



Selection and Use of High Visibility Clothing for Professional Use

There are two different Europe-wide standards for the testing and certification of high visibility clothing but both require a combination of fluorescent material for daytime visibility and retroreflective material for night-time and low-light conditions.

BS EN 1150 covers garments for purely private use, but BS EN 471 sets more demanding minimum standards of visual performance and durability needed for high visibility clothing worn in the course of a trade or profession and is mandatory. Compliance with BS EN 471 ensures that the wearer is as visible as possible against varying backgrounds in ALL weather and lighting conditions (bright daylight as well as rain, mist, dusk and night-time) and that a garment's conspicuity and structural integrity are retained over a reasonable service life in a workwear application.

The marketing and supply of high visibility clothing for occupational use is covered by EU Directive 89/686/EEC, which was transposed into UK law by the Personal Protective Equipment (EC Directive) Regulations 2002, and PPE provided for such use MUST comply with its requirements. BS EN 471 covers high visibility jackets, waistcoats, shirts, coats, tabards, trousers and coveralls (together with harnesses) and the selection of appropriate garments that comply with this standard will ensure compliance with the Directive and UK Regulations.

BS EN 471 provides for three classes of basic design (Classes 1, 2 and 3) and two levels of retroreflectivity (Level 1 and Level 2) from which the buyer/user may select those appropriate to the risks in a particular occupational environment. Class 3 incorporates the largest areas of fluorescent and reflective materials and Level 2 gives the highest reflectivity, so a garment to Class 3 /Level 2 offers the highest overall level of protection that can be specified under the Standard.

There will be relatively few applications in the UK for which Level 1 reflectivity is acceptable as all instances where the assessed risk includes road traffic are required by the Department for Transport (and the Highways Agency) to be Level 2.

The Class of a garment is to a large extent determined by its type and the maximum practicable areas of fluorescent and reflective materials that can be incorporated. Class 3 will therefore generally only be achieved by sleeved jackets and coveralls whilst sleeveless waistcoats, shirts and tabards are unlikely to exceed Class 2. Trousers and overtrousers on their own will almost certainly be Class 1, but when worn with a Class 3 jacket the combined outfit would of course comply with the requirements of Class 3.

The selection of the appropriate Class or Level of performance for a particular application is for the wearer/provider to determine by their own risk assessment, but in some industries there will be established codes of practice that give guidance on the selection of high visibility clothing. For example the Code of Practice for Safety at Street Works and Road Works specifies Class 3 jackets with sleeves for use on dual carriageways with speed limits above 50mph and Class 2 for all other roads, all with yellow fluorescent material and Level 2 reflectivity.

Hitherto the use of trousers or overtrousers has generally been based on personal comfort and weather protection but there are signs that this is changing. Network Rail has recently introduced an "all orange" directive for PPE which means that high visibility trousers will be worn as standard in combination with jackets or waistcoats. The reasoning being that a worker wearing a waistcoat

only and who is bent down and facing away from an approaching train/vehicle, has very little of his high visibility waistcoat visible.

There is a current difficulty in meeting the Class 3 jacket design requirements for small wearers (usually women). This difficulty lies in reconciling the minimum area of fluorescent material required (0.8 m²) with the maximum practicable area that can be incorporated in such a small garment. In these cases the risks of wearing an oversized garment will need to be balanced against the risk of using a garment offering a lower class of conspicuity (Class 2). This anomaly has yet to be addressed by the European Technical Committee responsible for BS EN 471.

HOW TO ASSESS A GARMENT'S COMPLIANCE TO BS EN 471

The key thing to look for is the product label. To comply with the standard a garment **MUST** have a permanent label that states the following:

- That the garment complies to BS EN 471
- The design Class of the garment
- The reflectivity Level of the garment
- The name of the manufacturer (or the manufacturer's agent)
- The type or model code for the garment
- The size of the garment (given as the height/chest size of the wearer not just Small, Medium or Large etc)
- Basic washing/dry cleaning instructions (and the number of cycles through which the garment will retain compliant fluorescent/reflective performance)

IF A GARMENT IS NOT LABELLED IN THIS WAY, IT DOES NOT COMPLY TO THE STANDARD IRRESPECTIVE OF ANY OTHER CLAIMS THAT MAY BE MADE.

In addition the standard requires that a garment **MUST** be supplied with an information sheet which includes detailed instructions for its use, washing/cleaning, care and storage.

