



CITY OF HOUSTON

Administration & Regulatory Affairs Department
Strategic Purchasing Division

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Mayor

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<https://purchasing.houstontx.gov>

Date: September 9, 2012
Subject: Letter of Clarification No. 3
Reflective and Non-Reflective Material for Various Departments
Reference: Invitation to Bid (ITB) No.: S06-S24081

To All Prospective Bidders:

This Letter of Clarification is issued for the following reasons:

- To revise the above referenced solicitation as follows:
 1. The bid solicitation No. S24081 issued July 31, 2012 has been replaced in its entirety with the attached bid solicitation No. S24081 marked revised September 6, 2012.
- To answer the following questions:
 1. Question: "Page 6 of 34, 3.4 "Types III, IV, IX and IV" should be "Types III, IV, IX and XI?"
Answer: "Types III and IV have been deleted in the revised specifications and only type XI is referenced."
 2. Question: "Page 9 of 34, 5.9.1"--- and whether dry or tally wet by rain" should be "--- and whether dry or totally wet by rain."
Answer: "This information has been deleted."
 3. Question: "We respectfully request the City to revise the reference of ASTM D 4956-09 and ASTM D 4956-04 to "ASTM D4956-11a (newest version)."
Answer: "The specification has been revised to comply with ASTM D 4956-11a."
 4. Question: "Page 10 of 34, 7.3.2"---when properly applied at temperatures above 50 degrees F" This is Sole Source Specification. We respectfully request the City to revise the application temperature to 65 degrees F as"---when properly applied at temperatures above 65 degrees F."
Answer: "The specification has been revised to comply with ASTM D4956-11a."
 5. Question: "Page 11 of 34, 7.6.1 "Color Requirements: Why does the luminance factors of Type IV have to meet the proposed ASTM Type XI?"
Answer: "The City will be using the Type XI material."

Partnering to better serve Houston

Council Members: Helena Brown Jerry Davis Ellen Cohen Wanda Adams Mike Sullivan Al Hoang Oliver Pennington Edward Gonzalez
James G. Rodriguez Mike Laster Larry Green Stephen C. Costello Andrew Burks Melissa Noriega C.O. "Brad" Bradford
Jack Christie **Controller:** Ronald C. Green

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6. Question: *"Page 11 of 34, 7.6.3 "The observation angles shall range from 0.2 degrees to 1.0 degrees. The entrance angles shall range from - 4degrees to 40 degrees." We request the City to revise this section to the ASTM standard as "The observation angles shall range from 0.2 degrees to 0.5 degrees. The entrance angles shall range from -4 degrees to 30 degrees."*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*
7. Question: *"Page 11 of 34, 7.6.10 and 7.6.11. These specifications are arbitrary and capricious and the City has a risk to create a Sole Source Specification. . "ASTM D 4956 -11a does not list these specifications. We request the City to delete these paragraphs.*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*
8. Question: *"Page 12 of 34, Table 3. These tables are arbitrary and capricious and the City has a risk to create a Sole Source Specification. We request the City to replace these tables with the Type IV of ASTM D 4956-11a (Table 5)."*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*
9. Question: *"Page 16 of 34, Table 3. These labels are arbitrary and capricious and the City had a risk to create a Sole Source Specification. We request the City to replace these tables with the Type IV of ASTM D 4956 – 11a (Table 10)."*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*
10. Question: *"Page 17 of 34, 8.12Optical Stability, This specification is arbitrary and capricious and not a standard, ASTM D 4956 – 11a does not list this specification. The City has a risk of promoting a Sole Source Specification. Please delete the specification."*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*
11. Question: *"Page 19 of 34, 8.15.4.1.for Temporary Signing- Fluorescent Orange Colors" "(2) retains less than 50% of the coefficient of retroreflection values listed in Table 1 (page12) at 0.2 degrees observation, -4 degrees entrance (measured in accordance with ASTM E810). We request the City revise this sentence to (2) retains less than 50% of the coefficient of retroreflection values listed in Table 10 of ASTM D 4956-11a at 0.2 degrees observation, - 4 degrees entrance (measured in accordance with ASTM E810)." This request is consistent with the above request."*
Answer: *"The specification has been revised to comply with ASTM D 4956-11a."*

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12. Question: "First, within section 8.0 beginning on page 14 of the bid, Type XI (11) Reflective Sheeting has been specified. But within the online product bid site, line items 8 through 10 in the first product group do not state Type XI (11). Can "Type XI" be added to clarify product type in accordance with the bid document specifications?"

Answer: "Yes, Type XI has been added to the description."

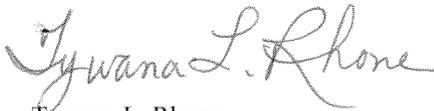
13. Question: "Secondly, within the online product bid site, line item 7 in the second product does not state Type XI (11) for this Fluorescent Yellow Green Reflective Product. As stated in the formal bid document in Section 8.0 beginning on page 14, Type XI (11) product has been specified ALL Fluorescent Colors. Can "Type II" be added to clarify product type in accordance with the bid document specifications?"

Answer: "Yes, Type II has been added to the description."

- Due to the aforementioned change to the e-bidding description you may need to edit your bid. To do so please select the "Bid Number" and proceed accordingly.

This Letter of Clarification will be considered part of the solicitation referenced on the first page of this document. All revisions, responses, and answers incorporated into the Letter(s) of Clarification are collaboratively from both the Strategic Purchasing Division and the applicable City Department(s).

Furthermore, it is the responsibility of each Supplier to obtain any previous Letter(s) of Clarification associated with this solicitation.



Tywana L. Rhone
Purchasing Manager
Strategic Purchasing Division
832-393-8754

DRH
CDW/DRH/tlr

Cc Attachment S24081 Specifications and Terms & Conditions Revised 9.6.12

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CITY OF HOUSTON INVITATION TO BID



Revised: September 6, 2012

Bid Opening

Sealed bids, in duplicate, will be received by the City Secretary of the City of Houston, in the City Hall Annex, Public Level, 900 Bagby, Houston, Texas 77002 until **10:30 a.m. Thursday, September 20, 2012**, and all bids will be opened and publicly read in the City Council Chamber at 11:00 A.M. on that date for the purchase of:

**REFLECTIVE AND NON-REFLECTIVE MATERIALS
FOR
VARIOUS DEPARTMENTS
BID INVITATION NO. S06-S24081
NIGP CODE: 550-45**

Buyer

Tywana L. Rhone is the Buyer for this solicitation and she may be reached at 832.393.8754. Any questions regarding this solicitation should be submitted in writing to 832-393-8760 (fax) or via e-mail at tywana.rhone@houstontx.gov

Electronic Bidding

In order to submit a bid for the items associated with this procurement, you must fill in the pricing information on the "PLACE BID" page.

Pre-Bid

A Pre-Bid Conference was held for all Prospective Bidders in the Strategic Purchasing Division, Basement, City Hall, 901 Bagby, Houston, Texas 77002 at 1:30 PM, Wednesday August 15, 2012 in Conference Room No. 2.

All Prospective Bidders are urged to be present. It is the bidder's responsibility to ensure that they have secured and thoroughly reviewed all aspects of the bidding documents prior to the Pre-Bid Conference. **Any revisions to be incorporated into this solicitation arising from discussions before, during and subsequent to the pre-bid conference will be confirmed in writing by Letter(s) of Clarification prior to the bid due date. No verbal responses will otherwise alter the specifications, terms and conditions as stated herein.**

Bidding forms, specifications and all necessary information should be downloaded from the Internet at <https://purchasing.houstontx.gov>. By registering and downloading this bid document, all updates to this bid document will be automatically forwarded via e-mail to any registered bidder. This information may also be obtained from the office of the City Purchasing Agent, 901 Bagby, Basement, Houston, Texas 77002.

The place of the bid opening may be transferred in accordance with Paragraph B (5) of Section 15-3 of The Code of Ordinances, Houston, Texas. The bid opening meeting may be rescheduled in accordance with Paragraph B (6) of said Section 15-3.

The City reserves the right to reject any or all bids or to accept any bid or combination of bids deemed advantageous to it.

CITY EMPLOYEES ARE PROHIBITED FROM BIDDING ON THIS SOLICITATION IN ACCORDANCE WITH THE CODE OF ORDINANCES SECTION 15 - 1.

CONTENTS

SECTION A. - OFFER
SECTION B. - TECHNICAL SPECIFICATIONS
SECTION C. - GENERAL TERMS & CONDITIONS

**SECTION A.
OFFICIAL BID FORM**



**REFLECTIVE AND NON-REFLECTIVE MATERIALS
FOR
VARIOUS DEPARTMENTS
BID INVITATION NO. S06-24081**

Honorable Mayor and City Council Members:

The undersigned hereby proposes to furnish and deliver, **reflective and non-reflective materials FOB destination point as listed on individual Purchase Orders**, the items listed below in accordance with the Net Prices and other conditions shown herein, and in accordance with the City's Specifications and General Terms and Condition Specifications. When issued, Letters of Clarification shall automatically become part of this bid document and shall supersede any previous specifications or provisions in conflict with the Letters of Clarification. It is the responsibility of the Bidder to ensure that it has obtained such letters. By submitting a bid on this project, Bidder shall be deemed to have received all Letters of Clarification and to have incorporated them into its bid. THE MANUFACTURER'S NAME, PRODUCT NAME AND PRODUCT NUMBER MUST BE DESIGNATED IN THE SPACE PROVIDED, IF BIDDERS ARE BIDDING AN "OR EQUAL" ITEM.

The undersigned hereby proposes to furnish and deliver **reflective and non-reflective materials FOB destination point as listed on individual Purchase Orders**, parts and components in accordance with the percentage (plus or minus) applied to the stated Manufacturer's List Price Schedules identified herein, or from the Price List's most current published revision, in accordance with the City's Specifications and General Terms and Conditions. Most current published revision means latest price list in effect between the "first advertised date" as shown on the "Notice to Bidder" and the Bid Opening Date. When issued Letters of Clarification shall automatically become part of this bid document and shall supersede any previous specifications or provisions in conflict with the Letters of Clarification. It is the **responsibility of the Bidder** to ensure that it has obtained such letters. By submitting a bid on this project, Bidder shall be deemed to have received all Letters of Clarification and to have incorporated them into its bid.

The City may accept this bid offer by issuance of a Notice of Award Letter and/or a Purchase Order covering award of said bid to this Bidder at any time on or before the 120th day following the day this Official Bid Form is opened by the City. This offer shall be irrevocable for 120 days after bid opening or for 90 days after City Council awards the bid, whichever comes last, but this period may be extended by written agreement of the parties.

The City of Houston reserves the option, after bids are opened, to increase or decrease the quantities listed, subject to the availability of funds, and/or make award by line item.

BIDDING AND AWARD:

It is the intent of the City to award, on the basis of overall low net bid meeting specifications for the entire award; however, the right is reserved to accept or reject in whole or in part any or all bids received and to make an award on the basis of individual item, combination of items or overall best bid, as it is deemed in the best interest of the City.

THIS IS A THIRTY-SIX (36) MONTH AWARD WITH TWO (2) ONE (1) YEAR OPTIONS TO EXTEND

FIRM PRICES ARE TO BE QUOTED FOR THE FIRST TWELVE (12) MONTH PERIOD

SECTION A. OFFICIAL BID FORM FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

SPECIAL BIDDERS NOTE:

These bid documents are to be bid exactly as published or amended by any letter(s) of clarification that may be issued pertaining thereto.

LINE ITEM BIDS:

Only one item may be bid for each referenced line item. To bid the referenced line item and an alternate, bidder must submit a separate bid form for each alternate item(s) with its own original signature page. Multiple bids for the same line item on one bid form will be just cause to reject a bid from further consideration.

