PRESENTATION OF INDUSTRIAL DEVELOPMENT CENTER FOR LEATHER AND FOOTWEAR INDUSTRY WITH TESTS' SPECIFICATIONS
1. Short introduction

1.1 Foundation

IRCUO was found in 1999 as a response of Slovenian leather and footwear industry to increasing quality and innovation demands of the market. Additionally, companies needed a technological center, where they could test input materials and final products, before market introduction.

1.2 Vision

The vision of IRCUO is to become a driving force of leather and footwear industry in Slovenia, which will significantly contribute to increase of its competitiveness in the world market. Due to its business and technical excellence IRCUO will become respected institution in Slovenia and abroad.

With knowledge and technological equipment IRCUO will also be able to help other organizations, which need testing of input materials or footwear, domestic or abroad. By pre-testing better business decisions will be made and risk of mistakes will be reduced.

1.3 Mission

IRCUO will add value and increase competitiveness of its members, by managing the following activities:

a) Pre-testing of input materials and footwear, before market introduction

b) Information sharing: all achievements and latest relevant information and knowledge will be shared with the members on a monthly basis through electronic newspaper

c) Managing integrated research and development projects, co-financed by government or European Union development funds and programs (EUREKA, CRAFT, 7. FRAME PROGRAM...)

d) Cooperation with other domestic and foreign research institutes and partners

1.4. IRCUO today

Today IRCUO has its laboratory in Žiri, which has a very long tradition in footwear production. Successfully finished integrated project co financed by Phare (EU) and Slovenian government funds, enabled us to gain 18 hi-tech equipment for testing input materials and footwear on various characteristics.

With modern equipment we will be able to contribute to higher quality and added value of our clients’ products.

By applying our services also on different R&D projects, we are able to contribute to project success, and on the other hand transform gained knowledge to R&D departments of our members and clients.
## 2. Equipment of the center

### 2.1. List of equipment

<table>
<thead>
<tr>
<th>MACHINE</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>2</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>3</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>4</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>5</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>6</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>7</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>8</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>9</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>10</td>
<td>bally penetration machine, weight device</td>
</tr>
<tr>
<td>11</td>
<td>Rubber/sole abrasion machine and weight device</td>
</tr>
<tr>
<td>12</td>
<td>Bennewart flex machine</td>
</tr>
<tr>
<td>13</td>
<td>Bennewart flex machine with cold chamber</td>
</tr>
<tr>
<td>14</td>
<td>Water vapor permeability machine</td>
</tr>
<tr>
<td>15</td>
<td>Veslic machine</td>
</tr>
<tr>
<td>16</td>
<td>Steel / plastic toe caps testing machine</td>
</tr>
<tr>
<td>16a</td>
<td>Dynamometer</td>
</tr>
<tr>
<td>17</td>
<td>Electrical conductivity tester</td>
</tr>
<tr>
<td>18</td>
<td>Resistance of shoe to warm conditions</td>
</tr>
<tr>
<td>19</td>
<td>Resistance of shoe to cold conditions</td>
</tr>
<tr>
<td>20</td>
<td>Martindale abrasion machine</td>
</tr>
<tr>
<td>21</td>
<td>Hot contact machine</td>
</tr>
<tr>
<td>22</td>
<td>Ross flex machine</td>
</tr>
<tr>
<td>23</td>
<td>Ross flex machine with cold chamber</td>
</tr>
<tr>
<td>24</td>
<td>Steel midsole testing machine</td>
</tr>
<tr>
<td>25</td>
<td>Slip resistance machine</td>
</tr>
<tr>
<td>26</td>
<td>Lace abrasion machine</td>
</tr>
<tr>
<td>27</td>
<td>Climate chamber</td>
</tr>
<tr>
<td>28</td>
<td>Xenon light test</td>
</tr>
<tr>
<td>29</td>
<td>Thermal insulation device</td>
</tr>
<tr>
<td>30</td>
<td>Fuel oil resistance device</td>
</tr>
<tr>
<td>31</td>
<td>Water wicking test</td>
</tr>
</tbody>
</table>
2.2. Specification of tests

2.2.1. Dynamometer / test of adhesion of upper to the sole

What does it test? It tests the quality of adhesion between upper and sole of footwear

Why is it important? The quality of adhesion between upper and sole is of vital importance for the footwear. The insufficient quality of adhesion can cause the discontact between upper and sole, which leads to the reduction or elimination of footwear’s vital characteristics (comfort, water resistance etc).