The UK Regulations further require that any garment complying with the Standard must also be CE marked

Unfortunately, despite the best endeavours of Trading Standards, there has been an increasing number of instances of clothing being falsely labelled as complying to the Standard when it does not. In order to achieve compliance a garment must have been type tested and approved under BS EN 471 by the British Standards Institute or an equivalent Notified Body (an independent laboratory authorised to test under the EEC Directive on Personal Protective Equipment). Buyers and specifiers who are offered garments as compliant, can and should therefore request copies of the relevant test certification (and check that it relates to the current product) if they are in any doubt as to a supplier's claims.

It is important to understand that retroreflective products work by reflecting light back towards the light source (the headlights of an approaching vehicle driver) so, to the person buying or wearing a reflective garment, the retroreflective bands will usually just appear a dull silver/grey irrespective of whether their reflectivity is excellent or non-existent. The wearer may therefore believe that he is clearly visible to traffic at night when in fact he is not and instances have been found where the reflectivity of a "high visibility" garment has been no better than white tissue paper!

It is therefore beyond the expertise of most buyers to check attributes such as retroreflectivity and durability and it is impossible to tell from a superficial inspection whether the garment will:

- Reflect brightly enough at night and in poor lighting.
- Suffer a serious reduction in reflectivity in rain, when the fabric it is wet
- Fade and lose its fluorescence after a short time in sunlight or after washing
- Suffer cracking of the plastic materials or loss of reflective glass beads when folded/creased repeatedly or at low temperatures

Cases of false labelling are therefore difficult to detect but there are some basic physical aspects of a garment's design that can be checked against the label claims by a quick visual inspection and which are needed to comply with ANY class or level in the Standard.

- The total visible areas fluorescent material MUST be roughly equal on the front and back of a garment and MUST be yellow, orange/red or red (or a combination of these)
- Garments covering the upper body MUST have one or two reflective bands encircling the torso (coveralls must have two)
- Where a single torso band is used, there MUST also be a band over each shoulder joining the torso band front and back.
- Garments with sleeves MUST also have two reflective bands encircling each sleeve
- Trousers and overalls MUST have two reflective bands encircling each leg.
- No reflective band can be less than 50mm wide
- Pairs of reflective bands MUST be at least 50mm apart
- Reflective bands MUST be inset at least 50mm from the bottom edge of a jacket etc., sleeve or leg.
- No reflective band can have a gap in it more than 50mm wide (for fastenings etc) and the total gaps in a single band cannot exceed 100mm for the torso and 50mm for legs and sleeves.

For the lowest class (Class 1) the minimum total visible areas of fluorescent and reflective material are 0.14m² and 0.1m² respectively, which are equivalent to about 2¼ and 1½ sheets of A4 paper. For Class 2 these minimum areas are 0.5m² and 0.13m² (about 8 and 2 sheets of A4 paper) and for Class 3 they are 0.8m² and 0.2m² (about 12¾ and 3¼ sheets of A4 paper). It will therefore be appreciated that there is a big difference between the levels of protection offered by the three classes.

Note: A garment may have smaller pieces of fluorescent or reflective material than specified above (forming piping, logos and pull tabs etc.) but these cannot be included in the minimum total material areas required by the standard. There are slightly different requirements for combination materials that are both fluorescent and reflective.

The correct selection of high visibility garments is only the first step in ensuring effective personal protection. Once in service those garments must be properly cared for and regularly inspected to ensure that they continue to offer the protection that they were designed to give. Washing/dry cleaning instructions will be included with each compliant garment and must be followed. The label will also state how many washing/cleaning cycles a garment will withstand without its visual performance becoming impaired. But, as high visibility workwear is often used in harsh conditions and subject to abrasion and impact, it should be examined regularly for obvious defects and discarded if for example a significant area of the reflective bands has been damaged. However good the product, it will not last forever and the sight of a worker in a waistcoat that has long ago lost its fluorescent qualities or with tar/paint staining obliterating a large area of the reflective material is still too common!

The information above is only a guide to some of the simpler requirements of the standard and full copies of BS EN 471 can be purchased from BSI at www.bsi-global.com/en/Shop/. Also advice on compliance is available to purchasing officers and Trading Standards from the Retroreflective Equipment Manufacturers Association (REMA) on 07921 365333 and info@rema.org.uk