 090-3 shall be complied with.		P
	The specification for the constituent products used in manufacture shall be retained according to the manufacturer`s FPC procedures.		P
6.3.6	Component specification		P
	The manufacture of components shall be controlled using a component specification giving all the necessary information of the component in sufficient detail to enable it to be manufactured and for its conformity to be evaluated.		P
	The execution class to be applied shall be given in the component specification, see EN 1 090-2 and EN 1090-3.		P
	The manufacturer shall implement a written inspection and test plan for checking and recording that manufactured components conform to their component specification.		P
	The component specification shall be prepared from design information. To the extent that the manufacturer undertakes the preparation of the component specification from design information Clause 6.3.4 applies.		P
	Annex A gives guidance on preparation of the component specification.		P
6.3.7	Product evaluation		P
	The manufacturer shall establish procedures to ensure that the declared values and classes of all of the characteristics are maintained. The means of production control of characteristics and the sampling methods for a component or family to be evaluated shall be in accordance with Table 2.		P
	If the component specification includes a prescribed inspection and test plan for component properties then those requirements shall be followed in addition to the requirements given in Table 2.		P
6.3.8	Non-conforming products		P
	The manufacturer shall have written procedures that specify how to deal with non-conforming products. Such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer’ s written procedures. The procedures shall conform with EN 1 090-2 or EN 1 090-3 as appropriate.		
7	**Marking**		--