Standard: ISO20344, ISO20345

Samples requirements: 3 pieces of shoes (size 42)

The method is shoe destructive!

2.2.2. Dynamometer / energy absorption of seat region

What does it test?: It tests absorption of the energy in the seat/heel region of footwear.

Why is it important: Human step consists of various phases, where specific parts of the sole contact the ground with different force. The seat/heel region touches the ground as first and therefore exposes itself to pressure. Therefore energy absorption at this part of shoe is very important for comfortable and healthy wear of footwear.

Standard: ISO 20344, ISO20345 / Samples requirements: 3 pieces of shoes (size 42)

The method is shoe destructive!

2.2.3. Dynamometer / nail penetration test of metal penetration resistant inserts

What does it test: it tests the quality of metal penetration resistant inserts to the nail penetration

Why is it important?: Workers are sometimes exposed to different sharp pieces on the floor, which could penetrate the sole and hurt the foot and destruct the shoes. Therefore
the sole of specific footwear includes penetration protection inserts, which should be of sufficient quality to protect the foot from hurting, when step is made on sharp pieces.

Standard: ISO20344, ISO20345

Sample requirements: 1 piece of metallic insert.

The method destructs the insert.

2.2.4. Dynamometer / tearing resistance

What does it test?: It tests the tearing resistance of leather, textile and rubber. It measures the force needed at material tearing.

Why is it important?: Each material has specific structure, which defines its hardness, density, flexibility, endurance and therefore resistance to different mechanical and chemical forces. Input materials must therefore (depending on the footwear utilization) satisfy specific norms to guarantee the quality of final product.

Standard: ISO20344, ISO20345

Sample requirements: We need the sample of material big enough to cut 3 separate samples of dimensions 3 X 12 cm.

2.2.5. Dynamometer / Laces tensile strength

What does it test?

It measures the tensile strength of shoe lace (disregarding the material, from which is made), which means maximum force needed and maximal elongation at final point of elongation, just before breaking. Two clamps stretch the lace at continuous stabile movement speed until breaking; computer records the force and elongation.

Why is it important?: Each material has specific structure, which defines its hardness, density, flexibility, endurance and therefore resistance to different mechanical and chemical forces. The quality of laces to tensile resistance is of vital importance, since the lace breakdown makes the shoe very uncomfortable and disfunctional and creates customer dissatisfaction.

Standard: SATRA PM94

Sample requirements: We need three samples of each lace model, which is about 50 cm long, allowing doing two separate tests with the sample of 20 cm.
2.2.6. Dynamometer / Laces slippage and knot security test

What does it test?

This test measures two characteristics of shoe lace: its slippage and knot security, which are interrelated tests. Slippage means the force needed to move the lace through the special knot, prescribed by the standard. Knot security means the force, required to totally unlace the knot.

Why it is important?

Lace slippage depends on material, its surface structure/roughness and shape. It influences directly the knot security, which means force needed for the knot to unlace. It is very important characteristic since it influences on the quality of walking and creates customer’s dissatisfaction if it is too slippery and therefore unknots easily.

Standard: SATRA TM195 (formerly PM195)

2.2.7. Dynamometer / Attachment strength of shoe lace tags

What does it test?

This test measures the force needed for the lace tag to drop under certain continuous force.

Why it is important?

Lace tags keep the ends of the lace into correct position and shape. Lace tag is important to effectively and easily put lace through eyelets. Lace tags also prevent lace construction to fall apart.

Standard: SATRA PM175

2.2.8. Dynamometer / Tensile resistance and elongation

What does it test?: It measures the tensile resistance of material (leather, upper, textile), which means maximum force needed and maximal elongation at final point of elongation.

Why is it important?: Each material has specific structure, which defines its hardness, density, flexibility, endurance and therefore resistance to different mechanical and chemical forces. The quality of material to tensile resistance and elongation characteristics are of vital importance in the production of footwear in the phase of combining upper and sole.

Standard: ISO20344, ISO20345
Samples requirements: We need the sample of material big enough to cut 3 separate samples of dimensions 3 X 12 cm.

2.2.9. Vamp flexing machine

What does it test?: Resistance of leather and textile (dry and wet) to flex movements, which simulates movements at walking.

Why is it important?: Consistent flexing of material can cause different visual and structural damages to the material (wrinkles, cuts, tearings), which reduces the core feature and functionality of the material, which can cause significant dissatisfaction with the footwear (quicker water penetration, shorter product life cycle, weak comfort…)

Standard: ISO20344, ISO4643, SATRA TM25

Samples requirements: We need the sample of material big enough to cut 3 separate samples of dimensions 6 X 8 cm.

