

Protective clothing - High visibility clothing

Reference number: EN 471

Status: European standard - product specification (high visibility).

Scope: This standard specifies the requirements for protective clothing aiming to signal the presence of the wearer visually in daylight as well as under illumination by headlights of cars. These requirements cover the area of materials used, their colour and retro-reflection.

Comment:

- fluorescent material: material that re-emits optical radiation at wavelengths longer than absorbed; this material is considered to be the background material of the high visibility clothing.
- retro-reflective material: material that reflects the light emitted by a light source back to that source.
- combined material: material with combined fluorescent and retro-reflective properties

CONTENT

Requirement:

Background Surface, retro-reflective and combined material:

High visibility clothing is categorized in 3 classes on basis of the quantity of materials used (X):

- Class 1:
background material: $\geq 0,14 \text{ m}^2$
retro-reflective material: $\geq 0,10 \text{ m}^2$
or
combined material: $\geq 0,20 \text{ m}^2$
- Class 2:
background material: $\geq 0,5 \text{ m}^2$
retro-reflective material: $\geq 0,13 \text{ m}^2$
- Class 3:
background material: $\geq 0,8 \text{ m}^2$
retro-reflective material: $\geq 0,2 \text{ m}^2$

High visibility clothing is categorized in 2 classes based on the quality of the used retro-reflective material (Y).

Clothing design:

Comment: Design requirements of EN 471 are very complicated; see the full text of the standard for details

- the background material shall encircle the torso, sleeves and trouser legs horizontally, i.e. this material shall be used for both front and back
- retro-reflective bands shall be at least 50 mm large (30 mm for safety harnesses)
- closure systems must not interrupt the background or retro-reflective material by more than 50 mm
- number and position of retro-reflective bands
 - coveralls: 2 horizontal bands around the torso; 2 bands on the sleeves on the same height as on the torso; 2 bands on the trouser legs.
 - jackets, waistcoats, tabards
 - 2 horizontal bands around the torso and around the sleeves at the same height .
 - or 2 horizontal bands around the torso and around the sleeves at the same height plus a vertical band over each shoulder, reaching to the uppermost torso band.
 - or 1 horizontal band around the torso plus a vertical band over each shoulder; 2 horizontal bands around the sleeves
 - bib and brace trousers and waistband trousers: 2 horizontal bands around the trouser legs

Colours :

Chromatic and the luminance factor are specified for the following 3 colours:

- fluorescent yellow
- fluorescent orange-red
- fluorescent red

No other colours are allowed as background material. The requirement shall also be met after an artificial weathering test (UV radiation).

Colour fastness shall also be guaranteed against rubbing, perspiration, washing, dry cleaning, hot pressing and bleaching.

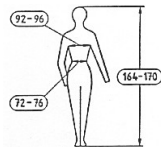
Other requirements for the background material :

- dimensional stability (≤ 3 % shrinkage)
- mechanical strength
- Impermeability to water
- water vapour permeability

Requirements for retro-reflective material:

- New materials shall meet minimum reflectance criteria (these criteria are different for retro-reflective materials and for combined materials; retro-reflective materials are divided into 2 quality classes).
- Minimum criteria are also set after a number of test exposures: abrasion, flexing, folding at low temperature, temperature variation, washing, dry cleaning, influence of rainfall.

Size designation:



- a pictogram is used
- the indications on the pictogram relate to body dimensions not to dimensions of the clothing; they mean that the garment can be used by a person with the body dimensions given on the label
- Information to be given:
 - for jackets: body height and chest circumference.
 - for trousers: body height and waist circumference.
 - intervals are normally 4 cm for circumferences and 6 cm for body height; intervals can be combined.

Marking:

On a clearly visible and readable label lasting the foreseeable number of cleaning cycles

It contents :

- the CE marking (as appropriate for PPE category II or III).
- cleaning and maintenance symbols.
- name or logo of the manufacturer.
- type of the garment (manufacturer's reference).
- size designation (pictogram)
- reference to EN 471
- "high visibility jacket" pictogram
- Classes:
 - based on area of material (X)
 - based on of reflective material quality(Y)

Information for the user:

to be provided by the manufacturer in at least the official language(s) of the country of use; precise and understandable for the user.

contents:

- name and address of manufacturer or his authorized representative.
- name and reference of the product.
- reference to the relevant product standard.
- explanation on pictogram and performance levels obtained.
- instructions for use, e.g. safety checks before use, specific area of use and limitations of use (time of wear in specific conditions).
- storage and maintenance instructions, instructions for cleaning and disinfection, etc.
- packaging instructions for transport.

Pictogram: