

Maintaining Sign Retroreflectivity: Calibration Signs

The Calibration Signs Procedure requires the inspector to view “calibration signs” prior to conducting the nighttime inspections. The calibration signs are set up in a location where the inspector can view them in the same manner in which they will be viewed during the nighttime inspections. The inspector uses the calibration sign to establish a benchmark reference for all of the signs that are to be inspected during the nighttime inspections.

Calibration signs are to have known retroreflectivity levels at or above the minimum levels. Multiple signs are required to represent the various types of sign colors and backgrounds that will be encountered. These calibration signs will need to be stored in a safe place when not being used to prevent the degradation of the sign’s retroreflectivity calibration. The FHWA provides recommendations for this procedure that should be followed for consistency and accuracy of the inspection assessment, they are as follows:^[1]

- *Calibration signs are needed for each color of sign in (MUTCD section 2A.08), Table 2A-3.*
- *Calibration signs must be viewed at typical viewing distances using the inspection vehicle.*
- *Calibration signs need to be properly stored between inspections so that their retroreflectivity does not deteriorate.*
- *Calibration sign retroreflectivity should be verified periodically.*

The calibration signs may be actual signs, but should be sized with dimensions to be no less than 12” x 12”.

CONTROL TEST PROCEDURE:

Prior to the visual nighttime inspections, this procedure requires that an inspector view the calibration signs to “calibrate” their eyes. To accomplish this, two methods can be performed, a stationary test and a mobile test.

Stationary Test:

1. Vehicle is to be placed 200 feet directly behind, and 15 feet to the left of, the control sign.

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2. Headlamps and windshield are to be cleaned prior to testing; headlamps are to be kept at the low-beam setting for the test.
3. Inspector is to stay seated in the passenger seat of the vehicle
4. Inspector is given the order of signs to be viewed and the associated R_A values for each sign.
5. If only one sign can be mounted at a time, an additional person will be required to change the different control signs. Sign exchange can be done more efficiently if the signs are exchanged at the notification of the inspector by way of the horn or radio communication.

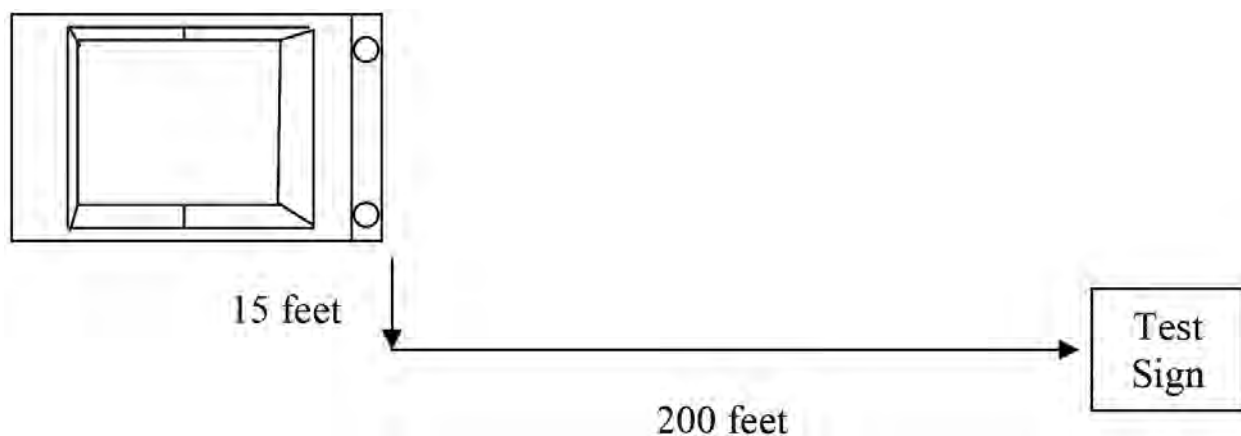


FIGURE 1: Stationary Test Set Up

Mobile Test:

1. Driver is to retrieve the control signs and place on control sign post or stand.
2. Headlamps and windshield are to be cleaned prior to testing; headlamps are to be kept at the low-beam setting for the test.
3. Both driver and inspector are to follow all traffic rules for safety in testing grounds.
4. Once the specific signs are mounted, the driver is to pass the control sign at a reasonable and prudent speed for the inspection control site while the inspector observes the control sign(s). Multiple test runs are recommended for each sign being observed.

Upon completion of the calibration test all test materials are to be safely stored to protect them from damage and degradation.

