



# Memorandum

Subject: **ACTION:** Clarifying Guidance on  
Application of Daytime Luminance  
Factors in 23 CFR 655

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**Purpose:**

The purpose of this memorandum is to provide clarifying guidance regarding the application of daytime luminance factors in 23 CFR, appendix to Part 655, Subpart F. Since this section of the CFR was updated in 2002, newer sign sheeting materials have become available that are not listed in one of the tables. This memo provides guidance on how to address application of Table 1A for Types IX and XI white sheeting to ensure the broadest competition for quality sign sheeting materials on Federal-aid projects.

**Background:**

While the FHWA Color Tolerance Charts available at FHWA Office of Operations are still allowed to be used for verification of sign sheeting color per 23 CFR 655.603(c), most agencies and companies use the alternate method of determining the color of retroreflective sign materials and pavement marking materials, as found in the appendix to Subpart F. One of the color factors, daytime luminance, which is specified in Table 1A, includes factors based on specific sheeting types.

**Action:**

Until Table 1A is updated to address the new sign sheeting materials available, it is acceptable to apply the minimum daytime luminance value ( $Y\% \geq 27$ ) for white retroreflective sign sheeting material provided in the current ASTM D4956 or AASHTO M268, Standard Specification for Retroreflective Sheeting for Traffic Control.

If an agency chooses to apply the AASHTO standard on Federal-aid projects, it is recommended the optional higher minimum luminance value ( $Y\% \geq 40$ ) not be used because it would unnecessarily restrict competition. Please share this information with your respective state department of transportation or federal lands management agency.

Attachment

## Attachment

Table 1A establishes minimum and maximum daytime luminance factors for traffic sign retroreflective sheeting materials based on sheeting types specified in ASTM D4956. Currently, ASTM Type IX and XI sheeting are not included in Table 1A. At least two U.S. sign sheeting products currently meet each of the ASTM Type IX and XI specifications.

Both ASTM and AASHTO have sign sheeting specifications that include daytime luminance factors, and both have been updated to allow for new sheeting materials. In both specifications, the minimum daytime luminance for beaded and prismatic sheeting materials was consolidated (with the exception of ASTM Type V). The following table shows the current factors in each of the specifications.

Daytime Luminance Factors for White Sheeting (excluding Type V = metalized materials)			
	Minimum	*Minimum	Maximum
ASTM D4956-11	27		-
AASHTO M268	27	40	-
23 CFR Subpart F (Types I, II, III, and IV)	27		-
23 CFR Subpart F (Types IV, VII, and VIII)	40		-

\*Minimum values for higher daytime conspicuity are supplementary requirements that apply when specified by the end user.

Recent research (currently in final review) shows that under typical driver sign viewing geometry there are no significant differences in field measurements of daytime luminance between Types VIII, IX, and XI. Similarly, observers in the testing perceived similar daytime brightness levels for Types VIII, IX and XI.

### **Questions and Answers:**

Q: What is daytime luminance?

A: Simply put, it is a measure of the daytime brightness of a sign sheeting. In the case of white sheeting, when you measure the brightness, you are effectively measuring how white it is. Therefore, a white sheeting material with a lower luminance value may appear slightly silver or gray under daytime conditions.

Q: Why would we allow a lower value than was specified in the past?

A: Some newer sheeting types increase retroreflection (the reflected light from headlamps) so much that they are not capable of providing the same high levels of luminance (the reflected light from daytime non-point sources) as previous designed sheeting. Because the previous factors in both the CFR and the older ASTM specifications were based primarily on the capabilities of available sign sheeting products (rather than research-defined needs of the driver), ASTM adjusted their specifications in 2009 to simplify and allow for new sheeting with greater retroreflectivity capability to meet the specification.

Q: Why is only white sheeting included in this memorandum?

A: White sheeting has higher daytime brightness than any color. Other colors may require

additional testing before FHWA is comfortable adjusting the daytime luminance factors. Luminance is more critical for darker colors and the color boxes for yellow, red, and orange are so close that the color recognition may potentially be affected. However, measurements taken on sign samples indicate that for colors other than white, all available U.S. sheeting products appear to meet the CFR requirements, even those whose product literature indicates the wider daytime luminance ranges established by the revised ASTM specifications.

Q: When will Table 1A be updated?

A: The table will be updated with the next edition of the MUTCD or as a technical correction to the CFR. The decision may depend on the outcome of the testing mentioned above or the progress of other on-going research to determine driver needs for daytime luminance.

Q: How can I access the current requirements?

A: 23 CFR 655 is linked on the MUTCD Web site: <http://mutcd.fhwa.dot.gov/res-23cfr655.htm>