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	Each item of safety footwear shall be clearly and permanently marked,e.g.by embossing or branding, with the following:		P
	a)size;		P
	b)manufacturer's name and postal address;		P
	c)manufacturer's type designation;		P
	d)at least year and month of footwear manufacture;		P
	e)reference to this document,i.e.ISO 20345:2021;		P
	f)the appropriate category,as described in Table 20 and/or,where applicable the symbol(s)from Table16 appropriate to the protection provided.		P
	The markings for e)and f)should be adjacent to one another or lie below or above each other.		P
	Hybrid footwear shall be marked “SBH” .For anyadditional marking,see Table16.		P
	For any additional marking on the footwear related to safety,the manufacturer shall provide evidence to support the claim and an explanation in the user notice.For example,if the manufacturer claims "acid resistant",the footwear shall be tested in accordance with EN 13832-3:2018[8].		P
8	**Manufacturer's instructions and information**		--
8.1	General		P
	Safety footwear shall be supplied to the end user with at least the following information given in 8.1 to 8.5.		N/A
	All information shall be unambiguous and shall include the following.		P
	a)Name and full address of the manufacturer;		P
	b)Reference to this document,i.e.ISO 20345:2021;		P
	c)Explanation of any graphical symbols,markings or levels of performance,if applicable;		P
	d)Basic explanation of the tests that have been applied to the footwear,if applicable;		P
	e)Instructions for use:		P
	1)tests to be carried out by the wearerbefore use,ifrequired;		P
	2)fitting and how to put on and take off the footwear,if relevant (e.g.use of heel strap or mechanical closing systems);		P
	3)application (basic information on possible uses and,where detailed information is given,the source);		P
	4)limitations of use (e.g.temperature range);		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	5)instructions for storage and maintenance,with maximum periods between maintenance checks (ifimportant,drying procedures to be defined);		P
	6)instructions for cleaning and/or decontamination;		P
	7)obsolescence deadline or period of obsolescence;		P
	8)if appropriate,warnings against problems likely to be encountered during use		P
	9)a warning,that the footwear shall not be modified,exept for orthopeadic adaptions according to Annex A;		P
	10)if helpful,additional illustrations,part numbers,etc.		P
	f)Reference to accessories and spare parts,if relevant (e.g.recommended socks);		P
	g)Type of packaging suitable for transport,ifrelevant.		P
8.2	Electrical properties		P
8.2.1	Partially conductive footwear		P
	Additional information shall be given regarding partially conductive properties:		P
	“Electrically partially conductive footwear should be used if it is necessary to minimize electrostatic charges in the shortest possible time,e.g.when handling explosives.Electrically partially conductive footwear should not be used,if the risk of shock from any electrical apparatus or live parts with AC or DC voltages has not been completely eliminated.In order to ensure that this footwear is partially conductive,it has been specified to have an upper limit of resistance of 100 kQ in its new state.		P
	During service,the electrical resistance of footwear made from conducting material can change significantly due to flexing and contamination,and it is necessary to ensure,that the product is capable of fulfilling its designed function of dissipating electrostatic charges during its entire life.Where necessary,it is therefore recommended,that the user establish an in-house test forelectrical resistance and use it at regular intervals.This test and those mentioned below should be a routine part of the accident prevention program at the workplace.		P
	If the footwear is worn in conditions where the soling material becomes contaminated with substances that can increase the electrical resistance of the footwear,wearers should always check the electrical properties of their footwear before entering a hazard area.		P
	It is recommended to use an electrical dissipative socks.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	Where partially conductive footwear is in use,the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear.In use,no insulating elements should be introduced between the inner sole of the footwear and the foot of the wearer.If an insert (i.e.insocks, socks)is put between the inner soleand the foot the combination footwear/insert should be checked for its electrical properties."		P
	Antistatic footwear		P
	Additional information shall be given regarding antistatic properties:		P
	"Antistatic footwear should be used if it is necessary to minimize electrostatic build-up by dissipating electrostatic charges,thus avoiding the risk of sparkignition of,for example,flammable substances and vapours,and ifthe risk ofelectric shock from mains voltage equipment cannot be completely eliminated from the workplace.Antistatic footwear introduces a resistance between the foot and ground but may not offer complete protection.Antistatic footwear is not suitable for workon live electrical installations.. It should be noted,however,that antistatic footwear cannot guarantee adequate protection against electric shock from a static discharge as it only introduces a resistance between foot and floor.If the risk of static discharge electric shock,has not been completely eliminated,additional measures to avoid this risk are essential.Such measures,as well as the additional tests mentioned below,should be a routine part of the accident prevention programme at the workplace.		P
	Antistatic footwear will not provide protection against electric shock from AC or DC voltages.If the risk of being exposed to any AC or DC voltage exists,then electrical insulating footwear shall be used to protect from against serious injury.		P
	The electrical resistance ofantistatic footwear can be changed significantly by flexing,contamination or moisture.This footwear might not perform its intended function ifworn in wet conditions.		P
	Class Ifootwear can absorb moisture and can become conductive if worn for prolonged periods in moist and wet conditions.Class I footwear is resistant to moist and wet conditions and should be used is if the risk of exposureexists.		P
	If the footwear is worn in conditions where the soling material becomes contaminated,wearers should always check the antistatic properties of the footwear before entering a hazard area.		P
	Where antistatic footwear is in use,the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear."		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	It is recommended to use an antistatic socks.		P
	“It is,therefore,necessary to ensure,that the combination of the footwear its wearers and their environment is capable,to fulfil the designed function of dissipating electrostatic charges,and of giving some protection during its entire life.Thus,it is recommended,that the user establish an in-house test for electrical resistance,which is carried out at regular and frequent intervals."		P
P8.3	Insocks		P
	If the footwear is supplied with a removable insock,it should be made clear in the leaflet that testing was carried out with the insock in place.A warning shall be given that the footwear shall only be used with the insock in place and that the insock shall only be replaced by a comparable insock supplied by the original footwear manufacturer orsupplied by an insocks manufacturer which will supply insocks that fulfil the properties ofthis standard in combination with the foreseen safety footwear.		P
	If the footwear is supplied without an insock,it should be made clear in the leaflet that testing was carried out with no insock present.A warning shall be given that only insocks that fulfil the properties of this standard in combination with the identified safety footwear can be fitted.		P
8.4	Perforation resistance		P
	Additional information shall be given regarding perforation resistance:		P
	“The perforation resistance of this footwear has been measured in the laboratory using standardized nails and forces.Nails of smaller diameter and higher staticor dynamic loads will increase the risk of perforation occurring.In such circumstances,additional preventative measures should be considered. Three generic types of perforation resistant inserts are currently available in PPE footwear.These are metal types and those from non-metal materials,which shall be chosen on basis of a job-related risk assessment.All types give protection against perforation risks,but each has different additional advantages or disadvantages including the following:		P
	Metal (e.g.S1PS,S3):Is less affected by the shape of the sharp object/hazard (i.e.diameter,geometry, sharpness)but due to shoemaking techniques may not cover the entire lower area of the foot.		P

EN ISO 20345			
Clause	Requirement + Test	Result - Remark	Verdict
	Non-metal (PS or PL or category e.g.S1PS,S3L): May be lighter,more flexible and provide greater coverage area,but the perforation resistance may vary more depending on the shape of the sharp object/hazard (i.e.diameter,geometry,sharpness).Two types in terms of the protection afforded are available.Type PS may offer more appropriate protection from smaller diameter objects than type PL.		P
8.5	Date of obsolescence		P
	The obsolescence date of footwear during storage before use depends on the effects oftime,environment and has to be stated by the manufacturer.		P
	It is the responsibility of the manufacturer to determine all factors,which can influence the time of use and/or foreseen protection (e.g.UV radiation,heat,cold,water,salt,temporal factors of material properties...)		P
	The obsolescence dates should be proven by supporting evidence (tests,experience).The manufacturer cannot predict the obsolescence date during use.		P

ANNEX： Photos of Products

Fig.1

Fig.2

-- End of report --