2.2.10. Bally penetrometer

What does it test?: Resistance of leather to absorption and penetration of water

Why is it important?: Water resistance and absorption is one of the key characteristics of footwear. It prevents the water to penetrate the feet of user. Additionally resistance to water absorption prevents the upper from absorption of too high amount of water, which increases the weight of the shoe and slows the procedure of drying.

Standard: ISO20344, EN13518
Samples requirements: We need the sample of material big enough to cut 2 separate samples of dimensions 6 x 8 cm.

2.2.11. Rubber/sole abrasion machine

What does it test?: It tests the abrasion of rubber/sole in terms of weight loss, considering also the density of rubber/sole.

Why is it important?: The sole of footwear is exposed to different surfaces during walking. This causes the abrasion of the sole profile, which can lead to reduction of sole characteristics and higher possibilities for slip or fall of the footwear user. Quality of the rubber/sole should be therefore tested before production and sales.

Standard: ISO20344, ISO20345, ISO 12770

Sample requirements: Material or finished sole that allows cutting 3 test samples (valves) in a diameter of 1,5 cm and approximately 1 cm long.

2.2.12. Bennewart flexing machine

What does it test?: It test the resistance of soles on flexing movements

Why is it important?: The anatomy of walking requires flexing of the shoe in the metatarsal area. Consistent sole flexing can cause cracks, which lead to reduction of functional characteristics of sole and whole footwear (comfort, water resistance…). By
pre-testing a producer can identify potential problems and anticipate cracking of the sole, which causes customers’ dissatisfaction and increases his purchase costs.

**Standard:** ISO 20344, ISO20345, SATRA TM161

**Samples requirements:** 3 pieces of samples of soles (smallest, mid, biggest available number)

### 2.2.13. Bennewart flexing machine with cold chamber

![Image of Bennewart flexing machine with cold chamber]

**What does it test?** It tests the resistance of soles on flexing movements. The chamber is able to do the test on soles till the temperature of – 25 degrees Celsius.

**Why is it important?:** The anatomy of walking requires flexing of the shoe in the metatarsal area. Consistent sole flexing can cause cracks, which lead to reduction of functional characteristics of sole and whole footwear (comfort, water resistance…). The possibilities of cracking are even higher in cold conditions. By pre-testing a producer can identify potential problems and anticipate cracking of the sole, which causes customers’ dissatisfaction and increases his purchase costs.

**Standard:** ISO 20344, ISO20345, SATRA TM161

**Samples requirements:** 3 pieces of samples of soles (smallest, mid, biggest available number)
2.2.14. Water vapour permeability tester

What does it test?: It tests the quality of material to water vapour permeability, i.e. how strongly material allows water vapour to go through it.

Why is it important?: Feet get warm and humid during long walk or run, which causes the vapour occur. If material does not allow the vapour to go through it, the feet get sweat, humid and cold, which reduces the comfort and pleasure of wearing. Therefore material must allow certain degree of water vapour permeability.

Standard: ISO 20344, ISO 20345

Samples requirements: Material that allows cutting 3 test samples (circles) in a diameter of 4,5 cm. If this test is to be performed on a material of already finished whole footwear, 1 piece of shoe from every size (smallest, mid, biggest) is needed.

2.2.15. Veslic colour rub fastness tester

What does it test?: It tests colour resistance on rubbing (leather, textiles, lining)
Why is it important?: Walking initiates rubbing between shoe interior materials and socks. If the colour of material is not sustainable enough, material starts to lose colour, which can be than unpleasantly transformed on the sock and skin. It also reduces the visual attractiveness of product. This is why testing of material to color abrasion is needed.

**Standard**: EN13516, EN13517

**Sample requirements**: Material that allows cutting 2 separate test samples of dimensions 2,5 X 13 cm.

### 2.2.16. Steel/plastic protective toe caps testing machine

![Steel/plastic protective toe caps testing machine](image)

**What does it test?**: resistance of protective toe caps to impacts (100 / 200J)

**Why is it important?**: Protective, safety and some models of occupational footwear incorporate a protective toe caps, which protects wearers feet from sudden impact or heavy weight pressures. Therefore, the toe cap should be of certain quality in order to effectively perform its function.

