

High Visibility Apparel in Work Zones



Characteristics of High-Visibility Safety Apparel

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Introduction

Working near traffic and around construction equipment can be dangerous, and staying safe is of the utmost importance. The purpose of this field guide is to raise awareness of the types and characteristics of high-visibility safety apparel for the protection of workers, with the ultimate goal of decreasing worker fatalities and injuries.

This field guide provides contractors, field personnel, inspectors, and engineers with guidance on selecting high-visibility safety apparel. This guide outlines different apparel and the appropriate situations where each type of apparel is required or recommended by National standards/guidelines. When selecting the appropriate apparel, you should also check State and local requirements.

The American National Standards Institute/International Safety Equipment Association (ANSI/ISEA) provides the industry standard¹ on use of high-visibility safety apparel. These standards specify minimum areas of retroreflective material, location of that material, and special features of the apparel. The 2003 edition of the *Manual on Uniform Traffic Control Devices*² (MUTCD) provides national

¹ American National Standards Institute/International Safety Equipment Association, ANSI/ISEA 107-2004, “American National Standard for High-Visibility Safety Apparel and Headwear,” Arlington, VA: 2004.

² U.S. Department of Transportation, Federal Highway Administration. *Manual on Uniform Traffic Control Devices*, Washington, D.C.: 2003.

guidance for all States and refers to the ANSI/ISEA standard on the use of high-visibility safety apparel.

“All workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel meeting the requirements of ISEA ‘American National Standard for High-Visibility Safety Apparel’...and labeled as ANSI 107-1999 standard performance for Class 1, 2, or 3 risk exposure.”—MUTCD 6D.03

The Federal Highway Administration went a step further and stressed the importance of safe practices for workers when it developed the Worker Visibility Final Rule in November 2006.³

“All workers within the right-of-way (ROW) of a Federal-aid highway who are exposed either to traffic (vehicles using the highway for purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel.”—Worker Visibility Final Rule-23 CFR 634-Worker Safety

What is High-Visibility Safety Apparel?

According to the Worker Visibility Rule, high-visibility safety apparel is defined as “*personal protective safety clothing that is intended to provide conspicuity [to make readily visible] during both*

³ Code of Federal Regulations, Title 23, Part 634, Worker Visibility Final Rule (FHWA-2005-23200).

daytime and nighttime usage, and that meets the Performance Class 2 or 3 requirements of the ANSI/ ISEA 107–2004 publication entitled ‘American National Standard for High-Visibility Safety Apparel and Headwear.’” Although ANSI/ISEA 107-1999 was available for referencing in the 2003 MUTCD Sections 6D.03 and 6E.02, many States now refer to 107-2004 since it is an updated version of the ANSI/ ISEA standard.

The use of high-visibility safety apparel allows motorists and equipment operators to see workers distinctly, reducing the risk of worker injury or fatality.

MUTCD 6D.03 requires that selection of the apparel be made by a competent person designated by the employer.

Apparel Types

A piece of apparel can consist of three parts: background material, retroreflective material, and combined-performance material. The background of the apparel is a fluorescent colored base material that is intended to be highly visible. The retroreflective material is the band of material on the apparel intended to reflect light back to the source when light shines on the apparel. The combined-performance material is a combination of retroreflective and fluorescent material that can be counted toward the minimum area requirements for background material. See figure below for

an example of each type of material. The color of the background material and the combined-performance material can either be fluorescent yellow-green or fluorescent orange-red.



There are five different types of apparel: Performance Class 1, Performance Class 2, Performance Class 3, Performance Class E, and Public Safety Apparel. Only Performance Class 2 apparel, Performance Class 3 apparel, and Performance Class 3 ensembles are acceptable for workers (public safety employees may also wear public safety apparel) to wear within the right-of-way (ROW) of Federal-aid highways.

Performance Class 1

Performance Class I apparel is **not** acceptable to wear within the ROW under the FHWA Worker Visibility Final Rule because it provides a minimal amount of required material to differentiate the wearer from the work environment, which makes them less visible. This type of apparel tends to blend in with the work environment instead of drawing attention to workers. The minimum specifications for this type of apparel are:

- Background material equals 217 in.²
- Retroreflective or combined performance material with background material equals 155 in.²
- Combined-performance material used without background material equals 310 in.²



Unacceptable Apparel
Examples

Performance Class 2

Performance Class 2 provides superior visibility for wearers through additional coverage of the torso and is more visible than Performance Class 1. This type of apparel is required as a minimum for all workers within the ROW of a Federal-aid highway who are exposed either to traffic or to construction equipment within the work area. The minimum specifications for this type of apparel are:

- Background material equals 755 in.²
- Retroreflective or combined performance material with background material equals 201 in.²

Typical Factors or Characteristics for Workers Wearing Performance Class 2

- Daytime activities.
- Working off the roadway.
- Physical barrier between worker and traffic.
- Lower speed roadways.

