EN 340 - PROTECTIVE CLOTHING
GENERAL REQUIREMENTS

This European standard specifies the general requirements for protective clothing including requirements for ergonomics, innocuousness, ageing, size, marking as well as the information that has to follow the clothing.

This standard is used as a reference standard together with other standards with specific requirements and can't be used alone.

This standard has been replaced by EN ISO 13688.

EN ISO 13688 - PROTECTIVE CLOTHING
GENERAL REQUIREMENTS

This European standard specifies the general requirements for protective clothing including requirements for ergonomics, innocuousness, ageing, size, marking as well as the information that has to follow the clothing.

This standard is used as a reference standard together with other standards with specific requirements and can't be used alone.

This standard replaces DS/EN 340.

EN 342 - PROTECTIVE CLOTHING
ENSEMBLES AND GARMENTS FOR PROTECTION AGAINST COLD

This European standard specifies the requirements and test methods for protective clothing that aim to protect against cold (not including garments for head, hands and feet).

The standard includes requirements for the properties of the clothing such as thermal insulation under stationary conditions as well as under movement, air permeability, water vapour resistance and tear strength. A test of water penetration resistance is an option.

Clothing according to this standard is marked with the below pictogram and informs about the level of protection:

- Y(B)/Y(C)/Y(R) Thermal insulation under movement / Icler
- Y(B)/Y(C)/Y(R) Thermal insulation under stationary /Icler
- Y Air permeability class
- Y Resistance to water penetration class (optional)

The first line after EN 342 refer to the level of thermal insulation under movement and is obligatory.

The next line refer to the level of thermal insulation under stationary conditions and is optional

Y(R) is listed if the garment is tested according to and live up to the requirements for single garments.
Y(B) is listed if the garment is tested according to and live up to the requirements for test with underwear.
Y(C) is listed if the garment is tested with underwear specified by the manufacturer and live up to the requirements for test with underwear.

Table 1 - Classification of air permeability

<table>
<thead>
<tr>
<th>AP mm/s</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 &gt; AP</td>
<td>1</td>
</tr>
<tr>
<td>5 &lt; AP ≤ 100</td>
<td>2</td>
</tr>
<tr>
<td>AP ≤ 5</td>
<td>3</td>
</tr>
</tbody>
</table>

After test of air permeability the garment is classified as either class 1, 2 or 3, where class 3 is the best and class 1 is the lowest, please see table 1.
### EN 343 - PROTECTIVE CLOTHING

**ENSEMBLES AND GARMENTS FOR PROTECTION AGAINST RAIN**

This European Standard specifies the requirements and test methods for materials and seams on protective clothing that is used for protection against precipitation (e.g. rain and snowflakes), fog and ground humidity. Materials and seams are tested for water penetration resistance before and after pre-treatment as well as for water vapour resistance.

Protective clothing according to this standard is marked with the pictogram shown below and information about the level of protection.

![EN 343 pictogram](image)

**X** indicates the level for water penetration resistance. The water penetration resistance is expressed in Wp. There are three classes, class 1, 2 and 3. Please see the table 1 below. Class 3 is the best class, class 1 the lowest.

<table>
<thead>
<tr>
<th>Water penetration resistance Wp</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material to be tested:</td>
<td></td>
</tr>
<tr>
<td>- Material before pretreatment</td>
<td>Wp ≥ 8000 Pa</td>
</tr>
<tr>
<td>- Material after each pretreatment</td>
<td>No test required*</td>
</tr>
<tr>
<td>- Seams before pretreatment</td>
<td>Wp ≥ 8000 Pa</td>
</tr>
</tbody>
</table>

*No test is required because the worst case scenario for class 2 and 3 is after pretreatment

**NOTE:** For each class several requirements have to be met.

Y indicates the level of water vapour resistance. The water vapour resistance is expressed in Ret. There are three classes, class 1, 2 and 3, where 3 is the highest class and 1 the lowest. Please see table 2 below.