**Standard**: EN12568

**Sample requirements**: 3 pairs of toe caps in three different sizes (smallest, mid, biggest) are needed.

Tests can also be done on protective toecaps integrated into the footwear in which case 1 pair of footwear from each of three sizes is needed according to the EN ISO 20344: 5.4 norm.
2.2.16a) Compression resistance of toe caps (in footwear)

What does it test?: resistance of protective toe caps to compression

Why is it important?: Protective, safety and some models of occupational footwear incorporate a protective toe caps, which protects wearers feet/toes from compression by heavy outside force. Therefore, the toe cap should be of certain quality in order to effectively perform its function.

Standard: EN12568, EN ISO 20344: 5.5.

Sample requirements: 3 pairs of toe caps in three different sizes (smallest, mid, biggest) are needed.

Tests can also be done on protective toecaps integrated into the footwear in which case 1 pair of footwear from each of three sizes are needed according to the EN ISO 20344: 5.5. norm.

2.2.17. Electrical conductivity and antistatic tester

What does it test?: It tests the electrical conductivity and antistatic features of footwear in dry and humid conditions.
Why is it important?: Conductivity and antistatic features of footwear protect wearer from damages that electricity could cause to his body.

**Standard:** ISO20344, ISO20345

**Sample requirements:** 1 pair of shoe from each of three sizes (smallest, mid, biggest).

### 2.2.18. Resistance of shoe to warm conditions

**What does it test?:** It tests the increase of temperature in the interior of shoe, when whole shoe is exposed to warm (rather hot) environment – sand. Depending on the type of footwear, the temperature of sand is between 150 and 250 degrees Celsius. At the same time the resistance of footwear sole is tested to warm/hot environment. Just soles can also be tested, but without measuring the increase of temperature – just deformations on the sole, caused due to exposure to warm/hot conditions.

**Why is it important?:** Professional footwear is exposed to many heavy conditions, including warm/hot temperatures. Whole footwear should have the capability to protect the feet of wearer, when being exposed to warm/hot temperatures of surfaces. The sole of the shoe should at the same time retain its characteristics, without melting and other deformations.

**Standard:** ISO20344, ISO20345

**Sample requirements:** 2 pieces of shoes from different sizes (not strictly prescribed which sizes)
2.2.19. Resistance of shoe to cold conditions

What does it test?: It tests the fall of temperature inside the shoe, i.e. thermal insulation of the shoe, when whole shoe is exposed to cold/freezing environment. The standard test if performed at – 17 degrees Celsius. However, on clients request simulations can be made in other conditions down to – 25 degrees Celsius.

Why is it important?: Thermal insulation is one of the most important characteristics of professional footwear. From the level of thermal insulation depends when the wearer of footwear will start to feel uncomfortable due to cold/freezing conditions.

Standard: ISO20344, ISO20345

Sample requirements: 2 pieces of shoes from different sizes (not strictly prescribed which sizes)

2.2.20. Martindale abrasion machine

What does it test?: It tests the quality of material (uppers, linings, in socks) to abrasion

Why is it important?: Walking initiates rubbing between shoe interior materials and socks. If the material is not of prescribed quality, the abrasion can damage its structure, which leads to reduction of material’s basic features. It also reduces the visual attractiveness of product. This is why testing of material to abrasion is needed.
Standard: ISO20344, ISO20345, EN12947

Sample requirements: Three samples of materials are needed, from each 4 separate circles of diameter 4,5 cm can be cut.

2.2.21. **Material hot contact tester**

![Material hot contact tester](image)

What does it test?: Endurance of material (for uppers or soles) at exposure to high temperature.

Why is it important?: High temperature can cause the material to melt and change shape or structure, which are not a desired characteristics of quality material for professional footwear usage.

Standard: ISO20344, ISO20345, SATRA PM49

Sample requirements: 3 samples of materials are needed, from where 3 test pieces in size of 3X7 cm can be cut. It can also be performed on finished footwear, where 1 piece of shoe from each of three sizes (smallest, mid, biggest) should be delivered.

2.2.22. **Ross flexing machine**

![Ross flexing machine](image)

What does it test?: It tests the endurance of rubber on flexing movements.
**Why is it important?:** Before producing soles, producer should check the endurance of material from which the soles will be produced. The characteristics of finished soles are namely in direct relation to the characteristics of materials that are made of. A buyer may require both, sole and material, to be adequate to the norms.

**Standard:** ISO20344, ISO20345

**Sample requirements:** a sample of material, that allows cutting 3 separate test pieces in dimensions of 15x2,5 cm.

**2.2.23. Ross flexing machine with cold chamber**

**What does it test?:** It tests the endurance of rubber on flexing movements in cold conditions. It is possible to use the freezing conditions down to – 25 degrees Celsius.