LOBBYING AND OTHER FORMS OF INFLUENCE PROHIBITED:

Neither Bidder(s) nor any person acting on Bidder(s)'s behalf shall attempt to influence the outcome of the award by the offer, presentation or promise of gratuities, favors, or anything of value to any appointed or elected official or employee of the City of Houston, their families or staff members. All inquiries regarding the solicitation are to be directed to the designated City Buyer identified on the first page of the solicitation. Upon issuance of the solicitation through the pre-award phase and up to the award, aside from Bidder's formal response to the solicitation, communications publically made during the official pre-bid conference, written requests for clarification during the period officially designated for such purpose by the City Buyer, neither Bidder(s) nor persons acting on their behalf shall communicate with any appointed or elected official or employee of the City of Houston, their families or staff through written or oral means in an attempt to persuade or influence the outcome of the award or to obtain or deliver information intended to or which could reasonably result in an advantage to any Bidder. However, nothing in this paragraph shall prevent Bidder from making public statements to the City Council body convened for a regularly scheduled session after the official selection has been made and placed on the City Council agenda for action.

HIRE HOUSTON FIRST:

THIS PROCUREMENT IS SUBJECT TO THE HIRE HOUSTON FIRST PROGRAM, WHICH GIVES A PREFERENCE TO CERTAIN LOCAL BIDDERS IN AWARD OF THE PROCUREMENT. FOR MORE INFORMATION, GO TO:

<http://www.houstontx.gov/onestop/hirehoustonfirstaffidavit.pdf>

Designation as a City Business or Local Business

To be designated as a City or Local Business for the purposes of the Hire Houston First Program, as set out in Article XI of Chapter 15 of the Houston City Code, a bidder or proposer must submit the **Hire Houston First Application and Affidavit ("HHF Affidavit")** to the Director of the Mayor's Office of Business Opportunities and receive notice that the submission has been approved prior to award of a contract. Bidders are encouraged to secure a designation prior to submission of a bid or proposal if at all possible.

Download the HHF Affidavit from the Office of Business Opportunities Webpage at the City of Houston e-Government Website at the following location:

www.houstontx.gov/obo/moreforms/hirehoustonfirstaffidavit.pdf

Submit the completed application forms to: Mayor's Office of Business Opportunity, One Stop Business Center, 900 Bagby St., Public Level, Houston, TX 77002 or Applications may be submitted via e-mail to HHF-MOBO@houstontx.gov or faxed to 832.393.0952.

Award of a Procurement of \$100,000 or More for Purchase of Goods:

THE CITY WILL AWARD THIS PROCUREMENT TO A "CITY BUSINESS," AS THAT TERM IS DEFINED IN SECTION 15-176 OF THE CITY OF HOUSTON CODE OF ORDINANCES ("THE CODE")

- IF THE BID OF THE CITY BUSINESS IS THE LOWEST RESPONSIBLE BID OR IS WITHIN 3% OF THE LOWEST BID RECEIVED, AND
- UNLESS THE USER DEPARTMENT DETERMINES THAT SUCH AN AWARD WOULD UNDULY INTERFERE WITH CONTRACT NEEDS, AS PROVIDED IN SECTION 15-181 OF THE CODE.

IF THERE IS NO BID OF A CITY BUSINESS THAT MEETS THESE CRITERIA, THE CITY WILL AWARD THE PROCUREMENT TO THE LOWEST RESPONSIBLE BIDDER.

SECTION A. OFFICIAL BID FORM FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

Award of Procurement under \$100,000 for Purchase of Goods:

THE CITY WILL AWARD THIS PROCUREMENT TO A "CITY BUSINESS," AS THAT TERM IS DEFINED IN SECTION 15-176 OF THE CITY OF HOUSTON CODE OF ORDINANCES ("THE CODE")

- IF THE BID OF THE CITY BUSINESS IS THE LOWEST RESPONSIBLE BID OR IS WITHIN 5% OF THE LOWEST BID RECEIVED, AND
- UNLESS THE USER DEPARTMENT DETERMINES THAT SUCH AN AWARD WOULD UNDULY INTERFERE WITH CONTRACT NEEDS, AS PROVIDED IN SECTION 15-181 OF THE CODE.

IF THERE IS NO BID OF A CITY BUSINESS THAT MEETS THESE CRITERIA, THE CITY WILL AWARD THE PROCUREMENT TO THE LOWEST RESPONSIBLE BIDDER

Award of Procurement that may be More or Less than \$100,000 for Purchase of Goods:

THE CITY WILL AWARD THIS PROCUREMENT TO A "CITY BUSINESS," AS THAT TERM IS DEFINED IN SECTION 15-176 OF THE CITY OF HOUSTON CODE OF ORDINANCES ("THE CODE")

- IF THE BID OF THE CITY BUSINESS IS LESS THAN \$100,000 AND IS THE LOWEST RESPONSIBLE BID OR IS WITHIN 5% OF THE LOWEST BID RECEIVED, OR
- IF THE BID OF THE CITY BUSINESS IS MORE THAN \$100,000 AND IS THE LOWEST RESPONSIBLE BID OR IS WITHIN 3% OF THE LOWEST BID RECEIVED, AND
- UNLESS THE USER DEPARTMENT DETERMINES THAT SUCH AN AWARD WOULD UNDULY INTERFERE WITH CONTRACT NEEDS, AS PROVIDED IN SECTION 15-181 OF THE CODE.

IF THERE IS NO BID OF A CITY BUSINESS THAT MEETS THESE CRITERIA, THE CITY WILL AWARD THE PROCUREMENT TO THE LOWEST RESPONSIBLE BIDDER.

Documents/forms must be downloaded from the City's Website <https://houstontx.gov/purchasing/index.html>

Additional Required Forms to be Included with this Bid:

In addition to the electronic Bid Form and the Official Signature Page, the Forms listed in Table 1 **must be completed and submitted to the Office of the City Secretary on or before the date and time the bid is due:**

| Table 1 |
|---|
| <u>Affidavit of Ownership</u> |
| <u>Fair Campaign Ordinance</u> |
| <u>Statement of Residency</u> |
| <u>Conflict of Interest Questionnaire</u> |
| <u>Bidders Attachments Supply</u> |
| <u>Location of Bidders Inventory</u> |

Table 2 lists other documents and forms that should be viewed/downloaded from the City's website, but are not required to be submitted with the bid. The City will request these forms, as applicable, to be completed and submitted to the City by the recommended/successful bidder:

| Table 2 |
|---|
| <u>MWBE</u> |
| <u>Sample Insurance Over \$50000</u> |
| <u>Formal Instructions for Price List Bidders</u> |
| <u>Formal Instructions for Bid Terms</u> |
| <u>EEOC</u> |

SECTION B.
CITY OF HOUSTON
TECHNICAL SPECIFICATIONS
FOR
REFLECTIVE AND NON-REFLECTIVE MATERIALS
FOR
VARIOUS DEPARTMENTS

1.0 SUPPLEMENTAL ITEMS TO BE FURNISHED:

Successful bidder shall furnish supplemental items as part of this Contract, at no additional cost, as follows:

- 1.1 Process Inks: Manufacturer of the sheeting shall furnish at no additional cost the process inks, clear coat, thinners, special screen wash solvent, etc. as recommended for its sheeting to meet performance requirements as detailed in ASTM 4956 – 11a.
- 1.2 Washers: If recommended by the sheeting manufacturer; for protection to the sign surface from damage by bolts or other fasteners; washers shall be furnished by the manufacturer at no additional charge.

2.0 INSTRUCTIONS AND TRAINING:

- 2.1 The manufacturer supplying the sheeting shall provide the services of a qualified technician for instruction and training at the primary sign manufacturing facility designated by the City. This instruction shall be available at a minimum ten (10) times during the contract period at no additional cost; and shall include but shall not be limited to, training films, material application, equipment operation, silk screening techniques, packaging, storage and other proven sign shop practices as they apply to the reflective sheeting supplied by the manufacturer, and to assure that the resulting signs can comply with the applicable specifications.
- 2.2 Additional on-site technical assistance by the manufacturer supplying the retroreflective sheeting shall be provided at the Traffic Maintenance Branch, 2200 Patterson Street, Houston, Texas. This assistance will be provided at a maximum of two (2) times per year of sign production, if required.
- 2.3 EQUIPMENT: The manufacturer supplying the retroreflective sheeting shall provide service for sheeting application equipment from the manufacturer if any; certify that trained personnel will be available within a 72 hours notice to render such service; and shall stock authorized parts for their sheeting application equipment. "Service" is understood to mean the capability of calibration and troubleshooting, as well as, the training and retaining experienced personnel as required.
- 2.4 COMPLIANCE: Failure to comply with specification requirements may be just cause of cancellation of Contract.

3.0 SPECIAL NOTICES:

Each bidder of reflective material shall furnish manufacturer certified test reports from its in-house testing facilities, or from an independent testing laboratory, which certifies that the material being supplied has/have been successfully tested in exact accordance with specification requirements prescribed in this solicitation. The test report may be furnished with the bid.

4.0 ITEM SPECIFICATIONS:

- 4.1 Detailed specifications governing items included in the solicitation (4.1.1 through 4.1.3) shall meet or exceed the standards set forth by the American Society for Testing Materials (ASTM) standard specification D4956-11a.
 - 4.1.1 Prismatic Diamond Grade (Type XI), All colors
 - 4.1.2 Non-Reflective Vinyl, Black or White
 - 4.1.3 Protective Overlay, Premium, Clear

TECHNICAL SPECIFICATIONS FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

5.0 REFLECTIVE SHEETING:

5.1 GENERAL:

It is the intent of the specification to describe reflective sheeting requirements for the various kinds, classes, and types of material utilized for reflective traffic control devices for streets and highways. The fabrication of such devices shall be performed in the City's shops by City personnel utilizing City equipment.

5.2 MANUFACTURING CHANGES:

When in the opinion of the Assistant Director, Traffic Maintenance Branch, or Director of the Houston Airport System, changes are made in the composition, manufacturing process, or quality of materials bid in the Contract that may affect its durability or appearance, such change shall be immediately reported to the Assistant Director and/or Deputy Director. The City reserves the right to conduct whatever evaluation or test that is deemed necessary to identify if a change made will affect the material's durability from the tentative approved list of materials.

5.3 PERIOD EVALUATION:

City reserves the right to periodically evaluate the performance of materials. Samples for periodic evaluation of performance will be selected at random from materials delivered to the City on Contracts. Failure of materials to comply with specification requirements as a result of periodic evaluation may result in cancellation of the Contract.

