High Visibility Clothing & Accessories Requirements for Europe
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## Introduction

High visibility products are worn in many different settings to provide conspicuity to people working in areas where the wearer needs to be seen easily. Examples of this are motorways, roads, railways, airports, docks, construction sites and also by emergency workers and security staff. Visibility products are also worn by school children, cyclists, motorcyclists and horse riders for non-professional or leisure activities.

## Directives, Standards and Categories

High visibility products fall within the jurisdiction of the Personal Protective Equipment (PPE) Directive (89/686/EEC) and are intended to signal the wearers’ presence visually in different light conditions and make the wearer stand out from the surrounding environment.

This document will give a brief overview of the standards, what is needed for certification and how requirements have or haven’t changed.
Currently there are two standards for visibility clothing and one for accessories published as Harmonized Standards in Europe. There is also a published standard in the United Kingdom for high visibility clothing worn on the railways. This UK standard (beginning with GO/RT) is published by the Rail Safety and Standards Board Limited.

For visibility clothing, there are defined areas of fluorescent background fabric and retro-reflective material. There are also requirements for the placement of both to ensure there is 360° visibility and that the human form is recognisable. Both standards for visibility clothing ensure enhanced visibility during daylight conditions (i.e. by the use of fluorescent fabric) and also in poor lighting or in darkness (from utilising retro-reflective material).

For visibility accessories, only retro-reflective material is utilised. Therefore these items can only be regarded as aides to conspicuity that perform best in very low light ambient lighting.

**EN ISO 20471:2013 High Visibility Clothing**

“EN ISO 20471:2013 High visibility clothing” was published on the 1st March 2013 and was subsequently issued as BS EN ISO 20471 in July 2013 incorporating a corrigendum. It became a harmonized standard on 28th June 2013. EN 471:2003 + A1:2007 was withdrawn on 1st September 2013.

This standard specifies the requirements for clothing intended to provide conspicuity of the wearer in any light condition. Under daylight conditions, fluorescent high visibility material is used, which provides a high level of contrast between the product and the environment in which it is to be worn. The situations in which high visibility clothing to EN ISO 20471 is worn are classed as ‘high risk’ and this standard is not applicable to medium-risk and low-risk.

This standard gives performance requirements for the colour and retro-reflection, as well as, for minimum areas and the placement of the fluorescent and retro-reflective materials. There are only three colours specified – fluorescent yellow, orange-red and red. There are also requirements for the colour fastness, dimensional stability, strength and the water vapour resistance of the fluorescent and any non-fluorescent materials. The retro-reflective material is tested for photometric performance as new and after a number of pre-treatments.

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There are three classes which are related to risk assessment and are defined by the minimum areas of background fluorescent and retro-reflective material. Class 3 garments provide the highest level of conspicuity with Class 1 being the lowest. These areas are defined according to the visible areas of fluorescent background material and bands of retro-reflective tape.

EN 1150 Visibility Clothing for Non-professional Use

“EN 1150 Visibility clothing for non-professional use” was published in January 1999 and was issued as BS EN 1150:1999 on 15th April 1999. It became a harmonized standard on 4th June 1999. It did not supersede any previous standard. This standard gives details of the requirements for high visibility clothing for non-professional use.

It outlines the use of both fluorescent background fabric and retro-reflective material to achieve enhanced conspicuity against most background conditions found in urban and rural situations both day and night.

Performance requirements for the colour, retro-reflection for minimum areas and the placement of the materials are also given by the standard. EN 1150 allows for flexibility in the design of clothing as the retro-reflective material does not have to be in tape form but can be in other shapes providing that the material is evenly distributed around the body. There is also a wider range of colours specified – fluorescent green, yellow-green, yellow, yellow-orange, orange, orange-red, red and pink. There are additional requirements for the colour fastness. The retro-reflective material is tested for photometric performance as new and after a number of pre-treatments.

The areas of fluorescent background fabric and retro-reflective material are dependent upon the size of the wearer.

EN 13356 Visibility Accessories for Non-professional Use

“EN 13356 Visibility accessories for non-professional use” was published in July 2001 and was issued as BS EN 13356:2001 on 15th September 2001. It became a harmonized standard on 21st December 2001. It did not supersede any previous standard.
This standard relates to products intended to be worn or carried by individuals to make them more conspicuous to other road users under low light levels. The products use retro-reflective material only.