**Why is it important?** Before producing soles, producer should check the endurance of material from which the soles will be produced. The characteristics of finished soles are namely in direct relation to the characteristics of materials that are made of. A buyer may require both, sole and material, to be adequate to the norms. The possibility that material will start to crack at consistent flexing movements in cold condition is even higher than at normal conditions.

**Standard:** ISO20344, ISO20345

**Sample requirements:** a sample of material, that allows cutting 3 separate test pieces in dimensions of 15x2,5 cm.
2.2.24. Steel midsole flexing machine

What does it test?: It tests the endurance of the steel midsole to the consistent flex movements in metatarsal area.

Why is it important?: Similar as sole, is also midsole exposed to consistent flexing movements, which can cause cracks, which lead to reduction of product’s function. By pre-testing, a producer can eliminate the risk of selling product, that do not satisfy norms and customers expectations.

Standard: ISO20344, ISO20345, EN12568

Sample requirements: 3 pairs of midsole shall be tested (size not prescribed)

2.2.25. Slip resistance tester

What does it test?: It tests the quality of footwear or just sole to slip on different surfaces.

Even though the standard prescribes the test to be performed in room conditions, various simulations can be made, using cold chamber or climate chamber as a mean to condition test piece to desired temperature/humidity. Therefore we can compare the behavior of footwear/sole in various conditions (very cold up to – 30 degrees Celsius or very hot up to 120 degrees Celsius or humid (from 10 till 98% rH).
Why is it important?: Slip resistance is one of the most important characteristics of professional footwear. A sole with quality material and good design allows customer comfort and safety walking on different surfaces. That is why test is also performed on different surfaces (ceramic, steel) and different lubricants (water, glycerol, NaLs and without lubricant at all).


Sample requirements: 3 samples of the same type of footwear need to be tested according to the standard.

2.2.26. Lace abrasion tester

What does it test?: It tests the abrasion resistance of lace when moving through standardized tool.

Why is it important?: Laces are exposed to continuous movement every day, when user laces and unlaces them. This can cause a lace failure if the lace is not of an appropriate quality. Additionally this causes many unpleasant moments to the wearer, because the walking in unlaced shoes is dangerous and non economic.

Additionally to this test is sometimes performed also the test on dynamometer, which measures tensile and elongation capabilities of laces. Often, the lace fails just in the moment of tight lacing procedure. That is why both tests are interconnected.

Standard: SATRA PM93

Sample requirements: 2 pieces of lace. Preferably additional 2 other (but similar in characteristics) pieces are tested for better comparison.
2.2.27. Climatic chamber for conditioning

What does it test?: First of all, climatic chamber is used for conditioning of samples before performing the test.

Additionally, due to possibilities that the machine offers (temperature range regulation: from 10 – 120 degrees Celsius / humidity range regulations: 10% - 98%) several other tests can be executed: measuring the absorption of humidity by material, measuring the speed of drying of material after humidity absorption.

Why is it important?: Level of humidity absorption and the speed of drying are important characteristics of materials, especially for linings and in socks.

Standard: There is no standard that regulates humidity. The nearest is 20344 and 345 that regulate water (not humidity) absorption and desorption. That is why comparative tests are made.

Samples requirements: One piece of at least two different materials is needed for comparison. Weight device is used as complementary equipment to determine increase/decrease of weight after the material was exposed to humid/dry conditions.

2.2.28. Xenon light test

What does it test?: It tests the lose of colour, when material is exposed to sun light.
Why is it important?: Some materials (PU, uppers), especially bright colors get yellow under influence of sun light, which causes visual distraction of product.

Standard: EN ISO 105B02

Sample requirements: 2 pieces of material in size of 5 x 15 cm.

2.2.29. Thermal insulation device

What does it test?: Thermal insulation device allows a shoe or shoe components manufacturer/distributor to evaluate different materials from the point of view of thermal insulation. The unit is expressed as W/m²*K and it means the amount of heat that must be delivered to the material to maintain certain temperature on certain surface area. It is the same unit as it is used for evaluation of thermal insulation of household windows, which must comply with certain eco standards.

Why is it important?: Thermal insulation is one of the most important characteristics of shoes for the usage in cold weather or other industrial cold conditions (slaughterhouses...). It is of vital importance that footwear protects human feet from cold, because cold reduces blood circulation, which can cause health problems.