Examples of Work Activities Requiring a Minimum of Performance Class 2 Apparel

- Mowing.
- Inspection.
- Maintenance.
- Road signage installation.
- Surveying.
- Utility operations.
- Toll collection.
- Incident response.
- Volunteer work (Adopt-a-Highway).
- News media coverage (covering incident management).

Examples of Performance Class 2 Apparel



Michigan DOT Performance
Class 2 Apparel



Washington DOT
Performance Class 2 Apparel

Performance Class 3

Performance Class 3 apparel offers the greatest worker visibility in both complex backgrounds and through a full range of body movements. This type of apparel should be worn when conditions include highly congested areas, complex lane shifts, or complex work zones. Visibility for Class 3 apparel is enhanced beyond Performance Class 2 by the addition of background and reflective materials to the arms and/or legs. Performance Class 3 apparel has to have either sleeves or trousers. The minimum specifications for this type of apparel are:

- Background material equals 1,240 in.²
- Retroreflective or combined performance material with background material equals 310 in.²

Typical Factors or Characteristics for Workers Wearing Performance Class 3

- Nighttime.
- No physical barrier.
- Work on roadway.
- High speed roadways.
- Urban areas.
- High-crash areas.



**Example of Performance
Class 3 Apparel**

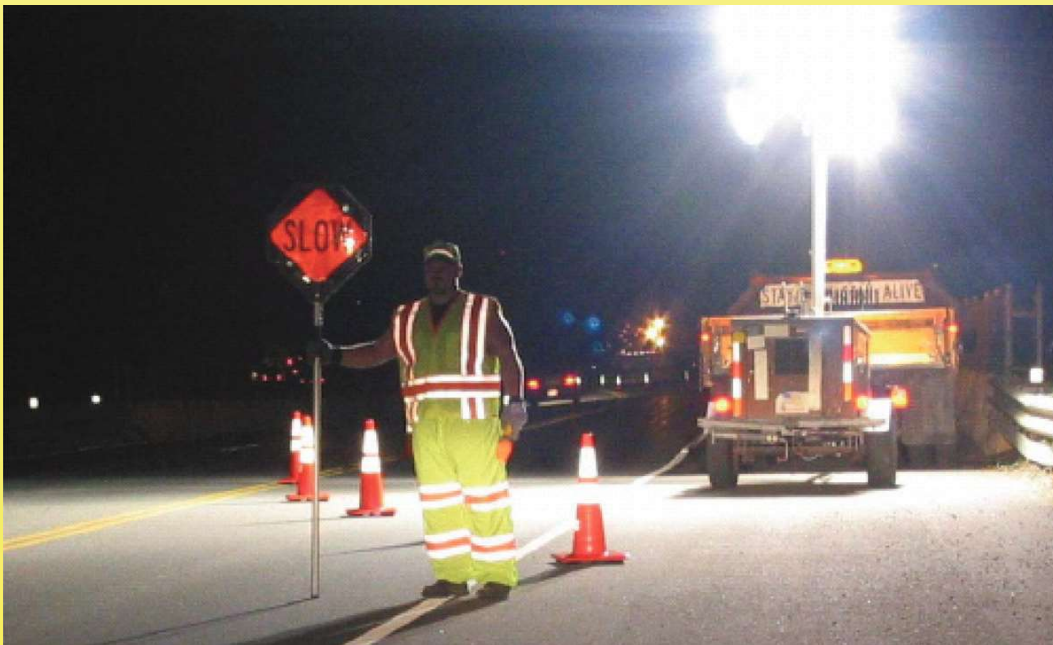
Examples of Work Activities Requiring a Minimum of Performance Class 3 Apparel

- Flagging operations.
- Temporary traffic control setup and removal.
- Positive protection setup and removal.
- Construction.
- Incident response in emergency response particularly at night.
- Emergency utility crews dispatched at night.

What is a Performance Class 3 Ensemble?

A combination of Performance Class 2 with Performance Class E apparel is considered a Performance Class 3 ensemble. An ensemble is a combination of apparel; for example, wearing a Performance Class 2 vest combined with Performance Class E trousers. Therefore, a Performance Class 3 ensemble can consist of one of the following:

1. A combination of a Performance Class 2 vest and Performance Class E trousers.
2. A combination of a Performance Class 2 vest and Performance Class E shorts.



**Example of Performance Class 3 Ensemble
(Performance Class 2 Vest and Performance Class E Trousers)**

The design of Performance Class 3 apparel allows workers to be easily seen through a full range of body motions at a minimum of ¼ mile (1,280 feet). Performance Class 3 apparel is worn typically when workers must focus all their attention on their work and not traffic.

