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| REVIEW OF NEW SPECIFICATION OR SPECIFICATION CHANGE  | 630-50 |
| **Specification Section No.:** 630 and 715 | **Item:** Retroreflective Sheeting |
| **Originating Office:** Safety and Traffic Engineering | **By:** Matthews |
| **Date Sent For Review:** June 2, 2016 | **Date Comments Due: June 23, 2016** |
| Submit response to: STANDARDS AND SPECIFICATIONS UNIT, DIVISION OF PROJECT SUPPORT 4TH FLOOR, CDOT HEADQUARTERS |
| **Vote****/N** | **Concurrent Reviews – Others Commenting** | The attached Draft Specification is submitted for your review and comments. If not returned by Date Comments Due, the draft specification will be considered to be approved unless the Standards and Specifications Unit of the Project Development Branch [(303) 757-9474, (303) 757-9402] is advised otherwise.**REMARKS:** If these proposed modifications are approved, our unit will delete the standard special provision, Revision of Section 630, Retroreflective Sign Sheeting, and will replace it with this new standard special provision.The reason for this modified version is because Form 1215a was missing from the version which had been originally sent |
|  | **Spec Committee Members:** |  **✓** |
|  | Co-Chairman: Lacey |  |
|  | Region 1: Quirk |  |
|  | Region 1: Stratton |  |
|  | Region 2: Ferguson |  |
|  | Region 3: Necessary |  |
|  | Region 4: Boespflug |  |
|  | Region 5: Valentinelli |  |
|  | Project Development: Vacant |  |
|  | Specifications: Brinck |  |
|  | Bridge: Hasan |  |
|  | Contracts & Market Analysis: Eddy |  |
|  | Materials: Schiebel |  |
|  | Traffic Engineering: Matthews |  | REVIEWER COMMENTS:( ) Approved ( ) Disapproved ( ) ModifiedIf disapproved or modified, give reason why and show any modifications on the attached draft copy: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ Name/Signature Date |
|  | Maintenance: Weldon |  |
|  | FHWA: Feery |  |
|  | Attorney General: Milan |  |
|  |  |  |
|  | **Others:** |  |
|  | Colorado Contractors Assoc.: Moody |  |
|  |  |  |
|  | **Technical Committees:** |  |
|  | PDAC |  |
|  | Drainage Advisory Committee (DAC) |  |
|  | Water Quality Advisory Committee (WQAC) |  |

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| **COLORADO DEPARTMENT OF TRANSPORTATION****SUBMITTAL OF NEW SPECIFICATION OR SPECIFICATION CHANGE** | Log No. (Assigned by Standards and Specifications Unit)630-50 (modified) |
| TO: Standards & Specifications Unit Project Development Branch | FROM:Safety & Traffic Engineering Branch(Region, Branch or Technical Committee) |
| SPECIFICATION SECTION NO.630 and 713 | ITEMRetroreflective Sheeting | Priority Routine [x]  Fast [ ]  |
| Reason for this new or changed specification:The addition of sections 713.10(b)(1)(A) and 713.10(b)(2)(A) was done to provide the specifications necessary to support a change from orange high intensity sheeting to fluorescent orange sheeting. Fluorescent sheeting is more visible during the dawn, daytime and dusk, as well as in inclement weather. Specifying its use on drums and tubular markers, just as we already do on orange construction signs, will help make our work zones safer by enhancing the visibility of these devices.* Removed the term “Type Fluorescent” as Fluorescent is a color, not a type.
* Defined sheeting materials shall be in accordance with Section 713
* Added daytime color and nighttime retroreflectivity requirements for drums and tubular devices.
 |
| New or Revised Specification:SEE ATTACHED |
| Note: See Procedural Directive 513.1 for a description of appropriate specification development procedures. |

 **CDOT Form #1215 1/15**

REVISION OF SECTIONS 630 AND 713

RETROREFLECTIVE SHEETING

Section 630 of the Standard Specifications is hereby revised for this project as follows:

In subsection 630.02, delete the sixth and seventh paragraphs, including Table 630-1, and replace them with the following:

Retroreflective sheeting for all signs requiring an orange background shall be Fluorescent.

## Table 630-1

# Retroreflective Sheeting Types

|  |  |  |  |
| --- | --- | --- | --- |
| **Sheeting** | **Type IV** | **Type VI****(Roll-up sign material)** | **Fluorescent1** |
| Application | Work Zone | Work Zone | Work Zone |
| All Orange Construction Signs |  |  | X |
| Orange Construction Signs that are used only during daytime hours for short term or mobile operations |  | X**4** | X |
| Barricades (Temporary) | X |  | X |
| Vertical Panels | X |  | X |
| Flaggers Stop/Slow Paddle | X |  | X |
| Drums**2** | X |  | X |
| Non-orange Fixed Support signs with prefix “W” | X |  |  |
| Special Warning Signs |  |  | X |
| STOP sign (R1-1)YIELD sign (R1-2)WRONG WAY sign (R5-1a)DO NOT ENTER sign (R5-1)EXIT sign (E5-1a) | X |  |  |
| DETOUR sign (M4-9) or (M4-10) |  |  | X |
| All other fixed support signs**3** | X |  | X |
| All other signs used only during working hours | X |  | X |
| All other signs that are used only during daytime hours for short term or mobile operations | X | X**5** | X |
| **1** Fluorescent Sheeting shall be of a brand that is on the CDOT Approved Products List.**2** Drum Sheeting and tubular marking shall be manufactured for flexible devices, and sheeting materials shall conform to Section 713.**3** Fixed support signs are defined as all signs that must remain in use outside of working hours. They shall be mounted in accordance with Standard Plan S-630-1.**4** RS 24 only.**5** White only. |