6.0 SCOPE:

- 6.1 This specification covers flexible, non-exposed glass bead lens and microprismatic, retroreflective sheeting designed for use on traffic control signs, delineators, barricades, and other devices.
- 6.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.
- 6.3 The following safety hazards caveat pertains only to the test methods portion, Section 12, of this specification. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7.0 REFERENCED DOCUMENTS:

7.1 ASTM Standards:¹

- B209** Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B209M** Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
- B449** Specification for Chromates on Aluminum
- D4956 – 11a** Specification for Retroreflective Sheeting for Traffic Control
- E284** Terminology of Appearance
- E308** Practice for Computing the Colors of Objects by Using the CIE System
- E808** Practice for Describing Retroreflection
- E810** Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry
- E811** Practice for Measuring Colorimetric Characteristics of Retroreflectors Under Nighttime Conditions
- E991** Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method
- E1164** Practice for Obtaining Spectrometric Data for Object-Color Evaluation
- E1247** Practice for Detecting Fluorescence in Object-Color Specimens by Spectrophotometry

TECHNICAL SPECIFICATIONS FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

7.1 ASTM Standards:¹ (Continued):

- E1347** Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry
- E1349** Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional (45°:0° or 0°:45°) Geometry
- E2152** Practice for Computing the Colors of Fluorescent Objects from Bispectral Photometric Data
- E2153** Practice for Obtaining Bispectral Photometric Data for Evaluation of Fluorescent Color
- E2301** Test Method for Daytime Colorimetric Properties of Fluorescent Retroreflective Sheeting and Marking Materials for High Visibility Traffic Control and Personal Safety Applications Using 45°: Normal Geometry
- G7** Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials
- G113** Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials
- G147** Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests
- G151** Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G155** Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

7.2 Other Standards

- ISO 4892-2:2006 Plastics** Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps
- ISO 4892-2:2006/Amd.1:2009 Plastics** Methods of exposure to laboratory light sources - Part 2: Xenon-lamps
- EN12899-1:2007** Fixed, vertical road traffic signs - Part 1: Fixed signs

8.0 TERMINOLOGY:

- 8.1 Definitions—Definitions of terms are as described in Terminology **E284**, Practice **E808**, and Terminology **G113**.
- 8.2 Definitions of Terms Specific to This Standard:
 - 8.2.1 Reboundable sheeting, n—retroreflective material intended to be attached to flexible impact resistant plastic devices, such as traffic drum-like channelizing devices.

9.0 CLASSIFICATION:

- 9.1 Retroreflective sheeting shall consist of a white or colored sheeting having a smooth outer surface and that essentially has the property of a retroreflector over its entire surface. Type XI is to be in conformance to the retroreflectance, color, and durability requirements listed in 11.1 and may be of any construction providing that those requirements are met. A typical example of Type XI applications are provided for descriptive information only and are not intended to be limitations or recommendations. Common identifiers for each type are listed in 9.2.
 - 9.1.1 The typical applications for the retroreflective sheeting addressed in this specification are:
 - 9.1.1.1 Type Typical Application
 - 9.1.1.2 XI Highway signing, construction-zone devices and delineators

9.0 CLASSIFICATION (CONTINUED):

9.2 Retroreflective sheeting shall be classified as follows:

9.2.1 Type XI—A retroreflective sheeting typically manufactured as an unmetalized cube corner microprismatic retroreflective element material. Applications for this material include permanent highway signing, construction zone devices, and delineators.

NOTE 1—All retroreflective sheetings, but especially microprismatic sheetings, may have unique performance characteristics outside of the range of the standard geometries presented in the tables that define the types. Certain applications may require the use of a particular product within a particular type in order to achieve a desired level of retroreflectivity in a given situation. In these cases, information concerning additional performance characteristics must be obtained.

9.3 Backing Classes—The backing required for retroreflective sheeting shall be classified as follows:

9.3.1 Class 1—The adhesive backing shall be pressure sensitive, require no heat, solvent, or other preparation for adhesion to smooth, clean surfaces.

9.3.2 Class 5—This shall be a nonadhesive backing made of material commercially used for self-supporting products such as traffic cone collars, temporary roll-up warning signs, and post bands.

10.0 ORDERING INFORMATION:

10.1 The purchaser using this specification shall include the following information:

10.1.1 ASTM designation (D4956),

10.1.2 Classification type (see Section 9),

10.1.3 Adhesive class (see 9.3),

10.1.4 Daytime color (see 11.3),

10.1.5 Length and width of sheets (see 13.1),

10.1.6 Length and width of rolls (see 13.2),

10.1.7 Supplementary information, if required by the purchaser, including:

10.1.7.1 Compliance with the minimum coefficient of retroreflection for 0.1° observation angle is a supplementary requirement which shall apply only when specified. An observation angle of 0.1° may be specified where the long distance performance of a sheeting is to be a requirement,

10.1.7.2 Fungus-resistance testing requirements (see Section 17), and

10.1.7.3 Reboundable sheeting requirements (see Section 18),

10.1.8 Indication that the sheeting is intended for work zone use, if applicable, to determine which weathering requirements apply, and any additional information.

11.0 PERFORMANCE REQUIREMENTS:

11.1 This is a summary of the retroreflective sheeting minimum performance requirements for Type XI.

11.1.1 Type XI—Minimum Coefficient of Retroreflection—Table 1; Outdoor Weathering—36 months, see 11.4; Daytime Luminance Factor—Table 2; Other requirements: When sheeting is specified for construction work zone applications, the outdoor weathering shall be 12 months.

11.0 **PERFORMANCE REQUIREMENTS (CONTINUED):**

TABLE 1 Type XI Sheeting^A

| Observation Angle | Entrance Angle | White | Yellow | Orange | Green | Red | Blue | Brown | Flourescent Yellow -Green | Flourescent Yellow | Flourescent Orange |
|-------------------|----------------|-------|--------|--------|-------|-----|------|-------|---------------------------|--------------------|--------------------|
| 0.1 ^{°B} | -4° | 830 | 620 | 290 | 83 | 125 | 37 | 25 | 660 | 500 | 250 |
| 0.1 ^{°B} | +30° | 325 | 245 | 115 | 33 | 50 | 15 | 10 | 260 | 200 | 100 |
| 0.2° | -4° | 580 | 435 | 200 | 58 | 87 | 26 | 17 | 460 | 350 | 175 |
| 0.2° | +30° | 220 | 165 | 77 | 22 | 33 | 10 | 7 | 180 | 130 | 66 |
| 0.5° | -4° | 420 | 315 | 150 | 42 | 63 | 19 | 13 | 340 | 250 | 125 |
| 0.5° | +30° | 150 | 110 | 53 | 15 | 23 | 7 | 5 | 120 | 90 | 45 |
| 1.0° | -4° | 120 | 90 | 42 | 12 | 18 | 5 | 4 | 96 | 72 | 36 |
| 1.0° | +30° | 45 | 34 | 16 | 5 | 7 | 2 | 1 | 36 | 27 | 14 |

^A Minimum Coefficient of Retroreflection (R_A) $cd/ft^2(cd \cdot lx^{-1} \cdot m^2)$.

^B Values for 0.1° observation angle are supplementary requirements that shall only apply when specified by the purchaser in the contract or order.

TABLE 2 Daytime Luminance Factor (Y %)^A

| Color | All except | | | |
|---------------------------|------------|---------|---------|---------|
| | Type V | | Type V | |
| | Minimum | Maximum | Minimum | Maximum |
| White | 27 | ... | 15 | |
| Yellow | 15 | 45 | 12 | 30 |
| Orange | 10 | 30 | 7.0 | 25 |
| Green | 3.0 | 12 | 2.5 | 11 |
| Red | 2.5 | 15 | 2.5 | 11 |
| Blue | 1.0 | 10 | 1.0 | 10 |
| Brown | 1.0 | 9.0 | 1.0 | 9.0 |
| Flourescent Yellow -Green | 60 | | | |
| Flourescent Yellow | 40 | | | |
| Flourescent Orange | 20 | | | |

^A The luminance factors shown for fluorescent colors consist of the sum of a reflectance luminance factor and fluorescence luminance factor. The luminance factor may be determined using a good approximation to Illuminant D65, requiring an instrument with an appropriately filtered light source, or by using a bispectral photometer conforming to Test Method G147.

11.2 Coefficient of Retroreflection—The coefficient of retroreflection shall meet or exceed the minimum requirements for the appropriate type of sheeting (see Table 1) as specified in 12.3.

11.3 Daytime Color—The color of the sheeting shall conform to requirements of Table 2 and Table 3 when tested in accordance with 12.4. Daytime color requirements were developed for a limited set of retroreflective sheetings and a limited set of measurement devices. Measurement techniques appropriate for a wider range of optical technologies and instruments are under development. Some sheeting may require visual assessment to determine the acceptability of daytime appearance.

11.4 Accelerated Outdoor Weathering Requirements—The retroreflective sheeting shall be weather resistant and show no appreciable cracking, scaling, pitting, blistering, edge lifting, or curling, or more than 1/32-in. (0.8-mm) shrinkage or expansion when tested in accordance with 12.6. Conduct retroreflectivity measurements after outdoor weathering at 0.2° observation and -4° and +30° entrance angles. The minimum coefficient of retroreflection (R_A) after weathering is specified in Table 4.

11.0 PERFORMANCE REQUIREMENTS (CONTINUED):

NOTE 2—Supplementary Requirement 19 describes a method for artificial accelerated weathering, which users of this specification may employ for preliminary judgment until outdoor weathering results are available.

- 11.5 Colorfastness—After the specified outdoor weathering, the specimen shall conform to the requirements of Table 2 and Table 3 when tested in accordance with 12.4 and 12.7.
- 11.6 Shrinkage—The retroreflective sheeting shall not shrink in any dimension more than 1/32 in. (0.8 mm) in 10 minutes or more than 1/8 in. (3.2 mm) in 24 h when tested in accordance with 12.8.
- 11.7 Flexibility—The sheeting shall be sufficiently flexible to show no cracking when tested in accordance with 12.9.
- 11.8 Liner Removal—The liner, when provided, shall be easily removed without soaking in water or other solutions, and shall not break, tear, or remove adhesive from the sheeting. (See 12.10.)
- 11.9 Adhesion—When tested in accordance with 12.5, the adhesive backing of the retroreflective sheeting shall produce a bond that will support a 13/4-lb (0.79-kg) weight for adhesive class 1 without the bond peeling for a distance of more than 2 in. (51 mm).
- 11.10 Impact Resistance—Retroreflective sheeting shall show no cracking or delamination outside of the actual area of impact when subjected to the impact test in accordance with 12.11.
- 11.11 Nighttime Color—The nighttime color of the sheeting shall conform to the requirements of Table 5, when tested in accordance with 12.12.

12.0 TEST METHODS:

- 12.1 Test Conditions—Unless otherwise specified in this specification, condition all adhesively bonded and unbounded test samples and specimens at a temperature of 73 ±3°F (23 ±2°C) and 50 ±5% relative humidity for 24 h prior to testing.
- 12.2 Panel Preparations—Unless otherwise specified in this specification, when tests are to be performed using test panels, apply the specimens of retroreflective material to smooth aluminum cut from Alloy 6061-T6 or 5052-H38, in accordance with Specification B209 or B209M. The sheets shall be 0.020 in. (0.508 mm), 0.040 in. (1.016 mm), or 0.063 in. (1.600 mm) in thickness, and a minimum of 8 by 8 in. (200 by 200 mm). Prepare the aluminum in accordance with Specification B449, Class 2, or degrease and lightly acid etch before the specimens are applied. Apply the specimens to the panels in accordance with the recommendations of the retroreflective sheeting manufacturer.
- 12.3 Coefficient of Retroreflection:
 - 12.3.1 For lots, rolls, or sheets of retroreflective sheeting at least 1 yd. long in new (unexposed) condition, take 3 samples in accordance with Section 14.1. Determine the coefficients of retroreflection in accordance with Test Method E810.
 - 12.3.1.1 To conform to this specification, the average of the 3 coefficients of retroreflection shall meet the minimum limits given in Section 11.2 and none of the coefficients of retroreflection obtained on any of the samples shall be less than 80% of the values required in Section 11.2.

12.0 TEST METHODS (CONTINUED):

12.4 Daytime Color:

Determine the chromaticity and luminance factor Y (%) for CIE standard illuminant D65 and the 1931 CIE 2° standard observer in accordance with Practice E308, Test Methods E1347, E1349, and E2301, and Practices E991, E1164, E2152, and E2153, as applicable. The luminance factor is the sum of the reflectance luminance factor and the fluorescence luminance factor. Bispectral measurement provides the individual factors, while measurement with simulated D65 provides their sum.