There are 3 types of products that are covered by this standard which are Type 1 – free hanging, Type 2 – removable, or Type 3 – mounted. These can be flexible or rigid.

This standard gives requirements for the photometric performance and minimum areas of the retro-reflective material.

**GO/RT 3279 Issue 8 High Visibility Clothing**

“GO/RT 3279 Issue 8 High Visibility Clothing” was published in December 2013 and replaces Issue 7 dated September 2012.

This Railway Group Standard published by the Rail Safety and Standards Board Limited (RSSB) specifies the minimum requirements for high visibility clothing that is to be worn on or near the railway lines in the UK to give drivers of rail vehicles a conspicuous warning of the presence of people.

This standard specifies the tolerances for the colour of background material and the design requirements. It also specifies the technical requirements for high visibility mini-vests.

This standard is used in conjunction with EN ISO 20471:2013 for all other properties.

**The PPE Directive**

The European PPE Directive covers all types of Personal Protective Equipment and places these into three distinct groups which have specific conformity assessment procedures. In the Directive, these are named as “Simple Design,” “Complex Design” and neither of these. The third category is commonly known as “Intermediate Design.” Whilst the Directive does not explicitly define these three groups as Categories, it is common practice to use the terms Category I, Category III and Category II respectively.
The definitions for these categories are given below:

- **Category I** – items that protect the wearer from minor injuries which are gradual and can be safely identified by the user in good time.

- **Category III** – items that protect against mortal danger or against dangers that may seriously and irreversibly harm the health, the immediate effects of which cannot be identified in sufficient time.

- **Category II** – items that are neither category I nor III.

**PPE Certification Process**

For all categories of PPE, the manufacturer must provide information about the measures it has taken in order to ensure the conformity of the PPE to the Basic Health and Safety Requirements (PPE Directive (89/686/EEC) Annex II) in technical documentation (Technical File). For intermediate and complex category products, the technical file and the product it covers must be examined by a Notified Body for Type Approval. If the product and technical documentation meet all the requirements, the Notified Body will issue an EC Type Examination Certificate. This certificate allows the article to be CE marked. For complex category products, ongoing surveillance is also required.

High visibility PPE falls within the category II or intermediate category and therefore requires an EC Type Examination.

For high visibility clothing, it is common practice for the suppliers’ of the fabrics and retro-reflective tape to get their products tested. The garment manufacturers can then use the suppliers’ test reports or test certificates for certification purposes without testing these components themselves. If the suppliers have not had their products tested, the garment manufacturer will have to commission this testing. The test reports for the components are given as part of the technical documentation (Technical File) to the notified body along with samples of the clothing for them to carry out the examination.

For products being certified to EN ISO 20471:2013, a garment of each style in the smallest size manufactured must be submitted so that the minimum areas can be calculated. If the smallest size of the garments meets the claimed class, then the larger sizes will also meet the requirements.
For products being certified to EN 1150:1999, a garment of each size must be submitted so that the minimum areas of each can be calculated. This allows the height of the wearer to be given on the labels and user information.

For products being certified to EN 13356:2001, each accessory must be submitted so that the areas of each item can be calculated. Testing is carried out either on the retro-reflective material (i.e. for arm/leg bands) or the actual item itself (i.e. for free hanging accessories).

The technical documentation required is the same for all products and must consist of the following:

- Applicant's name & address.
- Manufacturer's name & address (if different from the applicant)
- Full description of products
- Product specifications
- Test Report numbers (the test report should accompany the Technical File)
- Conformance with the Basic Health and Safety Requirements - Personal Protective Equipment Directive 89/686/EEC - Annex II.
- A description of the control and test facilities used in manufacturer’s plant to check compliance and to maintain the quality of production
- Product markings
- Information to users
- EC Declaration of Conformity
- Declaration of Innocuousness

The Notified Body will carry out the EC Type Examination. If the PPE product meets the Basic Health & Safety Requirements of the Directive, the Notified Body will then issue a Certificate.
How have the requirements changed?

EN 1150 and EN 13356 were published in 1999 and 2001 respectively. There have been no amendments to either of these standards. There was, however, an agreement made in Europe that work will be carried out towards the revision of these standards.