Performance Class E Apparel

Performance Class E apparel, which take the form of either waistband trousers or shorts, is not intended to be worn without Performance Class 2 or 3 apparel.⁴ When worn with Performance Class 2 or 3 apparel, the overall classification for the ensemble will be classified as a Performance Class 3 ensemble. The specifications for this type of apparel are:

- Background material equals 465 in.²
- Retroreflective or combined performance material with background material equals 108 in.²

⁴ ANSI/ISEA 107-2004.

Public Safety Apparel⁵

This is apparel that can be utilized by fire service, emergency medical service (EMS), and law enforcement personnel in response to situations near and on the roadway. These types of apparel provide the user with features including access to belt-mounted equipment and/or tear away shoulders to allow the vest to tear away from the body if the wearer is stuck. ANSI/ISEA 207-2006, “American National Standard for High-Visibility Public Safety Vests,” covers apparel standards for public safety personnel working in the roadway—like fire service, EMS, and law enforcement personnel. Public safety



Example of Public Safety Apparel

⁵ ANSI/ISEA 207-2006 (2006). “American National Standard for High-Visibility Safety Apparel and Headwear.”

apparel is designed to provide visibility to the user in hazardous situations under any light conditions by day and under illumination by vehicle headlights in the dark. This type of apparel can include optional features like pockets, panels, public safety official identification (see figure), or a tear-away feature to make the apparel more useable in the various public safety positions.

The minimum areas of visible material are 450 in² for background material and 201 in² for retroreflective or combined-performance material with background material. This apparel is typically identified with an identification panel and/or trim incorporated into the vest that is colored red for fire service, blue for law enforcement, or green for EMS.⁶

How to Select the Appropriate Type of Apparel

There are several important factors to consider when making the final hazard and safety assessments that will help you determine the most appropriate type of apparel for your situation. The first consideration is the National, State, and local standards and regulations. The National standard states that all workers within the right-of-way of a Federal-aid highway who are exposed either to traffic or to construction equipment shall wear high-visibility safety apparel that meets Performance Class 2 or 3

⁶ ANSI/ISEA 207-2006 (2006). "American National Standard for High-Visibility Public Safety Vests."

of the ANSI/ISEA 107-2004. Check your State and local standards on the appropriate use of apparel, as they may vary in your area. If State and local standards are available, they will take precedence over the Federal standards, since Federal standards are minimum requirements.

A key to selecting the right apparel is to consider which will offer optimum visibility with comfort in daytime, low-light, and nighttime conditions in a variety of work environments. Another important consideration is apparel color. The chosen color needs to contrast with the work environment so that the worker can be easily seen. The apparel helps identify the wearer as a person and allows the worker to stand out within the work zone. Another factor relative to visibility is weather. Workers and supervisors should be aware of changing weather and choose appropriate apparel so that workers are visible in both clear and rainy conditions.

The next consideration to be taken into account is the site-specific characteristics. This would include such factors as:

- Sight or stopping distances—allowing traffic the appropriate amount of time and distance to recognize a worker.
- Constrained work zones that have limited buffer space available in the temporary traffic control zone.

- Proximity to traffic.
- Traffic speed and volume.

The next thing to consider when selecting apparel is the specific needs of workers. These needs are based on the type of job the worker is performing and the site-specific conditions. In selecting the appropriate apparel, consideration needs to be given to worker comfort during job performance. For example, the worker would struggle to perform his duties if he were wearing a long sleeved Class 3 vest while asphalt paving during the middle of summer in a hot climate.

Work Zone Visibility Tips

1. When selecting appropriate high-visibility safety apparel, be sure to check and abide by your State and local requirements.
2. Always wear high-visibility safety apparel when working around traffic to be as visible as possible.
3. The MUTCD recommends Performance Class 3 apparel for nighttime flagging even though illumination of the flagging station is required for nighttime work.
4. Performance Class 2 vest combined with retroreflective Class E trousers/shorts is considered a Performance Class 3 ensemble.

5. Inspect apparel routinely to ensure apparel has not become faded, torn, dirty, soiled, worn, or defaced. Apparel that is worn on a daily basis has a service life expectancy of approximately 6 months, although apparel that is not worn on a daily basis may have a useful service life of up to 3 years. (See brochure *High-Visibility Safety Apparel in Highway Work Zones—When does my high-visibility apparel no longer protect me and need to be replaced?* The brochure can be found at www.atssa.com).
6. Read your apparel's label to confirm your apparel is marked with the appropriate ANSI/ISEA Performance Class.⁷

⁷ ANSI/ISEA 107-2004.

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This material is based upon work supported by the Federal Highway Administration under Grant Agreement No. DTFH61-06-G-00004.

“Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the Federal Highway Administration.”



Special thanks to Michigan Department of Transportation, the Washington Department of Transportation, and Ron Moore of the City of McKinney Fire Department for providing pictures for this product.