Standard: Unit for determination is W/m²*K (the lower the value, the better the thermal insulation). There is no specific standard for the evaluation of thermal insulation just for footwear materials (the standard exists for whole footwear). However, this method can significantly reduce costs of development related to prototyping of whole footwear. With this device it is possible to measure in advance which material is offering more thermal insulation in comparison to another. Simulations of uppers with different material layers are also possible, therefore avoiding costs of prototyping whole footwear and evaluating it under 2.2.19 method (of course, measuring thermal insulation of finished footwear is also important, since sole structure (materials, thickness...) also influences total footwear thermal insulation).

Sample requirements: Contrary to the method described under 2.2.19 (resistance of shoe to cold conditions), we need only a test piece of dimensions 20 X 20 cm.
2.2.30. Fuel oil resistance device:

What does it test?: It measures the resistance of sole / sole material to fuel oil, which chemical name is 2,2,4-trimethylpentane.

Why is it important?: Exposure of sole to 2,2,4-trimethylpentane can cause its degradation, increase in volume and shape, which causes the deformation of the sole and can eventually lead to feet injury.


Sample requirements: We need one test piece (sole) of which two clear test pieces of dimensions 16 mm (diameter) and 4 mm thickness can be cut.

2.2.31. Water wicking test

What does it test?: It measures if the material is resistant to water climbing/wicking. Some materials are very hydrophilic and the water easily “climbs”, while other do not allow the water to climb or the process is slow. The method is more or less used for various textile materials for uppers.
Why is it important?: Even though the footwear has integrated waterproof membrane (like Sympa- or Goretex) the water can find its way around that protection, if the outer upper materials are not resistant to water climbing. It practically means that the water climbs to the top of the shoe collar and then penetrates the interior of the shoe from above, not from the side, since this area is protected with membrane layer.

Standard: Gore standard

Sample requirements: we need a test piece of 15 x 15 cm to cut three samples of correct sizes.

2.2.32. Determination of color with color meter

What does it test: If the client wants or needs, we can determine the colour of specific material according to standardized Pantone scale.

Why is it important: fashion trends impose quite clear requirements on brightness / darkness / depth of the colour, therefore it is wise to assess if the color of specific material complies with fashion trends and clients requirements

Standard: Pantone scale

Sample requirements: 1 half A4 size of material

2.2.33. Determination of dimension

What does it test: it measures length, thickness and other dimension parameters.

Why is it important: Footwear manufacturers often prescribe certain dimensions of footwear components.

Standard: by requirement of the client

Sample requirements: 1 footwear or footwear component sample

2.2.34. Determination of corrosion resistance of metallic parts

What does it test: resistance of metallic parts of footwear or other products to corrosion

Why is it important: corrosion of metal parts damages their functionality and ruins visual appearance of the product.

Standard: EN ISO 12568:1999
2.2.35. Dynamic test of footwear water resistance

What does it test: resistance of footwear to water penetration when exposed to walking in water

Why is it important: dynamic test of water penetration is more realistic than just statically putting shoe into water and waiting for the penetration. During walk shoe upper creates a pump similar effect, which causes that water can faster penetrate the shoe interior.

This test provides the information if the footwear is enough water resistance to enable customer to enjoy the walk.

Standard: internal IRCUO standard according to footwear type and purpose (army, protection, trekking...).

2.2.36. Resistance of PU soles to hydrolises

What does it test: resistance of PU soles to hydrolyse effects. Test requires 7 days of hydrolyses treatment in climate chamber and 150,000 flexes to be done in cold Bennewart sole flexing chamber.

Why is it important: if the PU is not of sufficient quality PU soles tend to crack faster than other types of soles when exposed to humid conditions and flex forces. The reason is the chemical reaction between PU and water/humidity.

This test provides the information if the PU soles are of appropriate quality to resist the cracking during walk.

CONTACTS:

AB H BRUNNER
Box 9036
SE-70009 ÖREBRO
Sweden
Contact person: Göran Hedberg
e-mail: goran.hedberg@brunner.se
Tel. +46 19 175886
Fax: +46 19 270107
Mobil: +47703302225
Web page www.brunner.se

ZAVOD IRCUO
Strojarska ulica 2
4226 Žiri – Slovenia

Contact person: Bostjan Novak
E-mail: bostjan.novak@ircuo.si / Web page: www ircuo si
Tel: 00386-4-51-58-163 or Tel/ fax: 00386-51-91-422