<table>
<thead>
<tr>
<th>Water vapour resistance Ret m² * Pa/W</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ª Ret above 40</td>
<td>2 20 &lt; Ret ≤ 40</td>
</tr>
<tr>
<td>2 20 &lt; Ret ≤ 40</td>
<td>3 Ret ≤ 20</td>
</tr>
</tbody>
</table>

Clothing with class 1 should only be worn in a limited period depending on the surrounding temperature.
EN 467 – PROTECTIVE CLOTHING
PROTECTION AGAINST LIQUID CHEMICALS
PERFORMANCE REQUIREMENTS FOR GARMENTS PROVIDING
PROTECTION TO PARTS OF THE BODY

This European standard specifies minimum requirements for protective clothing used for partial protection of
the body against liquid chemicals. The requirements apply to the properties of the materials used for the gar-
ment and not for the finished garment. All the properties tested obtain a class afterwards.

The following properties of the materials are tested:

<table>
<thead>
<tr>
<th>Property tested</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion resistance</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Stability to heat (resistance to blocking)</td>
<td>1-2, where 2 is best</td>
</tr>
<tr>
<td>Flex cracking resistance</td>
<td>1-5, where 5 is best</td>
</tr>
<tr>
<td>Puncture resistance</td>
<td>1-5, where 5 is best</td>
</tr>
<tr>
<td>Tear resistance</td>
<td>1-5, where 5 is best</td>
</tr>
<tr>
<td>Coating adhesion resistance (test of coated materials only)</td>
<td>1-5, where 5 is best</td>
</tr>
<tr>
<td>Resistance to permeation by liquids</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Seam strength</td>
<td>1-5, where 5 is best</td>
</tr>
</tbody>
</table>

All tests are made after 5 x wash. This standard also specifies requirements for the design of the different kinds of
clothing. Protective clothing according to this standard is marked with the below pictogram:

EN 467

This standard has been replaced by EN 14605.
EN 14605 - PROTECTIVE CLOTHING AGAINST LIQUID CHEMICALS

This standard specifies minimum requirements for the following types of chemical protective suits with limited use and recycling:

- Suit clothing with liquid-tight connections between different clothing parts (Type 3: liquid-tight clothing) and, if applicable with liquid-tight joints for component parts, such as hoods, gloves, boots, visors or respiratory equipment, which can be specified in other European standards (Type 4: spray-tight joints).

- Garments, providing protection to parts of the body (Type PB [3] and PB [4])

In the standard there are placed requirements for material properties and not to the complete clothing. The materials are tested for the following properties:

<table>
<thead>
<tr>
<th>Property tested</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Flex cracking</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Flex cracking -30C</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Tear</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Tensile</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Puncture</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Resistance to permeation</td>
<td>1-6, where 6 is best</td>
</tr>
</tbody>
</table>

Protective clothing under this standard are labeled with the following pictogram:
EN 14605
EN 13034 - PROTECTIVE CLOTHING
TO USE AGAINST LIQUID CHEMICALS

This standard specifies the test methods and requirements to protective clothing which are intended for use in cases of a potential low-risk exposure, e.g. a light spray, liquid aerosols or low pressure, low volume splashes, against which a complete liquid permeation barrier is not required.

Chemical protective suits (Type 6) forms the lowest level of chemical protection and is intended to be used if risks have been assessed as low and a full liquid permeation barrier is not necessary, i.e. when wearers are able to take timely adequate action when their clothing is contaminated.

All chemical protective clothing materials are tested and classified in accordance with table 1. The construction of seams shall prevent penetration of liquid through stitch holes or through other components of a seam and not obstruct run-off of the liquid.

Table 1: Performance requirements (EN 14325:2004)

<table>
<thead>
<tr>
<th>Tests</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion resistance</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Tear resistance</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Puncture resistance</td>
<td>1-6, where 6 is best</td>
</tr>
<tr>
<td>Liquid repellency</td>
<td>1-3, where 3 is best</td>
</tr>
<tr>
<td>Resistance to penetration by liquids</td>
<td>1-3, where 3 is best</td>
</tr>
</tbody>
</table>

Protective suits that fulfill the requirements of an EN 13034 are marked with the pictogram below.

EN 13034

Following chemicals are tested under EN 13034:

- 30 % aqueous solution of H₂SO₄
- 10 % aqueous solution of NaOH
- O-Xylene (undiluted)
- Butan-1-ol (undiluted)
EN 471 – PROTECTIVE CLOTHING
HIGH VISIBILITY WARNING CLOTHING FOR PROFESSIONAL USE

This European standard specifies the requirements for high visibility warning clothing which serve to make the wearer visible in daylight as well as in the front light of a car in the dark.