TABLE 3 Color Specification Limits (Daytime)^A

| Color | 1 | | 2 | | 3 | | 4 | |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | x | y | x | y | x | y | x | y |
| White | 0.303 | 0.300 | 0.368 | 0.366 | 0.34 | 0.393 | 0.274 | 0.329 |
| Yellow | 0.498 | 0.412 | 0.557 | 0.442 | 0.479 | 0.25 | 0.438 | 0.472 |
| Orange | 0.558 | 0.352 | 0.636 | 0.364 | 0.57 | 0.429 | 0.506 | 0.404 |
| Green ^B | 0.026 | 0.399 | 0.166 | 0.364 | 0.286 | 0.446 | 0.207 | 0.771 |
| Red | 0.648 | 0.351 | 0.735 | 0.265 | 0.629 | 0.281 | 0.565 | 0.346 |
| Blue ^B | 0.140 | 0.035 | 0.244 | 0.210 | 0.190 | 0.255 | 0.065 | 0.216 |
| Brown | 0.430 | 0.340 | 0.610 | 0.390 | 0.550 | 0.450 | 0.430 | 0.390 |
| Fluorescent Yellow-Green | 0.387 | 0.610 | 0.369 | 0.546 | 0.428 | 0.496 | 0.460 | 0.540 |
| Fluorescent Yellow | 0.479 | 0.520 | 0.446 | 0.483 | 0.512 | 0.421 | 0.557 | 0.442 |
| Fluorescent Orange | 0.583 | 0.416 | 0.535 | 0.400 | 0.595 | 0.351 | 0.645 | 0.355 |

^A The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with CIE Standard Illuminant D65.

^B The saturation limit of green and blue may extend to the border of the CIE chromaticity locus for spectral colors.

TABLE 4 Outdoor Weathering Photometric Requirements for All Climates

| Type | Months ^A | Minimum Coefficient of Retroreflection, R _A |
|------|---------------------|--|
| XI | 36 ^B | 80 % of Table 1 |

^A Testing at shorter intervals may be done to gather additional information.

^B When sheeting is specified for construction work zone applications, the outdoor weathering shall be 12 months.

12.4.1 For fluorescent specimens, it is necessary either that the physical illumination of the specimen be a good approximation to illuminant D65, requiring an instrument with an appropriately filtered light source, or else that a bispectral photometer conforming to Test Method E2301 be used.

12.4.2 There are three types of 45/0 (0/45) instruments: annular, circumferential, and uniplanar (see Fig. 1). Measurement of prismatic sheeting with circumferential instruments may require multiple measurements. Measurement of prismatic sheeting with uniplanar instruments definitely requires multiple measurements.

12.0 TEST METHODS (CONTINUED):

- 12.4.2.1 If the measurement geometry is circumferential, then the testing laboratory must verify that the apertures in the ring are sufficiently close for acceptable approximation to an annular measurement. This may depend on the optical construction of the specimen, and must be determined by the testing laboratory. Multiple measurements of the same specimen area at different rotations may be averaged to improve the approximation to an annular measurement.
- 12.4.2.2 If the measurement geometry is uniplanar, then a sequence of measurements shall be made on the same specimen area at incremental rotations, and the measurement values shall be taken as averages over all the rotations. The number of rotations shall be large enough for acceptable approximation to an annular measurement. The number depends on the optical construction of the specimen and must be determined by the testing laboratory.
- 12.4.3 Instruments (spectrophotometers, colorimeters) used to measure daytime color shall have 45/0 or 0/45 illumination and viewing geometry. The referee instrument shall have 10° apertures for both illumination and viewing. Use of aperture sizes deviating from these may affect the measurement results.
- 12.5 Adhesion—Apply the sheeting to a test panel, 0.040 in. (1.016 mm) minimum thickness, prepared as specified in 12.2. Bond 4 in. (102 mm) of a 1 by 6-in. (25.4 by 152-mm) specimen to a test panel. Condition (see 12.1) and then attach the weight to the free end and allow it to hang free at an angle of 90° to the panel surface for 5 minutes.
- 12.6 Outdoor Weathering—Conduct outdoor exposures in accordance with Practice G7. During exposure, test panels shall be open backed and oriented at an angle of 45° from the horizontal and facing the equator in accordance with Practice G7. Expose two panels per location for the number of months specified in Table 4. Conduct exposures in locations with the climate types shown in Table 6. Panel labeling, and conditioning and handling of panels prior to exposure and during evaluation periods shall be in accordance with Practice G147.
- 12.6.2 Washing Panels After Exposure—Following exposure, gently wash the panels using a soft cloth or sponge and clean water or a dilute solution of a mild detergent (1% by weight in water, maximum concentration). After washing, rinse thoroughly with clean water, and blot dry with a soft clean cloth. After washing and drying, condition the panels at room temperature for at least 2 h prior to conducting any property measurements.
- 12.6.3 Measurement of Coefficient of Retroreflection—After panels have been washed, dried, and conditioned in accordance with 12.6.1, measure retroreflectance at 0.2° observation and -4° and 30° entrance angles. Report the average of the coefficient of retroreflection measured at each geometry on the two panels from each exposure location.

TABLE 5 Color Specification Limits (Nighttime)^A

| Color | 1 | | 2 | | 3 | | 4 | |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | x | y | x | y | x | y | x | y |
| White (no requirement) | | | | | | | | |
| Yellow | 0.513 | 0.487 | 0.500 | 0.470 | 0.545 | 0.425 | 0.572 | 0.425 |
| Orange | 0.595 | 0.405 | 0.565 | 0.405 | 0.613 | 0.355 | 0.643 | 0.355 |
| Green | 0.007 | 0.570 | 0.200 | 0.500 | 0.322 | 0.590 | 0.193 | 0.782 |
| Red | 0.650 | 0.348 | 0.620 | 0.348 | 0.712 | 0.255 | 0.735 | 0.265 |
| Blue | 0.033 | 0.370 | 0.180 | 0.370 | 0.230 | 0.240 | 0.091 | 0.133 |
| Brown | 0.595 | 0.405 | 0.540 | 0.405 | 0.570 | 0.365 | 0.643 | 0.355 |
| Fluorescent Yellow-Green | 0.480 | 0.520 | 0.473 | 0.490 | 0.523 | 0.440 | 0.550 | 0.449 |
| Fluorescent Yellow | 0.554 | 0.445 | 0.526 | 0.437 | 0.569 | 0.394 | 0.610 | 0.390 |
| Fluorescent Orange | 0.625 | 0.375 | 0.589 | 0.376 | 0.636 | 0.330 | 0.669 | 0.331 |

^A The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with CIE Standard Illuminant D65.

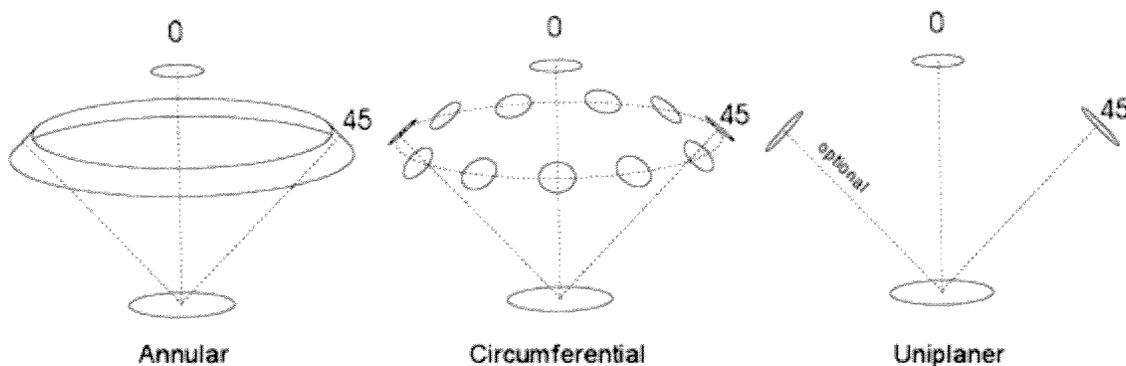


FIG. 1 Three Types of 0/45 (45/0) Instrument

TABLE 6 Climate Types for Use in Outdoor Exposures of Retroreflective Sheetings

| Climate Type ^{A,B} | Mean Monthly Temperature, °F (°C) | | Representative Example of a Typical Location |
|---|--|------------------------|--|
| | Warmest Month | Coldest Month | |
| Tropical summer rain | 82 to 93 (28 to 34) | 64 to 72 (18 to 22) | Miami, FL |
| Desert (optional, but recommended) | 82 to 93 (28 to 34) | 50 to 63 (10 to 17) | Phoenix, AZ |
| | Climate mutually agreed upon between the purchaser and the seller ^C | | |

^A Climate classification is in accordance with the Koppen reformed classification system.

^B Outdoor exposure results from Miami, FL and Phoenix, AZ are recognized internationally as benchmarks for evaluating durability of many different types of material and products.

^C Outdoor exposures of retroreflective sheeting materials are conducted in locations representative of several different climates by the National Transportation Product Evaluation Program (NTPEP) run by AASHTO.

NOTE 3—The use of two samples per weathering deck is considered a minimum and reflects historical practice and practicality. Additional samples may be weathered, and the results averaged, to decrease the effects of variability associated with the weathering process.

NOTE 4—Weathering tests are generally performed less frequently than other tests in this specification. Judgment must be used to satisfy the user that weathering results obtained on exposed samples are sufficiently applicable to the material being supplied.

- 12.7 Colorfastness—Use one of the outdoor weathered specimens to test for colorfastness. Wash, dry, and condition panels in accordance with 12.6.1 and test as specified in 12.4.
- 12.8 Shrinkage—Condition a 9 by 9-in. (229 by 229-mm) retroreflective sheeting specimen with liner, a minimum of 1 h at standard test conditions (see 12.1). Remove the liner and place the specimen on a flat surface with the adhesive side up. Ten minutes after the liner is removed and again after 24 h, measure the specimen to determine the amount of dimensional change.
- 12.9 Flexibility—Bend the sheeting, in 1 second, around a 1/8-in. (3.2-mm) mandrel with adhesive contacting the mandrel. For ease of testing, spread talcum powder on the adhesive to prevent sticking to the mandrel. The test specimen shall be 2 3/4 by 11 in. (70 by 229 mm). The test temperature shall be 73 ±3°F (23± 2°C).
- 12.10 Liner Removal—The protective liner, if any, shall be easily removed following accelerated storage for 4 h at 160°F (71°C) under a weight of 2.5 psi (17.2 kPa).
- 12.11 Impact Resistance—Apply the retroreflective sheeting to a 3 by 5 by 0.040-in. (76 by 127 by 1.016-mm) 6061-T6 aluminum test panel as specified in 12.2 and test condition as specified in 12.1. Subject the sheeting to the impact of a 2-lb (0.91-kg) weight, with a 5/8-in. (15.8-mm) diameter rounded tip, dropped from the height necessary to generate an impact of 10 in.-lb. (1.13 N-m).
- 12.12 Nighttime Color—Test for nighttime color. Determine the chromaticity in accordance with Practice E811 and evaluated using the CIE system in Practice E308. (The saturation limit shall be considered to extend to the boundary of the chromaticity locus of spectral colors.) Measure using CIE Illuminant A, observation angle of 0.33 degrees, entrance angle of +5 degrees, source and receiver apertures not to exceed 10 minutes of arc, and CIE 1931 (2 degree) standard observer.

13.0 GENERAL REQUIREMENTS:

- 13.1 Sheets—When the retroreflective material is in sheet form, the design, dimension, and tolerances shall be as specified by the purchaser.
- 13.2 Rolls—When ordered in rolls, the retroreflective material shall be evenly wound on a core of sufficient rigidity to prevent distortion of the roll. The maximum number of splices shall be 4/50-yd (46-m) roll. Each splice shall be visible at the edge of the roll. The length and width will be specified by the purchaser.
- 13.3 Color Processing—The sheeting shall permit color processing with compatible transparent and opaque process colors in accordance with the sheeting manufacturer's recommendation at temperatures between 60 to 100°F (16 to 38°C) and relative humidity at 20 to 80%.