**EN ISO 20471:2013**

EN 471 was first issued in 1994 and was revised in 2003. There was an additional amendment made in 2007. When this standard last required a mandatory review, it was decided that a further revision was needed. It would also become an International Standard (ISO). ISO 20471 was issued in 2013. As an EN ISO, it became harmonised in September 2013.

The main differences between EN ISO 20471:2013 and EN 471:2003 + A1:2007 are given below:

Class 3 garments must cover the torso and have sleeves or/and legs.

There are requirements given for the general design of garments with the types defined as follows:

- Garments covering the torso only
- Garments covering the torso and arms
- Garments covering legs
- Garments covering torso and legs
- Garments covering torso, arms and legs

**Design/Classes**

An ensemble of garments can be classified together, i.e. jacket + trousers. This must be indicated on the marking and user information.

Background material must encircle all relevant parts of the body with a minimum width of 50mm.

Two or more bands are allowed on legs, sleeves and in most cases the torso. These bands can all be used for the calculation of minimum areas.
Sleeves covering a view of a torso band must have a sleeve band or bands.

Harnesses are now excluded from the scope of EN ISO 20471, and therefore, cannot be certified to this standard.

Bib and braces can no longer meet Class 3, as they do not completely cover the torso.

**Fabrics**
The background fabrics must now meet the chromaticity and luminance after the maximum number of cleaning cycles (or if this is not stated by the manufacturer a minimum of 5 cycles).

Colour fastness to perspiration (staining) has been increased from Grade 3 to Grade 4 (both fluorescent and non-fluorescent materials).

The test method for tear strength of coated or laminate fabrics has been updated. The test is basically the same but uses larger specimens.

Tensile strength requirement on fabrics has been reduced.

Burst strength requirement on fabrics has been reduced.

Tear strength requirement on coated fabrics/laminates has been reduced.

Colour fastness to washing/dry cleaning has had the staining requirement reduced to 4 for non-fluorescent fabrics.

For fabrics other than coated/laminates, the water vapour resistance must be less than 5 m²Pa/W. If this is exceeded, then the thermal resistance must be tested and the water vapour permeability index (WPI) determined. The WPI must be ≥ 0.15. Tabards and waistcoats are exempt from this requirement.

Contrast (non-fluorescent) outer materials must now meet the mechanical property requirements.

Colour fastness to hot pressing is only required in the dry condition only.

**Retro-reflective material**
Level 1 has been removed.

Retro-reflective material must now be tested after a stated number of wash/dry cycles rather than the maximum number of wash cycles with one dry at the end.
If the maximum number of wash cycles is not stated by the manufacturer, the retro-reflective material must be tested after a minimum of 5 cycles.

The wash temperature can now be specified by the manufacturer.

**Labelling**

The vest pictogram has changed; it now shows ‘braces’. The square used in EN 471 is no longer required. See below:

There is only one number shown next to the pictogram for the minimum areas as there is now only one level of retro-reflective material.

The maximum number of wash cycles must be printed on the label but only if this is declared on the user information. If it does appear, it must be next to the care instructions.

**User Information**

The maximum number of cleaning cycles must appear if it is declared.

If a maximum number of cleaning cycles is declared, a statement must be included regarding lifetime, as follows: “The stated maximum number of cleaning cycles is not the only factor related to the lifetime of the garment. The lifetime will also depend on usage, care storage, etc.”

If the background and retroreflective materials have only been tested after the minimum 5 cleaning cycles, this shall be detailed in the user instructions.

**GO/RT 3279 Issue 8 High Visibility Clothing**

“GO/RT 3279 Issue 8 High Visibility Clothing” was published in December 2013 and replaces Issue 7 dated September 2012.

The main differences between GO/RT 3279 Issue 7:2012 and GO/RT 3279 Issue 8:2013 are given below:

- All references to EN 471:2003 + A1:2007 have been change to EN ISO 20471:013.
- High visibility clothing shall meet Class 2 for minimum areas (with the exception of the mini vest for which requirements are specified).
How Intertek can help

Intertek is a leading global provider of compliance services to manufacturers of Personal Protective Equipment. As well as evaluating footwear, gloves and protective clothing, we also conduct testing on high visibility clothing and work in partnership with manufacturers to meet the legal requirements of their target markets. Our team is fast, knowledgeable and care about your project.

For more information on specific testing and certification information, please contact Intertek at 1 855 LAB FIND (522 3463), email consumergoods@intertek.com, or visit our website at www.intertek.com.

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