High visibility clothing is divided into three levels according to the level of protection. Each level requires a minimum area of fluorescent material as well as retro reflective material, please see table 1 below. The area is measured on the smallest garment available and the class is determined on the basis of the smallest configuration possible.

Table 1 – Minimum requirements for the high-visibility materials in m²

<table>
<thead>
<tr>
<th></th>
<th>Class 3 - Garments</th>
<th>Class 2 - Garments</th>
<th>Class 1 - Garments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent background material</td>
<td>0,80</td>
<td>0,50</td>
<td>0,14</td>
</tr>
<tr>
<td>Retroreflective material</td>
<td>0,20</td>
<td>0,13</td>
<td>0,10</td>
</tr>
<tr>
<td>Combined performance material</td>
<td>-</td>
<td>-</td>
<td>0,20</td>
</tr>
</tbody>
</table>

The high visibility warning clothing is marked with the pictogram shown below. The determined class is indicated on the right of the pictogram as X and Y:

X indicates the class according to table 1 (please see above). Clothing with class 3 has the highest visibility, clothing with class 1 the lowest.

Y indicates the class for the retro reflective material – class 1 or class 2, where class 2 has the best retro reflective properties.

This standard also specifies requirements for the design of the clothing, such as the placement of the materials. Furthermore the standard specifies requirements for the materials and their properties, such as requirements for colours, luminance factor, colour fastness, mechanical properties, reflective properties etc.

This standard has been replaced by EN ISO 20471.
EN ISO 20471 – HIGH VISIBILITY CLOTHING
TEST METHODS AND REQUIREMENTS

This international Standard specifies requirements for high visibility clothing which is capable of visually signaling the user’s presence.

High visibility clothing is grouped into three classes related to risk assessment. Garments shall comprise the required areas of background material and retroreflective material or alternatively shall comprise the required area of combined performance material.

The area shall be measured on the smallest garment size available with all fasteners adjusted to the smallest configuration possible.

Each of these classes will provide a different level of conspicuity, class 3 being the class that provides the highest degree of conspicuity against most backgrounds found in urban and rural situations in daylight and night time.

The garment shall be made up of high visibility materials on all sides. To ensure visibility from all sides (360° visibility), it is important that horizontal retroreflective bands and fluorescent materials encircle torso, trouser legs and sleeves.

The performance class can be obtained using a single garment or a clothing ensemble, e.g. jacket and trousers. An assembly e.g. a classified trouser and a classified jacket, can be classified as an higher class if the assembly meets the minimum requirement achieved by the actually visible area when wearing the garment. This higher class shall be additionally specified in both the information for use and on the labels of both garments.

Regardless of the area of materials used, a class 3 garment shall cover the torso and shall have either long sleeves with retro reflective bands or a full length trouser legs with retroreflective bands, it not both.

Minimum required areas of visible material in m²
NOTE: The clothing class is determined by the lowest area of visible material.

<table>
<thead>
<tr>
<th></th>
<th>Class 3 -</th>
<th>Class 2 -</th>
<th>Class 1 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background material</td>
<td>0,80</td>
<td>0,50</td>
<td>0,14</td>
</tr>
<tr>
<td>Retroreflective material</td>
<td>0,20</td>
<td>0,13</td>
<td>0,10</td>
</tr>
<tr>
<td>Combined performance material</td>
<td>-</td>
<td>-</td>
<td>0,20</td>
</tr>
</tbody>
</table>

The minimum visible area requirements to achieve a garment classification in accordance with the above table are not to be reduced or compromised due to the presence of any logos, lettering, labels etc.

Classification must be stated by a graphical symbol.

The number next to the graphical symbol (x in the figure) indicates the garment class in accordance with the above table.

Besides this the EN ISO 20471 also contains requirements to the constructions of materials such as colour fastness, mechanical strength and retroreflective properties.

This document supersedes EN 471.
EN 470-1 – PROTECTIVE CLOTHING
FOR USE IN WELDING AND ALLIED PROCESSES
- GENERAL REQUIREMENTS

This European standard specifies requirements and test methods for protective clothing used during welding and allied processes. Protective clothing according to this standard aim to protect the wearer against small metal splashes, brief flame contact and ultraviolet light. The clothing can be used an entire work day (8 hours) under normal temperatures.

The standard also specifies requirements for the design as well as for the properties of the outer material where tests of the following properties are made: tensile strength, tear strength, dimensional changes, flame spread and resistance to metal splashes.

The tests of the mechanical properties are conducted on new material, test of flame spread as well as resistance to metal splash are conducted on materials that have been washed/cleaned x 5.

Protective clothing according to this standard is marked with the below pictogram:

EN 470-1

This standard has been replaced by EN 11611.
EN ISO 11611 – PROTECTIVE CLOTHING 
FOR USE IN WELDING AND ALLIED PROCESSES

This standard describes the test methods as well as the minimum requirements for protective clothing that aim to protect the wearers body during welding and allied processes. The standard does not include protective clothing for hands, head and feet (except hoods and gaiters).

The clothing aim to protect the wearer against molten metal splashes, brief flame contact, radiant heat and accidental contact with voltage up to 100V d.c. in normal conditions of welding.

The clothing is tested for resistance to flame spread, molten metal splashes, heat transfer (radiation) and electrical resistance and is divided into 2 classes after test, class 1 or 2, where class 2 offers the best protection.

The standard is marked with the below diagram and the class achieved:

EN ISO 11611

This standard also includes requirements for innocuousness, design and the mechanical properties such as tensile strength, tear strength, burst strength, seam strength and dimensional change.

This standard replaces EN 470-1.

EN 531 – PROTECTIVE CLOTHING 
FOR WORKERS EXPOSED TO HEAT

This European standard specifies requirements and test methods for protective clothing used against heat. The purpose of clothing that complies with the requirements of this standard is to protect against short flame contact and against at least one type of heat comprising convective heat, radiant heat and/or large molten metal splashes.

The standard is marked with the pictogram shown below and inform about the level of protection

EN 531

A B C D E

Protective clothing according to this standard must pass the test regarding limited flame spread (A) and as a minimum at least one of the other tests of B-E.

A = Limited flame spread including hole formation, flaming or molten debris, after flame time and afterglow time

B= Convective Heat; divided according to test result into class 1-3, where 3 is best.

C= Radiant heat; divided according to the test results into class 1-4, where 4 is best

D= Molten aluminium splash; divided according to the test results into class 1-3, where 3 is best

E= Molten iron splash; divided according to the test results into class 1-3, where 3 is best.

The standard also features requirements for design.

This standard has been replaced by EN 11612.
EN ISO 11612 - PROTECTIVE CLOTHING
CLOTHING TO PROTECT AGAINST HEAT AND FLAME

This European Standard specifies the requirements and test methods for clothing that is intended to protect the wearer against heat and flame.

Clothing according to this standard is marked with the pictogram below:

This standard includes requirements for limited flame spread. Test is made according to procedure A and/or B and the test method used is listed as A1 or A2 together with the pictogram.

Requirements for heat resistance are also part of this standard and the following properties are tested:

- Protection against convective heat: the level reached is listed as B1, B2 or B3, where B3 offers the best protection and B1 the lowest.
- Protection against radiant heat: the level reached is listed as C1, C2, C3 or C4, where C4 offers the best protection and C1 the lowest.
- Protection against molten aluminium splashes: the level reached is listed as D1, D2 or D3 offers the best protection and D1 the lowest.
- Protection against molten iron splashes: the level reached is listed as E1, E2 or E3, where E3 offers the best protection and E1 the lowest.
- Protection against contact heat: the level reached is listed as F1, F2 or F3, where F3 offers the best protection and F1 the lowest.

The protection level of each property is listed together with the pictogram; at least one should be listed.

Besides the above requirements, this standard also comprises requirements for the design, innocuousness, and for the mechanical properties like for instance tear strength. The standard also includes tests of optional properties, for instance test of waterproofness according to EN 343. The result of this test is marked at the pictogram with the letter W followed by the achieved class.

This standard replaces EN 531.