14.0 SAMPLING:

- 14.1 To determine conformance to requirements for Coefficients of Retroreflection for rolls or sheets at least 1 yd. (0.914m) long of retroreflective sheeting in new (unexposed) condition:

- 14.1.1 A full width x 1 yd. (0.914 m) long specimen is selected at random to represent the entire sheet, roll, or lot.

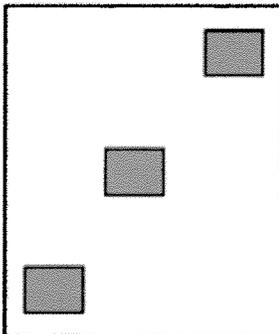
NOTE 5—Samples smaller than 1 yd. (0.914 m) long should not be used to judge conformance for full rolls or lots.

- 14.1.2 Three samples are taken from the selected specimen.

- 14.1.2.1 The three samples shall be spaced evenly across (left, center, and right) and spaced evenly down the specimen as shown in the examples in Fig. 2.

- 14.2 For determining conformance to all other requirements, single samples taken at random shall be tested.
- 14.3 If requested by the City, the two (2) apparent low Bidders will be required to submit samples of the items proposed within seven (7) days of such request. The samples will be used to determine if the proposed items meet the specifications stated herein.
- 14.4 **If the Bidder fails to provide samples within the seven (7) day period, as required, the City may reject the bid and not consider it for further evaluation.** These samples, if not subjected to destructive testing; they will be returned to the bidding Supplier. A notice will be mailed to the Supplier when samples are ready to be released by the City. Supplier will have fourteen (14) days to redeem the samples. If samples are not redeemed within this time period the City cannot be responsible for condition or loss of the subject samples.

A) 1 yd long (0.914 m)



B) 1 yd long (0.914 m)

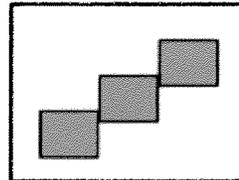


FIG. 2 Examples of Proper Spacing for Samples

TECHNICAL SPECIFICATIONS FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

15.0 PRECISION AND BIAS:

The precision and bias for the test methods in Section 12 have not been determined.

16.0 PACKAGING AND PACKAGE MARKING:

The sheets or rolls manufactured under this specification shall be packaged in accordance with commercially acceptable standards. Each package shall be marked with the following:

| | |
|---------------------------|-------------------|
| Name, Brand, or Trademark | Lot or Run Number |
| Quantity | Part Number |
| Size | Classification |
| Length | |

SUPPLEMENTARY REQUIREMENTS - The following supplementary requirements shall apply only when specified by the City in the Award or order.

17.0 FUNGUS RESISTANCE:

17.1 Scope—This supplementary specification covers fungus-resistance testing.

17.2 Test Requirements and Test Methods:

17.2.1 Test Condition—Unless otherwise specified in this specification, all adhesively bonded and unbounded test samples and specimens shall be conditioned at a temperature of $73 \pm 3^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) and $50 \pm 5\%$ relative humidity for 24 h prior to testing.

17.2.2 Panel Preparations—Unless otherwise specified in this specification, when tests are to be performed using test panels, the specimens of retroreflective material shall be applied to smooth aluminum cut from Alloy 6061-T6, in accordance with Specification B209 or B209M, sheets in 0.020-in. (0.508-mm) thickness. The aluminum shall be prepared in accordance with Specification B449, Class 2 or degreased and lightly acid etched before the specimens are applied. The specimens shall be applied to the panels in accordance with the recommendations of the retroreflective sheeting manufacturer.

17.3 Fungus Resistance:

17.3.1 For use in areas where fungus growth on retroreflective sheeting may be a problem, fungus resistance shall be determined as specified herein.

17.3.2 After inoculation with the test organism, *Aspergillus niger*, and incubation for 14 days, the retroreflective material shall show no appreciable formation of fungus growth. Any formation of fungus growth shall be noninjurious to the retroreflective material and shall be removable by wiping with a soft cloth.

17.3.3 Test Organism—The test organism used in this test shall be *Aspergillus niger*, ATCC Number 6275.² Cultures of this organism shall be carefully maintained on a potatodextrose agar medium and promptly renewed if there is evidence of contamination. The stock cultures may be kept for not more than 4 months in a refrigerator at a temperature between 37 to 50°F (3 to 10°C). Subcultures incubated between 82.4 to 86°F (28 to 30°C) for 10 to 14 days shall be used in preparing the inoculum.

17.3.4 Culture Medium—The culture medium shall have the following composition:

| | |
|--------------------------------------|--------|
| NaNO ₃ | 3.0 g |
| K ₂ HPO ₄ | 1.0 g |
| MgSO ₄ ·7H ₂ O | 0.5 g |
| KCl | 0.25 g |
| Agar | 15.0 g |
| Distilled water to make 1000 mL. | |

17.0 FUNGUS RESISTANCE CONTINUED:

- 17.3.5 The pH shall be 5.5 to 6.5: if otherwise, adjust to that range with HCl or NaOH. After mixing, the ingredients shall be sterilized by autoclaving for 15 minutes at 15 psi (103 kPa) at 248°F (120°C). Under sterile conditions, the medium shall be poured into six petri dishes (150 by 20 mm), about 2.2 oz. (65mL) per dish, and allowed to harden.
- 17.3.6 Inoculum—Add about 0.34 oz. (10 mL) of sterile, distilled water containing about 0.005% of nontoxic wetting agent to a subculture (10 to 14 days old) of the test organism in a ripe, fruiting condition. The spores shall be forced into suspension with a sterile camel's hair brush (or other suitable means) and diluted to 3.4 oz. (100 mL) with sterile, distilled water.
- 17.3.7 Preparation of Specimens—Cut three 3 by 3-in. (76 by 76-mm) specimens from the sample and apply to test panels with the retroreflective surface up. Completely immerse the test specimens in a leaching tank of continuously flowing water for 24 h and then remove and dry. The leaching tank shall be large enough to hold an amount of water weighing not less than 50 times the weight of the specimens. The water entering the tank shall not fall directly on the specimens and shall flow at a rate of 1.3 to 2.6 gal/h (5 to 10 L/h). The pH of the water shall be in the range of 6.0 to 8.0.
- 17.3.8 Inoculation—Under aseptic conditions, dip each specimen in 70% ethanol for a few seconds, rinse in distilled water, and place firmly on the surface of the solidified agar medium contained in the petri dishes. Place specimens with the retroreflective surface facing up, one specimen to each dish. With a sterile pipette, distribute 0.03 to 0.05 oz. (1.0 to 1.5 mL) of inoculum over the surface of each specimen and the surrounding medium.
- 17.3.9 Incubation Period—The period of incubation shall be 14 days at a temperature between 84.2 to 89.6°F (28.9 to 32°C) and 85 to 90% relative humidity.
- 17.3.10 Control—Test three control specimens of untreated, porous-grade filter paper with the specimens of the retroreflective material to check the viability of the inoculum. At the end of the incubation period, the controls should be covered with fungus growth.
- 17.3.11 Test Results—Upon completion of the incubation period, examine the specimens visually for fungus growth. Wipe the specimens with a soft cloth wet with a 70% ethanol solution. Visually examine the specimens for damage resulting from fungus growth. If no pitting or textured surface is found, the sample will be reported to have passed.

18.0 REBOUNDABLE SHEETING REQUIREMENTS:

NOTE 18.1—Not all types of sheeting are available in Reboundable form.

18.1 Performance Requirements:

- 18.1.1 Impact Resistance—Retroreflective sheeting shall show no cracking or delamination outside of the actual area of impact when subjected to the impact test in accordance with 18.2.1.
- 18.1.2 Flexibility Requirements—The sheeting shall be sufficiently flexible to show no cracking when tested in accordance with 18.2.2.
- 18.1.3 Adhesion—When tested in accordance with 18.2.3, the adhesive backing of the retroreflective sheeting shall produce a bond to support a 1¾-lb (0.79-kg) weight for adhesive classes 1 without the bond peeling for a distance of more than 1 in. (25.4 mm).

18.0 REBOUNDBLE SHEETING REQUIREMENTS(CONTINUED):

18.1.4 Outdoor Weathering—The retroreflective sheeting shall be weather resistant and show no appreciable cracking, scaling, pitting, blistering, edge lifting, or curling, or more than 1/32-in. (0.8-mm) shrinkage or expansion after outdoor exposures specified in 12.6. The outdoor exposure time and minimum coefficient of retroreflection (R_A) after exposure is specified in Table 7. Retroreflectivity measurements after outdoor weathering will be made only at 0.2° observation and -4 and +30° entrance angles.

18.2 Test Method:

TABLE 7 Minimum Coefficient of Retroreflection (R_A) and Required Outdoor Exposure Times

| Type | Months | Minimum Coefficient of Retroreflection, R_A |
|------|--------|---|
| XI | 12 | 80 % of Table 1 |

18.2.1 Impact Resistance—Retroreflective sheeting, applied to a 3 by 5 by 0.040-in. (76 by 127 by 1.016-mm) 6061-T6 aluminum test panel as specified in 12.2 and test conditioned as specified in 12.1, shall be subjected to the impact of a 4-lb (1.82-kg) weight, with a 5/8-in. (15.8-mm) diameter rounded tip, dropped from the height necessary to generate an impact of 100 in.-lb. (11.3 N-m).

18.2.2 Flexibility—The sheeting shall be bent, in 1 s, around a 1/8-in. (3.2-mm) mandrel with adhesive contacting the mandrel. For ease of testing, spread talcum powder on the adhesive to prevent sticking to the mandrel. The test specimen shall be 23/4 by 11 in. (70 by 279 mm). The test temperature shall be 32°F (0°C).

18.2.3 Adhesion—Apply the sheeting to a test panel, 0.040-in. (1.016-mm) minimum thickness, prepared as specified in 12.2. Bond 4 in. of a 1 by 6-in. (25.4 by 152-mm) specimen to a test panel. Condition (see 12.1) and then attach the weight to the free end and allow it to hang free at an angle of 90° to the panel surface for 5 minutes, without the bond peeling for more than 1 in. (25.4 mm).

18.2.4 Outdoor Weathering—Test two panels in each location in accordance with Table 6. After panels have been exposed for the number of months listed in 18.1.4, wash and condition them in accordance with 12.6.2, then test for coefficient of retroreflection. Report the average of the coefficient of retroreflection measured at each geometry on the two panels from each exposure location.

19.0 ARTIFICIAL ACCELERATED WEATHERING:

19.1 Scope—This supplementary test may be used for provisional qualification of retroreflective sheeting in the interim period until the results from accelerated outdoor weathering are available (see 12.6). The results from accelerated outdoor weathering shall supersede and take precedence over the results from artificial accelerated weathering tests.

19.2 Test Specimens—Expose three replicate specimens. Each test specimen shall be a minimum of 2.5 in by 2.5 in (64 mm by 64 mm)

19.3 Test Conditions—Conduct exposures in a xenon arc exposure apparatus to simulate direct exposure to solar radiation. Operate the exposure apparatus in accordance with the basic principles and operating procedures of Practice G155 for using xenon arc and water apparatus intended to reproduce the weathering effects that occur when materials are exposed to sunlight, heat and moisture as rain or dew in actual use.

TECHNICAL SPECIFICATIONS FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

NOTE: Results from artificial accelerated weathering tests are best used to compare the relative stability of materials. Reproducibility between laboratories has been shown to be good when the stability of materials is evaluated in terms of performance ranking compared to a control material of similar composition and construction and known outdoor stability; therefore, exposure of a control material at the same time as the test material is strongly recommended (see Practice G151).