CONDUCTING THE CALIBRATION SIGN PROCEDURE:

1. The inspection team is given assigned roads and provided a vehicle to conduct the inspection for the retroreflectivity of the designated signs.
2. The team is to conduct the “control test” procedure.
3. Once the sign inspection begins, with the vehicle moving at the posted speed limit, the inspector is to locate and verify the signs along the road.
4. When approaching a sign, the inspector is to verify if the sign is there, if it is damaged, or if the sign view is blocked.
5. If all is well, the inspector is to observe the retroreflectivity of each sign and give it a rating of good, fair, or poor for retroreflectivity.
6. Multiple passes may be required to locate and assess any particular sign or group of signs.
7. Any signs that fail the test are to be identified and the highway department notified that the sign(s) are to be replaced.
8. Any signs given a fair rating are to be identified and are to be inspected in the next round of inspections or to be tested using the [Comparison Panel Procedure](#).
9. All inspections and procedures should be documented for future reference.

COST & EFFICIENCY

Initial cost required for this procedure includes the training of the inspector to ensure that proper inspection and recording methods are followed and are consistent with the goals of the program. Conducting the Calibration Signs Procedure also requires the agency to maintain a separate set of control signs that are used strictly for the calibration of the inspector’s eye. These control signs should be tested periodically to verify that they meet the minimum retroreflectivity requirements. A complete set of signs to represent the agency’s signs in the field and representing the colors identified in the MUTCD 2A.08, Table 2A-3, should be maintained. The Minimum Maintained Retroreflectivity Levels are found at:

<http://mutcd.fhwa.dot.gov/pdfs/2009/part2a.pdf>

The signs used for this calibration may be signs a facility has on site; however, the signs must be calibrated and verified that they provide the minimum retroreflectivity that will enable the inspector to properly assess the signs in the field. As with other methods of measuring retroreflectivity, the major expense incurred in this method is the cost associated with the purchase of a retroreflectometer. The cost of an ASTM specified retroreflectometer is approximately \$10,000. Considering that the calibration signs need to be checked once a year, the sharing of a single retroreflectometer among several municipalities is highly recommended.

The use of this procedure also requires that the agency have a location available to place a mounting post and calibration signs, and a safe place to store the calibration signs when not in use. The test location should have similar conditions to those in the field, that is, signs mounted at the appropriate distances to copy the inspection conditions.

Though similar to the Consistent Parameters Procedure, the addition of the control test requires more time to conduct the complete visual inspection. Once on the road additional factors can either increase or decrease the inspection procedure, factors such as sign number, sign density, and vehicle speed. The number and density of signs, as well as the speed of the inspection, at any location may require several approaches to accurately observe each sign.

The efficiency of this method is solely dependent on the experience and training of the inspector. Clearly identifying a good sign from a fair sign comes down to a judgment call on the inspector's part and can affect when the sign is to be inspected again. Inspector fatigue may also influence the rating of a sign, so it is important to identify questionable signs and have them re-inspected.

It is recommended that all signs be inspected annually, preferably at the same time of year. Fair signs should be noted as potential replacements for the following year. Failing signs should be replaced as soon as possible.

KEY POINTS:

- Inspector is to be trained prior to conducting inspection.
- All signs in an agency's jurisdiction should be inspected at least once per year, and should be done at the same time of year and with similar weather conditions, if possible.
- The overhead lamp of the vehicle is to be turned on for at least a minute, at a minimum of every five minutes during the inspection to imitate the affect of an on-coming vehicle to represent a worst case scenario for eye sight at night.
- Inspections should occur in the lane of travel at the posted speed limit, and not on the shoulder.
- Control signs used for the calibration should be stored in a safe location with protective coverings to prevent sign damage and deterioration to maximize the usable life of the calibration signs.
- Signs of questionable reflectivity that are in the range of fair to poor should be either replaced or tested further using an additional method or procedure.
- All inspection procedures and findings should be documented and records should be maintained to support inspection documentation.

Differences from the Consistent Parameter Procedure:

The *Consistent Parameters* procedure and the Calibration Sign Procedure follow similar methods in the field with regard to the inspection. However, the Calibration Sign Procedure does not specify the type vehicle to be used, although a 2000 year model or newer should be used due to lighting technology changes. The inspector does not have to be 60 years of age or older.

REFERENCES:

^[1]New MUTCD Sign Retroreflectivity Requirements, FHWA-SA-07-020. U.S. Department of Transportation, Federal Highway Administration, Washington D.C., 2007.



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