EN 533 - PROTECTIVE CLOTHING
PROTECTION AGAINST HEAT AND FIRE
LIMITED FLAME SPREAD MATERIALS AND MATERIAL ASSEMBLIES

(Has been replaced by EN 14116)

Protective clothing according to this standard is suitable for protection in situations with accidental contact with igniting flames where there is no significant heat hazard.

Clothing according to EN 533 is marked with the below pictogram:

EN 533

The clothing is tested according to EN 532 and the test includes a test of flame spread, flaming debris, afterglow, hole formation and afterflame. This test divides the materials into 3 classes, flame spread index 1, 2 and 3, where 3 gives the best protection and 1 the worst.

The test is made both before and after one of two specified cleaning procedures. The procedure chosen is as number of washes x C together with the class.

This standard has been replaced by EN ISO 14116.
EN ISO 14116 – PROTECTIVE CLOTHING
PROTECTION AGAINST HEAT AND FLAME
LIMITED FLAME SPREAD MATERIALS, MATERIAL ASSEMBLIES AND CLOTHING

This standard replaces EN 533 and specifies the requirements for protective clothing with limited flame spread properties. Clothing according to this standard is intended to protect against sporadic and brief contact with open fire in cases where no heat hazard of any kind exists.

Clothing according to this standard is marked with the below pictogram:

EN ISO 14116

Tests of the following properties are made: flaming debris, after glow, hole formation and after flame. After test the clothing is classified into index 1, 2 or 3, where index 3 offers the best protection and index 1 the lowest.

The clothing is also provided with a cleaning index that inform about which cleaning procedure the clothing have been exposed to before test. The cleaning index is listed together with the flame spread index in the following way:

EN 14116/Index 1+2+3/C x number of washes/type of wash

This standard also comprises requirements for the design of the clothing, tensile strength, tear strength and seam strength.

EN 1149 – PROTECTIVE CLOTHING
ELECTROSTATIC PROPERTIES

This European standard includes a series of standards that describe test methods and requirements for the electrostatic properties of protective clothing.

The standard specifies the requirements for design and materials for protective clothing that aim to protect the wearer against incendiary discharges. The requirements may not be sufficient in oxygen enriched flammable atmospheres.

EN 1149-1: Test method for measurement of surface resistivity
EN 1149-2: Test method for measurement of the electrical resistance through a material
EN 1149-3: Test method for measurement of charge decay
EN 1149-4: Test of clothing (in preparation)
EN 1149-5: Material performance and design requirements

Protective clothing according to this standard is marked with the below pictogram:

Protective clothing where the properties of the materials are taken into account are marked EN1149-3.

Protective clothing where the properties of the materials as well as the design are taken into account are marked EN 1149-5.
CLC/TS 50354
ELECTRICAL ARC TEST METHODS FOR MATERIAL AND GARMENTS, FOR USE BY WORKERS AT RISK FROM EXPOSURE TO AN ELECTRICAL ARC

The purpose of this technical specification is to specify some requirements for protective clothing to ensure that the clothing itself does not make the situation worse if the user is exposed to an electrical arc.

This technical specification does not offer protection from current through the body nor protection from the heat/energy generated by the electrical arc.

This technical specification includes at test of material as well as a test of clothing. The clothing shall be made of materials that live up to the requirements of this specification.

The test includes a test of burning time, melting and hole formation. The closure of the garment should be unaffected by test and work afterwards.

After the test, the material as well as the garment are classified into class 1 or 2, where class 2 offers the best protection.

This standard has been replaced by EN 61482.

EN 61482 - LIVE WORKING
PROTECTIVE CLOTHING AGAINST THE THERMAL HAZARDS OF AN ELECTRICAL ARC

EN 61482

This European standard consists of two parts that each describes two test methods that are used to test materials and protective clothing that aim to protect against the thermal hazards of electrical arcs.

Method 1, listed as EN 61482-1, is used to determine the arc performance value of flame resistant materials used for clothing. The result from this method is called the ATPV (arc thermal performance value) and is expressed as kW * s/m². The ATPV of the material indicates how much thermal energy a material can withstand before the wearer will suffer 2nd degree burns.

Method 2, also called the box test, listed as EN 61482-1-2, is used to determine the arc rating of flame resistant material and clothing. The test classifies the materials/clothing into two classes, class 1 (4 kA) or 2 (kA), where class 2 offers the highest level of protection.