



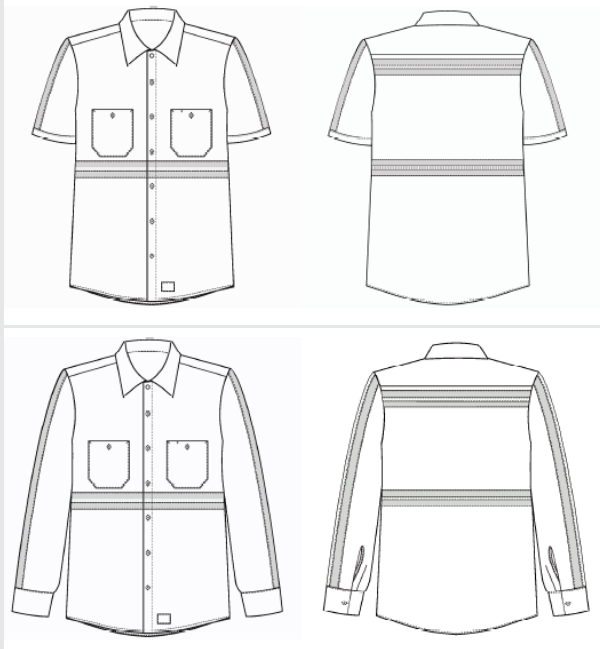
## TRSA Enhanced-Visibility Industry Guidelines

The use of high-visibility clothing can be cost-prohibitive, which is why it often isn't used in settings where it would be beneficial, but is not legally required. TRSA created these enhanced-visibility industry guidelines to help companies specify uniforms which provide additional visibility for employees needing clothing in workplaces where compliant high visibility PPE isn't mandatory, but where enhanced visibility would be advantageous. These enhanced-visibility industry guidelines will provide direction on how to improve both daytime and nighttime visibility of employees by describing clothing in terms of color and suggested placement of retroreflective striping.

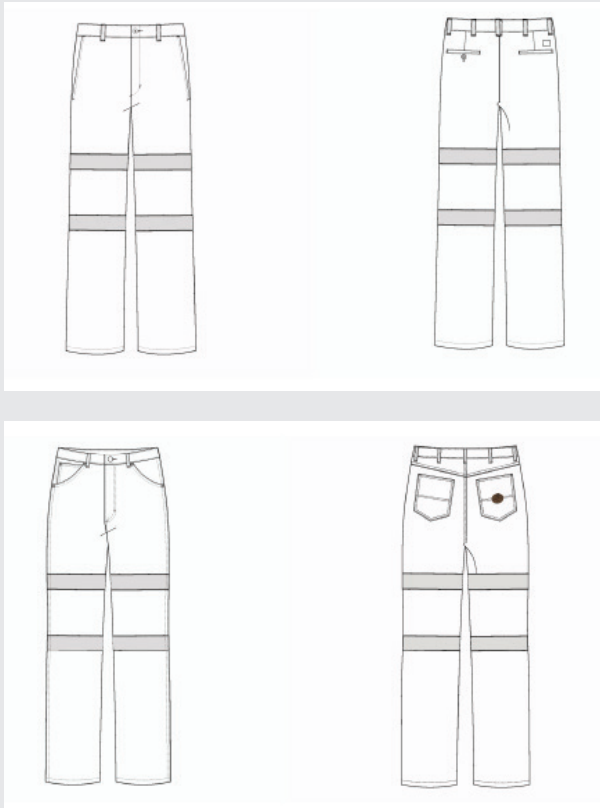
Clothing providing enhanced visibility gives employees additional conspicuity that may not be required by law, but would nonetheless enhance worker safety. Workplace environments that require employees to work around low speed heavy equipment in low light or among obstructions are well-suited for clothing which provides an extra measure of visibility for employees. Some good examples include factory floors, manufacturing facilities, landfills and mines.

## Enhanced-Vis Placement Specs.

### Shirts (example):



### Pants/Trousers (example):



Garments described as providing enhanced visibility generally provide some measure of daytime visibility (perhaps by being fluorescent in color) and/or nighttime visibility (through the use of retroreflective striping) but at levels below those required by ANSI/ISEA 107-2010, the American National Standard for High-Visibility Safety Apparel and Headwear. Enhanced-visibility garments work best if their high visibility materials conform to ANSI/ISEA 107 photometric requirements.