19.3.1 Simulation of Terrestrial Daylight—The xenon arc shall be filtered to provide a simulation of terrestrial daylight. The spectral power distribution of the filtered xenon arc shall conform to the Relative Ultraviolet Spectral Power Distribution Specification for Xenon Arc with Daylight Filters in Practice G155, Table 1.

19.3.2 Exposure Test Methods—Three methods are provided for testing to determine conformance to provisional weathering requirements. These methods correspond to international practices for artificial accelerated weathering. Method I is equivalent to ISO 4892-2:2006/Amd.1:2009 Cycle 10, Method II is equivalent to Practice G155 Cycle 1 and Method III is equivalent to ISO 4892-2:2006 Plastics Cycle 1. Control the exposure conditions according to the exposure set point parameters in Table 8.

NOTE: The operational fluctuations given in Table 8 do not imply that the user is allowed to program a set point higher or lower than the exact set point specified. They refer to allowable deviations from the set point in the reading observed at the control sensor during equilibrium operating conditions. These deviations are the result of normal operational variations in apparatus. If the operational fluctuation is greater than the maximum allowable specified in Table 8, discontinue the test until the problem is resolved

19.3.2.1 Results obtained using any of the methods shall be accepted for showing conformance to this supplementary requirement.

NOTE: Method III meets the requirements of EN12899-1:2007. The historical practice within CEN and ISO has been to specify the Black Standard Thermometer for controlling temperature in xenon arc apparatus.

19.3.3 Xenon Arc Irradiance Setting—The recommended irradiance set point is $0.51 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm. However, to accommodate testing in xenon arc machines set at $0.35 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm specified for other types of specimens being tested at the same time, the option is given to test retroreflective sheeting at the lower irradiance level. Therefore, the test duration is specified in terms of radiant exposure rather than time in order to provide equivalent radiant exposures at the different irradiance levels.

NOTE: A) Rationale for the Xenon Arc Recommended Irradiance Setting of $0.51 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm: 1) Data on spectral solar irradiance as a function of time of day in Miami, Florida and Phoenix, Arizona show that for approximately two to three hours before and after local noon, the irradiance on a surface angled 45° from the horizontal and facing the equator is at least $0.50 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm for a significant portion of the year. Thus, the xenon arc irradiance of $0.51 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm is representative of solar irradiance levels to which retroreflective sheeting is exposed in the accelerated outdoor benchmark exposure sites; 2) The recommendation is also made to encourage harmonization among international standards for artificial accelerated weathering of retroreflective sheeting. In ISO standards for xenon arc exposures using daylight filters the irradiance set point is generally specified as $60 \text{ W}/\text{m}^2$ in the spectral region 300 nm to 400 nm, which corresponds to $0.51 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm.

NOTE: B) Radiant energy is not the sole weathering factor responsible for degradation of polymeric materials. Method II runs at a lower irradiance set point requiring longer test duration to accumulate the specified radiant exposure. This longer exposure time may for some retroreflective sheeting produce greater changes in properties than the higher irradiance methods due to the consequent longer residence time at high temperature.

19.4 Test Requirements—Expose specimens to the radiant exposure required in Table 9. After exposure, wash and condition the specimens in accordance with 12.6.2.

NOTE: A) When specimens are removed from the weathering device, it should be during the light only period of the test cycle.

NOTE: B) General relationship between Artificial Accelerated weathering and Accelerated Outdoor Weathering requirements - The 20 year annual average total UV (295-385 nm) radiant dosage on a surface angled 45° from the horizontal and facing the equator for Miami, Florida and Phoenix, Arizona are $283 \text{ MJ}/\text{m}^2$ and $331 \text{ MJ}/\text{m}^2$, respectively. A test specimen exposed to $3670 \text{ kJ}/(\text{m}^2 \cdot \text{nm})$ at 340 nm in a typical xenon arc apparatus with daylight filters will have received a total UV (295-385 nm) radiant dosage on the order of $330 \text{ MJ}/\text{m}^2$. The artificial accelerated weathering simulates the radiant dosage received during approximately 1 year of accelerated outdoor weathering at the benchmark exposure sites.

19.0 ARTIFICIAL ACCELERATED WEATHERING:

- 19.4.1 Conduct coefficient of retroreflection measurements of each replicate specimen after exposure at 0.2° observation angle and at -4° and +30° entrance angles in accordance with Test Method E810. For each combination of entrance and observation angle the average of the replicate specimens shall meet or exceed the minimum requirements for the applicable Type in Table 9.
- 19.4.2 After exposure, the test specimens shall show no appreciable cracking, scaling, pitting, blistering, edge lifting, or curling of more than 1/32 in. (0.8 mm) shrinkage or expansion.
- 19.4.3 After exposure, measure the Daytime Color of each replicate specimen in accordance with 12.4. The daytime color of the retroreflective sheeting shall conform to requirements of Table 2 and Table 3 for the appropriate Type of sheeting.

TABLE 8 Xenon Arc Apparatus Operating Conditions and Set Points

| Exposure Parameters | Method I | Method II | Method III |
|---|--|--|--|
| Irradiance set point at 340 nm ^A | 0.51 W/ (m ² ·nm) | 0.35 W/ (m ² ·nm) | 0.51 W/ (m ² ·nm) |
| Light/Dark Cycle | Continuous light | Continuous light | Continuous light |
| Panel Temperature set point ^B | 63°C | 63°C | na |
| Black Standard Thermometer Temperature set point ^B | na | na | 65°C |
| Water Spray Cycle ^C | Alternating periods of 102 minutes light only and 18 minutes light + water spray | Alternating periods of 102 minutes light only and 18 minutes light + water spray | Alternating periods of 102 minutes light only and 18 minutes light + water spray |
| Relative Humidity set point ^D | 50 % during the light only period (optional) | 50 % during the light only period (optional) | 50 % during the light only period |
| Chamber Air Temperature ^E | 38 °C (optional) | 38 °C (optional) | 38 °C |

^AThe allowed deviation from the stated irradiance indicated by the device used to monitor irradiance at 340 nm is ± 0.02 W/ (m²·nm) during equilibrium conditions.

^BThe allowed deviation from the stated temperature indicated by the device used to monitor temperature is ± 2.5 °C during equilibrium conditions.

^CWater spray refers to water sprayed on the exposed surface of the test specimens.

^DWhen chamber humidity control is used, the control set point shall apply only to the light only period with an allowed deviation from the stated relative humidity indicated by the device used to monitor humidity of ± 10 % during equilibrium conditions.

^EWhen chamber air temperature control is used, the allowed deviation from the stated temperature indicated by the device used to monitor chamber temperature is ± 2 °C during equilibrium conditions. Xenon arc exposures are typically which allows the air temperature in the chamber to find its own level during the test cycle. While most models of xenon arc apparatus now allow for chamber air temperature control some older models do not have this capability.

TABLE 9 Radiant Exposure Requirements for Artificial Accelerated Weathering with corresponding Exposure Times and Retained Photometric Requirements

| Retroreflective Sheeting Type | Radiant exposure @ 340 nm (kJ/(m ² •nm)) | Methods I & III Exposure Time (hours) | Method II Exposure Time (hours) | Minimum Coefficient of Retroreflection, R _A |
|-------------------------------|---|---------------------------------------|---------------------------------|--|
| XI | 3670 ^A | 2000 | 2915 | 80% of Table 1 |

^AWhen sheeting is specified for construction work zone applications, the minimum radiant exposure shall be 920 kJ/(m²•nm) at 340 nm (equivalent to 500 hours using Methods I or III and 730 hours exposure using Method II).

19.5 Other Specifications

19.5.1 American Association of State Highway and Transportation Officials. AASHTO designation M 268-03.⁴

E1247 Practice for Detecting Fluorescence in Object-Color Specimens by Spectrophotometry

20.0 CORRECTION FACTORS FOR CONVERSION FROM ILLUMINANT C TO ILLUMINANT D65

20.1 Table 10 lists the correction factors to change measurements made using Illuminant C to approximate measurements made using Illuminant D65.

TABLE 10 Correction Factors for Conversion from Illuminant C to Illuminant D65

NOTE 1—As an example, a blue sample which measured (x, y, Y) = (0.150, 0.150, 5.0) using Illuminant C would be converted to (0.149, 0.158, 5.0) to provide the result using Illuminant D65.

| Color | x | y | Y |
|--------|--------|--------|------|
| White | +0.003 | +0.014 | 0.00 |
| Yellow | +0.001 | +0.002 | 0.00 |
| Orange | +0.001 | +0.001 | 0.00 |
| Green | +0.000 | +0.019 | 0.00 |
| Red | +0.000 | +0.001 | 0.00 |
| Blue | -0.001 | +0.008 | 0.00 |
| Brown | +0.000 | 0.000 | 0.00 |

21.0 GRAFFITI RESISTANT:

21.1 The overlay film should be resistant to most enamels, strong acids and alkalis. The overlay film shall have a transparent, flexible smooth-surfaced, moisture resisting material and shall have sufficient strength and flexibility to be easily handled, cut to shape, processed and applied without appreciable stretching, tearing or other damage.

21.2 SATISFACTORY PERFORMANCE LIFE:

The overlay film will perform effectively provided that application and maintenance is followed in accordance to the manufacturer's recommendations. It is considered unsatisfactory if it has deteriorated due to natural causes to the extent that:

21.0 GRAFFITI RESISTANT (CONTINUED):

21.2.1 The sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night conditions.

21.2.2 The reflective intensity is less than the minimums specified by the retro-reflective sheeting type. All measurements shall be made after sign cleaning according to the manufacturer's recommendations.

21.3 GENERAL CHARACTERISTICS AND PACKAGING:

The film shall be of appearance, free from ragged edges and cracks and shall be furnished in rolls. Shheeting furnished shall be of good appearance, free from ragged cracks, and extraneous materials and shall be furnished in rolls.

21.4 PHOTO METRICS:

A composite produced by applying protective film over reflective sheeting shall provide retroreflective performance conforming to the requirements of screen processed sheeting of the same type throughout the effective life of the reflective sheeting.

21.5 CLEANABILITY:

The overlay film manufacturer shall identify acceptable cleaning systems sufficient to clean paint and other surface contaminants without damaging the sign face.

21.6 FIELD PERFORMANCE:

The expected performance life of a sign face constructed of overlay film and reflective sheeting shall be equivalent to the performance life of the retroreflective material used.

21.7 STORAGE:

The overlay film, when stored according to manufacturer's recommendations, shall be suitable for use for a period of up to one (1) year.

For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2 Available from the American Type Culture Collection (ATCC), 12301 Parklawn Dr., Rockville, MD 20852, or Mycology Laboratory, PRL, U.S. Army Natick Laboratories, Natick, MA 01760.

4 Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

22.0 PRICE ADJUSTMENT FOR LINE ITEMS (ITEM NOS. 1 THRU 18):

22.1 Direct Cost:

In this section means Supplier's cost from the manufacturer of any item or if Supplier is the manufacturer, the cost of raw materials required to manufacture the item, plus costs of transportation from manufacturer to Supplier and Supplier to the City.

22.2 Price Decreases:

22.2.1 If the Supplier's Direct Cost **decreases** at any time during the term of this award, Supplier shall **immediately** pass the decrease on to the City and lower its prices by the amount of the decrease in Direct Cost.

22.2.2 The Supplier shall notify the City Purchasing Agent of price decreases in the same way as for price increases set out below. The price decrease shall become effective upon City Purchasing Agent's receipt of Supplier's notice.

22.3 Price Increases:

22.3.1 Suppliers may request a price increase after **twelve (12) months** from the bid opening date of the bid received by the City Secretary of the City of Houston. Subsequent price increases may be requested **six (6) months** from the date of the previous approved price increase. The amount of the first increase shall not exceed actual documented increase in Supplier's Direct Cost and shall not ever be more than **10%** above the previous bid price. The amount of the subsequent price increase shall also not exceed this percentage.

22.3.2 To request a price increase, Supplier must submit a letter setting the amount of the increase, along with an itemized list of any increased prices, showing the Supplier's current price, revised price, the actual dollar difference and the percentage of the price increase by line item. Documentation from the Supplier's supplier(s) showing the actual dollar increase to the Supplier must accompany this request. Such documentation from the Supplier's supplier must clearly show the dollar increase incurred by the Supplier on the applicable award per item bid. The letter and documentation shall be sent to the following address:

**City Purchasing Agent
City of Houston
P.O. Box 1562
Houston, Texas 77251**

22.3.3 If the City Purchasing Agent approves the price increase, he or she shall notify Supplier in writing; no price increase will be effective until Supplier receives this notice. If the City Purchasing Agent does not approve Supplier's price increase, Supplier may terminate its performance upon **sixty (60) days** advance written notice to the City Purchasing Agent. Termination of performance is Supplier's only remedy if the City Purchasing Agent does not approve the price increase.

22.3.4 If, at any time after approving a price increase, the City Purchasing Agent determines that the City can obtain the same item at a lower price from a different source without violating the State bid laws, the City may then purchase the item from the lower price source without any obligation to the Supplier.

23.0 PRICE ADJUSTMENT FOR PRICE LIST (ITEM NO. 19):

- 23.1 The price percentage adjustment bid shall remain firm during the full term of the award. Price adjustments will be determined from the plus or minus percentage applied to the manufacturer's published price list lowest unit price column as originally bid.
- 23.2 The price list(s) submitted with this bid will be in effect from the date bids are received and opened by the City Secretary. A price list substitution may be made any time after award by City Council. This substitution will be the updated version of the price list submitted with the bid. A letter from the manufacturer stating the new price list submitted is the replacement for the one being replaced must accompany the request. This letter must also state when (date) the new price list was distributed to its distributors/suppliers. **The new price list will not be accepted as a price list substitute if it was distributed and/or in the possession of the Bidder(s) before the bid due date.** A request to substitute the price list(s) with revised price list(s) will be allowed subject to the City Purchasing Agent's approval. Substitute price list(s) may only be later revisions to the original price list(s) bid. Acceptance of any revised price list(s) will be considered after the Supplier submits the following to the City of Houston City Purchasing Agent; Strategic Purchasing Division; P.O. Box 1562; Houston, Texas 77251:
- 23.2.1 A letter clearly stating **PRICE ADJUSTMENT REQUEST AND NAME AND NUMBER OF THE INVITATION TO BID** in the contents and on the outside of the envelope;
- 23.2.2 Itemized revised price list indicating effective date; and
- 23.2.3 Multiple copies of the revised manufacturer's price list(s) for distribution to participating City departments.
- 23.3 **Price list substitution(s) shall become effective only upon the Supplier's receipt of express written consent from the City of Houston City Purchasing Agent or his designee. Price list substitution(s) shall not be effective until such written consent is received.** If the Supplier submits a request for price list(s) substitution in accordance with the above revisions and the City Purchasing Agent fails to approve such request, the Supplier may terminate its performance upon 60-day advance notification in writing. This will be the Supplier's only remedy in the event a price adjustment is not approved. The effective date of the price list(s) change shall be no earlier than 30-days following receipt of written request by the City unless otherwise stated in the approval letter from the City Purchasing Agent or his designee. **No retroactive price changes will be honored for delinquent requests.** The price in effect on the date of issue of the purchase order establishes the price to be paid.
- 23.4 The City of Houston's City Purchasing Agent reserves the right to obtain a different source(s) to meet the requirements for any item(s) which has increased in price if said item(s) may be obtained a at lower price and if it is deemed in the best interest of the City to do so.

BIDDER'S QUESTIONNAIRE

In order to receive bid award consideration, the bidder must be able to demonstrate that they are currently providing or have had at least one contract, as a prime supplier, for delivering **reflective and non-reflective materials** that is similar in size and scope to this solicitation. The reference(s) should be included in the space provided below. Please attach another piece of paper if necessary. If references are not included with the bid, the bidder shall be required to provide such references to the City of Houston within five working days from receipt of a written request from the City of Houston to do so. **Bidder's capability and experience shall be a factor in determining the Supplier's responsibility. Bidder must have references documenting that it has delivered reflective and non-reflective materials.**

1. Name: _____
Address: _____
City & State: _____
Name & Phone Number of Contact: _____ Years of Services: _____

2. Name: _____
Address: _____
City & State: _____
Name & Phone Number of Contact: _____ Years of Services: _____

3. Name: _____
Address: _____
City & State: _____
Name & Phone Number of Contact: _____ Years of Services: _____

SECTION C
CITY OF HOUSTON
GENERAL TERMS AND CONDITIONS
FOR
REFLECTIVE AND NON-REFLECTIVE MATERIALS
FOR
VARIOUS DEPARTMENTS

1.0 TERM OF AWARD:

- 1.1 The term of the award shall be for a thirty-six (36) month period beginning on the date specified in the Notice of Award letter. During this period, purchase orders will be issued for items as needed. Any conflict between the terms and conditions as specified herein and said purchase orders; the term and conditions of this award shall govern. The supplier will not perform against the award without first having received an official City of Houston purchase order. While it is the intent to procure goods/services by issuing an Official City of Houston Purchase Order, there will be instances when a Purchasing Card (P-Card) or Petty Cash may be used. **The City requires that the prices awarded be honored on all purchases.**
- 1.2 It is emphasized that the City of Houston does not guarantee to purchase any specific quantity of any item listed; rather, the quantities may vary depending upon the actual needs of the user departments. Supplier shall remain obligated to the City under all clauses of this award that expressly or by their nature extend beyond and survive the expiration or termination of the award, including but not limited to warranties and indemnity provisions hereof.
- 1.3 "Upon written notice to the Supplier from the City Purchasing Agent or his designee, the term of this award shall be extended on the same terms and conditions on a month-to-month basis until (1) approval of a new award or (2) spending authority has been reached, whichever occurs first."

2.0 OPTIONAL EXTENSION:

This award may be extended for two additional one (1) year periods upon acceptance of the Supplier and thirty (30) days prior written notice from the City Purchasing Agent. A price increase subject to the provisions of this award may be requested by the Supplier for approval by the City Purchasing Agent at this time. If the price increase is approved by the City Purchasing Agent or if no price increase is requested, a letter of extension will be issued by the City Purchasing Agent for the Supplier's acceptance under the same terms and conditions as the existing award.

3.0 SUPPLIER'S DUTY TO PAY:

Supplier shall make timely payments to all persons and entities supplying labor, materials or equipment for the performance of this award. Supplier agrees to protect, defend, and indemnify the City from any claims or liability arising out of Supplier's failure to make such payments. (Disputes relating to payment of MWBE subcontractors shall be submitted to arbitration in the same manner as any other disputes under the MWBE subcontract. Failure of the Supplier to comply with the decisions of the arbitrator may, at the sole discretion of the City, to be deemed a material breach leading to termination of this award).

4.0 INTER-LOCAL AGREEMENTS

Under the same terms and conditions hereunder, the award may be expanded to other government entities through inter-local agreements between the City of Houston and the respective government entity that encompass all or part of the products provided under this award. Separate agreements will be drawn to reflect the needs of each participating entity.

5.0 PRICE LISTS (ITEM NO. 19):

5.1 Internet-Based Catalog/Price List

5.1.1 It is the City's desire that all price lists be provided electronically; therefore, if the Supplier is submitting a bid on any price list item as an **INTERNET-BASED CATALOG**, it is mandatory that pricing is in a secure format, available to the City of Houston in an **INTRANET** fashion. No custom software should be required to access the electronic catalog. The Supplier shall provide the ability for unlimited amount of users to order via on-line communication with the supplier's computer system by the City of Houston's PC terminals, printers, fax, or telephone. The supplier shall also provide the capability to conduct orders using the City of Houston Charge Card.

5.1.2 Supplier shall provide initial and on-going training and the set-up of PCs for City of Houston end-users.

5.1.3 Supplier's electronic catalog should include the following features:

5.1.3.1 Support open technology and standards such as Open-Buying on the Internet (OBI)

5.1.3.2 Flexible and robust product search methods

5.1.3.3 Account and user profile control including dollar limit processing

5.1.3.4 On-line ordering using a shopping cart utility

5.1.3.5 On-line order/usage history reporting

5.1.3.6 Notification of price changes in accordance with City of Houston terms and conditions

5.1.3.7 Help functions

5.1.3.8 Order processing using the City's Procurement Card

5.2 The Supplier shall furnish Price Lists to the Pricing Section of the Strategic Purchasing Division for distribution to all ordering departments, divisions and sections of the City of Houston requiring these items. Within ten (10) working days from written notification by the City Purchasing Agent, the Supplier shall furnish to the Pricing Section of the Strategic Purchasing Division, the number of required copies of its price list(s) bid for use by City Departments. Failure to timely furnish such price lists may result in rescinding the award. Each time a Supplier submits a revised price list it shall furnish the number of revised price list(s) required to the Pricing Section within ten working (10) days of such revision. Failure to do so may result in rescinding the award. **THESE PRICE LIST(S) SHALL BE FURNISHED AT NO COST TO THE CITY OF HOUSTON.**

5.3 Original, unaltered, manufacturers' price lists and revisions are requested. If all originals cannot be obtained, at least one (1) original plus photocopies of the original price list may be furnished provided each photocopy is certified as a true and accurate unaltered reproduction of the original. Each reproduced price list must have a notarized signature of authority that is certifying on the face thereof the copy is a true and accurate unaltered reproduction of the original. Although copies may be accepted, **IT IS A MANDATORY REQUIREMENT TO SUBMIT AT LEAST ONE (1) ORIGINAL PRICE LIST OR ACCESS TO THE MANUFACTURER'S INTERNET BASED CATALOG IN ORDER FOR YOUR BID TO BE CONSIDERED FOR AWARD RECOMMENDATION.**

5.4 A MINIMUM OF TEN (10) PRICE LISTS WILL BE REQUIRED FOR EACH ITEM AWARDED FROM THE SUCCESSFUL SUPPLIER(S) PRIOR TO AWARD. **THIS IS ONLY A MINIMUM REQUIREMENT OF THE NUMBER OF PRICE LISTS AND IS SUBJECT TO INCREASE ACCORDING TO THE REQUIREMENTS OF THE DEPARTMENTS.** THE SAME OR LIKE QUANTITIES WILL BE REQUIRED FOR SUBMITTAL OF REVISED PRICE LISTS.

5.5 Price lists furnished for these items shall include but shall not be limited to OEM descriptive catalogs and/or supplemental publications that clearly define each part number cost. Electronic media versions are preferred.

5.6 **THE CITY OF HOUSTON RESERVES THE RIGHT TO DUPLICATE THE PRICE LISTS AWARDED FOR DISSEMINATING TO THE DEPARTMENTS.**

GENERAL TERMS AND CONDITIONS FOR REFLECTIVE AND NON-REFLECTIVE MATERIALS: CONTINUED:

6.0 ADDENDA TO PRICE LIST(S) (ITEM NO. 19):

If addenda containing new parts not listed in the price list(s) submitted with the original bid are received by the Supplier from the manufacturer, the Supplier may submit the addendums having new items identified by part number reference and highlighted in addenda price lists for easy identification to the City Purchasing Agent for consideration. The City Purchasing Agent will allow addenda only upon written acceptance and only new items may be added. No item(s) presently listed in the Price List(s) will be considered from these addenda. All such addenda shall be subject to the requirements of Section 252.048 of the Texas Local Government Code.