Section 713 of the Standard Specifications is hereby revised for this project as follows:

Delete Subsection 713.10(b) and replace with the following:

1. *Retroreflective Sheeting.* Reflective sheeting for traffic control devices shall be listed on the CDOT Approved Products List, and conform to the requirements of ASTM D 4956.
2. Reflective Quality Requirements

1. Drums and Tubular Markers. Retroreflective sheeting shall conform to ASTM D4956 Type IV, with the following modifications:

The Minimum Coefficient of Retroreflection (RA) shall conform to the following minimum values.

|  |  |  |
| --- | --- | --- |
| **Observation Angle** | **Entrance Angle**  | **Minimum Coefficient of Retroreflection (RA)****[cd/fc/ft2 (cd/lx.m2)]** |
| **White**  | **Fluorescent Orange**  |
| 0.2o  | -4o  | 500  | 200  |
| 0.2o  | 30o  | 200  | 80  |
| 0.5o  | -4o  | 225  | 90  |
| 0.5o  | 30o  | 85  | 34  |

1. Daytime Color

1. Drums and Tubular Markers. All fluorescent orange sheeting shall meet the color requirements of ASTM D4956, with the following modifications:

The chromaticity coordinates and total luminance factor shall conform to the requirements as described in 23 CFR Part 655 Appendix to Subpart F.

The Fluorescence Luminance Factor (YF) shall conform to the following minimum values.

|  |  |  |
| --- | --- | --- |
| **Color** | **YF Initial Requirement**  | **YF Minimum Requirement**  |
| Fluorescent Orange | 20  | 15  |

REVISION OF SECTIONS 630 AND 713

RETROREFLECTIVE SHEETING

Sections 630 and 713 of the Standard Specifications are hereby revised for this project as follows:

In subsection 630.02, delete the sixth and seventh paragraphs, including Table 630-1, and replace them with the following:

Retroreflective sheeting for all signs requiring an orange background shall be Fluorescent.

## Table 630-1

# Retroreflective Sheeting Types

|  |  |  |  |
| --- | --- | --- | --- |
| **Sheeting** | **Type IV** | **Type VI****(Roll-up sign material)** | **Fluorescent1** |
| Application | Work Zone | Work Zone | Work Zone |
| All Orange Construction Signs |  |  | X |
| Orange Construction Signs that are used only during daytime hours for short term or mobile operations |  | X**4** | X |
| Barricades (Temporary) | X |  | X |
| Vertical Panels | X |  | X |
| Flaggers Stop/Slow Paddle | X |  | X |
| Drums**2** | X |  | X |
| Non-orange Fixed Support signs with prefix “W” | X |  |  |
| Special Warning Signs |  |  | X |
| STOP sign (R1-1)YIELD sign (R1-2)WRONG WAY sign (R5-1a)DO NOT ENTER sign (R5-1)EXIT sign (E5-1a) | X |  |  |
| DETOUR sign (M4-9) or (M4-10) |  |  | X |
| All other fixed support signs**3** | X |  | X |
| All other signs used only during working hours | X |  | X |
| All other signs that are used only during daytime hours for short term or mobile operations | X | X**5** | X |
| **1** Fluorescent Sheeting shall be of a brand that is on the CDOT Approved Products List.**2** Drum Sheeting and Tubular Marker shall be manufactured for flexible devices, and sheeting materials shall conform to Section 713.**3** Fixed support signs are defined as all signs that must remain in use outside of working hours. They shall be mounted in accordance with Standard Plan S-630-1.**4** RS 24 only.**5** White only. |

Delete Subsection 713.10(b) and replace with the following:

*(a) Retroreflective Sheeting.* Reflective sheeting for traffic control devices shall be listed on the CDOT Approved Products List, and conform to the requirements of ASTM D 4956.

1. Reflective Quality Requirements

A. Drums and Tubular Markers. Retroreflective sheeting shall conform to ASTM D4956 Type IV, with the following modifications:

The Minimum Coefficient of Retroreflection (RA) shall conform to the following minimum values.

|  |  |  |
| --- | --- | --- |
| **Observation Angle** | **Entrance Angle**  | **Minimum Coefficient of Retroreflection (RA)****[cd/fc/ft2 (cd/lx.m2)]** |
| **White**  | **Fluorescent Orange**  |
| 0.2o  | -4o  | 500  | 200  |
| 0.2o  | 30o  | 200  | 80  |
| 0.5o  | -4o  | 225  | 90  |
| 0.5o  | 30o  | 85  | 34  |

2. Daytime Color

A. Drums and Tubular Markers. All fluorescent orange sheeting shall meet the color requirements of ASTM D4956, with the following modifications:

The chromaticity coordinates and total luminance factor shall conform to the requirements as described in 23 CFR Part 655 Appendix to Subpart F.

The Fluorescence Luminance Factor (YF) shall conform to the following minimum values.

|  |  |  |
| --- | --- | --- |
| **Color** | **YF Initial Requirement**  | **YF Minimum Requirement**  |
| Fluorescent Orange | 20  | 15  |