**Enhanced visibility clothing is NOT a substitute for compliant high visibility clothing which is required in areas where workers are exposed to roadway hazards, as regulated by the Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration, 2009. For circumstances where high visibility work wear is required, refer to the MUTCD and ANSI/ISEA 107-2010 for applicable high visibility standard requirements.**

## Enhanced Visibility Garment Use Considerations

TRSA's industry guidelines on enhanced visibility help identify what employees can wear to help safeguard them in situations where enhanced visibility is appropriate. A number of factors should be considered when evaluating clothing for characteristics which would enhance visibility of a worker effectively in their work environment. These elements include color of background material, placement of retroreflective trim, as well as care and maintenance requirements of the garment dependent on the types and levels of soiling encountered.

### Color of clothing/daytime visibility.

Clothing whose color is in stark contrast to the background environment will promote the daytime visibility of a person or object. Fluorescent colors (typically, green, yellow, orange or pink) are commonly used to provide additional luminance contrast but they may not be the best choice when the working environment is lit by sources that do not emit any UV wavelengths.

### Retroreflective trim/nighttime visibility.

The use of retroreflective trim on clothing permits an individual to be more conspicuous when light illuminates them in nighttime conditions. In addition to using an effective amount of trim, proper placement of the trim is essential to distinguish between a human form and an inanimate object such as a construction barrel or safety rail. Application of striping in a pattern that encircles the torso or limbs provides 360° visibility of the wearer. Definition of the human form can be achieved by placing striping over the shoulders as well

as near the wrists and ankles where motion is accentuated. Flame resistant varieties of retroreflective striping are available and should be used preferentially on flame resistant garments.

Wider widths of striping will provide greater visibility, but, at a minimum, bands of retroreflective material used on a garment should be ½" in wide, with ¾" or 1" strongly preferred. Industry professionals suggest that each garment in an ensemble (top & bottom) should have at least 70in<sup>2</sup> of total tape width including conspicuity and retroreflective material. Twice this amount, 140in<sup>2</sup> would be appropriate and effective for a coverall using a biomotion pattern. Enhanced visibility reflective materials are recommended to have a minimum coefficient of retroreflection of 330cd/lux/m<sup>2</sup> at +5.0° entrance and 0.2° observation angles.<sup>1</sup>

**Arms.** To provide visibility from all sides and angles of viewing, bands of retroreflective trim should fully encircle the sleeve with the lowermost band placed no closer than 1" above the sleeve hem. If a second band of trim is used, it should be placed somewhere between the elbow and the shoulder. When multiple bands of trim are placed in parallel on a shirt or coverall, they should be at least 2" apart. Be cautious about placing trim too close to the cuff on long sleeved shirts to be sure the trim is not obscured when gloves or gauntlets are also worn. If trim is used in a vertical configuration, take care to compensate in the design for any ineffective viewing angles that remain.

**Shoulder Area.** The shoulder area of a garment (as defined in the ANSI/ISEA 207-2011 standard) is an area measured from the shoulder high point of a garment down 6" in the front and back. Retroreflective trim placed over the shoulder is one way to provide a wider viewable range of protection.

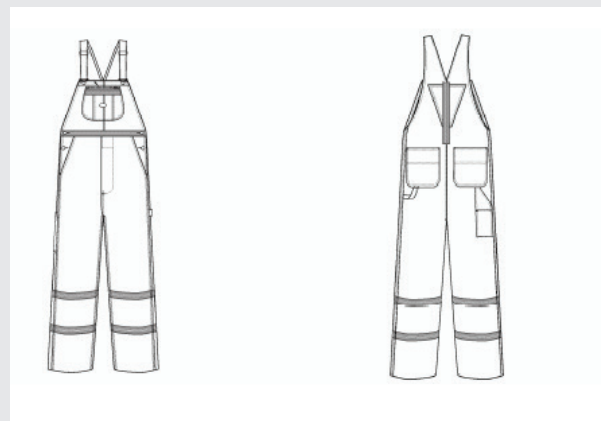
**Legs.** To provide visibility from all sides and angles of viewing, bands of retroreflective trim should fully encircle the pant leg with the lowermost band placed no closer than 2" above the hem. When multiple bands of trim are placed in parallel on a pant, they should be at least 2" apart. If trim is used in a vertical configuration, consideration should be given to compensate for viewing angles which may not be covered.

## Care and maintenance of enhanced visibility clothing.

Careful adherence to the manufacturer's recommendations for the care, cleaning and maintenance of enhanced visibility clothing will help ensure that minimum visibility levels are maintained throughout the reasonable life of the garment. Be aware of specific cleaning instructions pertinent to flame resistant garments. Dry

## Enhanced-Vis Placement Specs.

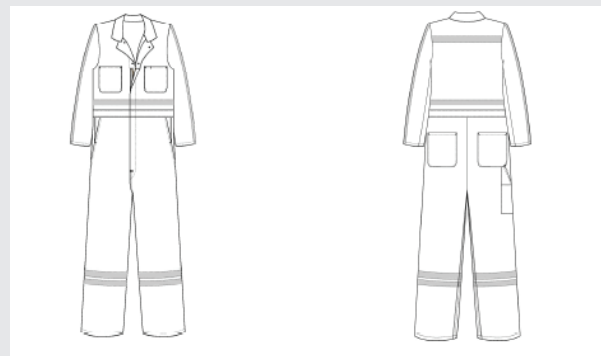
### Overalls (example):



### Jackets/Outerwear (example):



### Coveralls (example):



<sup>1</sup> 3M™ Scotchlite™ Reflective Material Product and Brand Usage Standards, p-9 Effective: January 2015 Replaces PBUS dated: October 2012.



cleaning is not recommended for some retroreflective striping. If necessary, refer to ASTM D5489-07, Standard Guide for Care Symbols for Care Instructions on Textile Products, for definition of care symbols/icons which may appear on labels.

**Garment Service Life.** The wear life of any garment is heavily dependent upon user behavior and the environment to which it is exposed; these factors and others can dictate how long a garment is serviceable. How the garment fits, how frequently it is worn, soiling levels, how it is laundered and whether it is properly repaired can all affect the service life of apparel. The Federal Highway Administration published research in 2006 suggesting that the service life of high-visibility garments is between 6 months and 3 years depending on many factors, but even this range can vary (as cited in ANSI/ISEA 107-2010, Appendix E).

It is the shared responsibility of the wearer, employer and issuing entity to monitor changes in the garment due to age and wear. A garment is in need of repair if fabric or seams are ripped or torn, if closures no longer function or if retroreflective trim is missing or loose. Garments should be considered for retirement if they are badly faded, permanently stained (especially those made of fluorescent background material), severely abraded or heavily repaired.

Periodically, the continued performance of retroreflective trim should be evaluated. One simple method is to hold a lighted flashlight at the temple and shine light on a garment with trim at a moderate distance (10m or greater). The trim should reflect light brightly back to the observer. If trim does not reflect or if the reflection is dim, the trim should be replaced. Do not rely solely on the visual appearance of the garment to determine the effectiveness of the retroreflective trim since deterioration in performance can occur in some cases without obvious visible evidence.

## Other considerations

Employees are more likely to wear garments that fit comfortably. Enhanced visibility safety apparel should be designed with the comfort of the wearer in mind while simultaneously providing the additional protection afforded by the fluorescence and/or retroreflective characteristics of the garment. Correct garment fit is essential to ensure that the retroreflective striping remains properly positioned and visible during work activities.

## Garment Labeling

Garments should contain labels which are easy to read and durable to laundering. In addition to meeting FTC requirements for disclosure of fiber content, country of origin, care instructions, etc., garment labels should specify:

- Name or trademark of the garment manufacturer
- Model or style number of product
- Garment size (except for headwear)

Brightly colored garments or garments with high retroreflectivity levels, and proper amounts and placement of reflective materials, are required to effectively enhance visibility. While the use of bright colored garments or garments with reflective materials enhance visibility, no bright colored garments or garments with reflective material can guarantee absolute visibility, particularly in adverse weather conditions. Performance will vary based upon actual use, exposure conditions and maintenance of the garments. Employers recommending enhanced visibility garments to customers should make sure that the products recommended meet the specific requirements of each customer's workplace.