7.0 INVOICING:

- 7.1 In order to expedite payment all invoices must be submitted in triplicate, itemized as to quantity, part number, description, and applicable discount (if any) in the same order and form as in the City of Houston Purchase Order. Variations will only delay payment. In addition, invoices must show the name of the Department, Division or Section to which the merchandise was delivered, and the City of Houston Purchase Order Number.
- 7.2 All delivery tickets must have a description of the commodity delivered.
- 7.3 Mail invoices to the Accounts Payable Section of the department and to the address, as noted on individual purchase orders.
- 7.4 Delivery tickets and packing slips shall contain the same information as the invoice.
- 7.5 All packing slips and delivery tickets must be signed by the receiving employee and must show his/her City employee number.

8.0 PAYMENT:

Payment is due thirty (30) days after the City has approved the invoice or after the City has accepted the goods, whichever occurs later.

9.0 CONTAMINATED MATERIALS:

Each Supplier shall be required to identify their source of supply. No material will be accepted from a hazardous or toxic waste site, regardless of whether the site has been identified by either a Local, State or Federal Agency. No contaminated, toxic, hazardous waste products or heavy metal product shall be contained in these deliveries. If any material, supplied to the City is found to be contaminated or contain heavy metal products, it will be the responsibility of the Supplier to remove and replace the contaminated product at their expense and at no cost to the City. The City has the option to solicit the removal of any contaminated material and charge back the Supplier any and all costs involved.

10.0 INSPECTIONS AND AUDITS:

- 10.1 The City reserves all rights to review all payments made to Suppliers by auditing at a later date. Subject to such audit, any overpayments may be recovered from the Supplier.
- 10.2 Representatives of the City have the right to examine the books of all subcontractors and/or suppliers supplying goods and/or services under the prime award insofar as those books and records relate to performance under the prime award.
- 10.3 City representatives may have the right to perform, or have performed, (1) audits of Supplier's books and records, and (2) inspections of all places where work is undertaken in connection with this award. Supplier shall keep its books and records available for this purpose for at least three years after this award terminates. This provision does not affect the applicable statute of limitations.

11.0 SILENCE OF SPECIFICATIONS:

The apparent silence of these specifications as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of these specifications shall be made on the basis of this statement. The Bidder shall be an established Supplier of the items bid.

12.0 SPECIFIED EQUIPMENT, OR EQUIVALENT:

- 12.1 Wherever in the specifications any materials or processes are indicated or specified by patent of proprietary name and/or by name of manufacturer, such specifications shall be deemed to be used for the purpose of facilitating descriptions of the performance, materials and/or processes desired and shall be deemed to be followed by the words, "or equivalent", if not so stated in the specifications herein.
- 12.2 The burden of proof shall rest with the Bidder, in the course of a technical evaluation, to prove that the proposed item(s) are equivalent to the performance, materials, processes, or articles specified. **DETERMINATION AS TO WHETHER THE ITEM(S) BID IS/ARE EQUIVALENT TO THOSE SPECIFIED SHALL REST SOLELY WITH THE CITY PURCHASING AGENT AND THE RECEIVING DEPARTMENT.**

13.0 DELIVERIES:

- 13.1 The Supplier agrees to make deliveries within ten (10) working days only upon receipt of duly signed and approved Purchase Orders issued by the City of Houston City Purchasing Agent or designee. Delivery made without such Purchase Order shall be at Supplier's risk and shall leave the City the option of canceling any award implied or expressed herein.
- 13.2 Unless otherwise stated in the Bid Form or Specifications, deliveries must consist only of new and unused merchandise.
- 13.3 Full tare must be allowed and no charges made for packages.
- 13.4 In the event that the deliveries of the supplies covered in the solicitation are not made within the number of days specified, or in the event that the supplies delivered are rejected, and are not removed and replaced within the number of days specified in the official notice of rejection, the City reserves the right to terminate. The defaulting Supplier will be deemed non-responsible and will be disqualified from bidding on the solicitation if it is re-let by the City within ninety (90) days of such termination.

14.0 SHIPPING TERMS:

Prices shall be F.O.B. Destination to the delivery location designated herein or on a purchase order. The Supplier shall retain title and control of all goods until they are delivered and the award of coverage has been completed. All risk of transportation and all related charges shall be the responsibility of the Supplier. The Supplier shall file all claims for visible or concealed damage. The City will notify the Supplier promptly of any damaged goods and shall assist the Supplier in arranging for inspection.

15.0 MATERIALS:

The items furnished shall be the latest product in production to commercial trade, and shall be of the highest quality as to materials used. The Supplier furnishing these items shall be experienced in the production of such items and shall furnish evidence of having supplied similar items, which have been in successful operation. The Bidder shall be an established Supplier of the items bid.

16.0 RESTOCKING (EXCHANGES AND RETURNS):

There will be no restocking charge to the City for return or exchange of any item purchased under the terms of this award. If the City wishes to return items purchased under this award, the Supplier agrees to exchange, these items for other items, with no additional charge incurred. Items must be returned to Supplier within thirty (30) days from date of delivery. If there is a difference in price in the items exchanged, the Supplier shall invoice the City for increase price or provide the City with a credit or cash refund for any decrease in price. On items returned, a credit or cash refund will be issued by the Supplier to the City. This return and exchange option shall extend for thirty (30) days following the expiration date of the award. All items returned by the City must be unused and in the same merchantable condition as when received. **Items that are special ordered and/or stocked by the Supplier at the specific request of the City may be returned only upon approval of the Supplier.**

17.0 ADDITIONS & DELETIONS:

The City, by written notice from the City Purchasing Agent to the Supplier, at any time during the term of this award, may add or delete like or similar equipment, supplies, locations and/or services to the list of equipment, supplies, locations, and/or services to be provided. Any such written notice shall take effect on the date stated in the notice from the City. Similar equipment, supplies, services, or locations added to the award shall be in accordance with the solicitation specification/scope of services, and the charges or rates for items added shall be the same as specified on the bid form. In the event additional equipment, supplies, locations and/or services are not identical to the item(s) already awarded, the charges therefore will then be the Supplier's normal and customary charges or rates for the equipment, supplies, locations and/or services classified on the bid form.

18.0 FORCE MAJEURE

18.1 Timely performance by both parties is essential to the award. However, neither party is liable for delays or other failures to perform its obligations to the extent the delay or failure is caused by Force Majeure. Force Majeure means fires, floods, explosions, and other acts of God, war, terrorist acts, riots, court orders, and the acts of superior governmental or military authority.

18.2 This relief is not applicable unless the affected party does the following:

18.2.1 uses due diligence to remove the Force Majeure as quickly as possible; and

18.2.2 provides the other party with prompt written notice of the cause and its anticipated effect.

18.3 The City may perform or solicit functions itself during periods of Force Majeure. Such performance does not constitute a default or breach of this award by the City.

18.4 If the Force Majeure continues for more than 30 days, the City Purchasing Agent or Director upon written authorization by the City Purchasing Agent may terminate this award by giving 30 days' written notice to Supplier. This termination is not a default or breach. SUPPLIER WAIVES ANY CLAIM IT MAY HAVE FOR FINANCIAL LOSSES OR OTHER DAMAGES RESULTING FROM THE TERMINATION EXCEPT FOR AMOUNTS DUE AT THE TIME OF THE TERMINATION.

19.0 MEASUREMENTS:

The measurement stated for these items are approximates. The City reserves the right to accept items that are similar in size, if in the City's judgment, the item bid fulfills the intended purpose.

20.0 WARRANTY:

A minimum warranty of twelve (12) months from Supplier and the manufacturer's warranty will be furnished on materials and workmanship shall be provided. The warranty period shall begin the day the City officially accepts the item. Any warranty work is to be completed within five (5) working days after receipt of item.

21.0 RELEASE:

PRIME SUPPLIER AGREES TO AND SHALL RELEASE THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES (COLLECTIVELY THE "CITY") FROM ALL LIABILITY FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THIS AGREEMENT, EVEN IF THE INJURY, DEATH, DAMAGE, OR LOSS IS CAUSED BY THE CITY'S SOLE OR CONCURRENT NEGLIGENCE AND/OR THE CITY'S STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY.

22.0 INDEMNIFICATION:

22.1 PRIME SUPPLIER AGREES TO AND SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES (COLLECTIVELY THE "CITY") HARMLESS FOR ALL CLAIMS, CAUSES OF ACTION, LIABILITIES, FINES, AND EXPENSES (INCLUDING, WITHOUT LIMITATION, ATTORNEYS' FEES, COURT COSTS, AND ALL OTHER DEFENSE COSTS AND INTEREST) FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THIS AGREEMENT INCLUDING, WITHOUT LIMITATION, THOSE CAUSED BY:

- (1) PRIME SUPPLIER'S AND/OR ITS AGENTS', EMPLOYEES', OFFICERS', DIRECTORS', CONTRACTORS', OR SUBCONTRACTORS' (COLLECTIVELY IN NUMBERED PARAGRAPHS 1-3, "PRIME SUPPLIER") ACTUAL OR ALLEGED NEGLIGENCE OR INTENTIONAL ACTS OR OMISSIONS;
- (2) THE CITY'S AND PRIME SUPPLIER'S ACTUAL OR ALLEGED CONCURRENT NEGLIGENCE, WHETHER PRIME SUPPLIER IS IMMUNE FROM LIABILITY OR NOT; AND
- (3) THE CITY'S AND PRIME SUPPLIER'S ACTUAL OR ALLEGED STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY, WHETHER PRIME SUPPLIER IS IMMUNE FROM LIABILITY OR NOT.

22.2 PRIME SUPPLIER SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY HARMLESS DURING THE TERM OF THIS AGREEMENT AND FOR FOUR YEARS AFTER THE AGREEMENT TERMINATES. PRIME SUPPLIER'S INDEMNIFICATION IS LIMITED TO \$500,000 PER OCCURRENCE. PRIME SUPPLIER SHALL NOT INDEMNIFY THE CITY FOR THE CITY'S SOLE NEGLIGENCE.

22.3 INDEMNIFICATION PROCEDURES:

- (1) Notice of Claims. If the City or Prime Supplier receives notice of any claim or circumstances which could give rise to an indemnified loss, the receiving party shall give written notice to the other party within 10 days. The notice must include the following:
 - (a) a description of the indemnification event in reasonable detail,
 - (b) the basis on which indemnification may be due, and
 - (c) the anticipated amount of the indemnified loss.

This notice does not estop or prevent the City from later asserting a different basis for indemnification or a different amount of indemnified loss than that indicated in the initial notice. If the City does not provide this notice within the 10 day period, it does not waive any right to indemnification except to the extent that Prime Supplier is prejudiced, suffers loss, or incurs expense because of the delay.

- (2) Defense of Claims
 - (a) Assumption of Defense. Prime Supplier may assume the defense of the claim at its own expense with counsel chosen by it that is reasonably satisfactory to the City. Prime Supplier shall then control the defense and any negotiations to settle the claim. Within 10 days after receiving written notice of the indemnification request, Prime Supplier must advise the City as to whether or not it will defend the claim. If Prime Supplier does not assume the defense, the City shall assume and control the defense, and all defense expenses constitute an indemnification loss.
 - (b) Continued Participation. If Prime Supplier elects to defend the claim, the City may retain separate counsel to participate in (but not control) the defense and to participate in (but not control) any settlement negotiations. Prime Supplier may settle the claim without the consent or agreement of the City, unless it (i) would result in injunctive relief or other equitable remedies or otherwise require the City to comply with restrictions or limitations that adversely affect the City, (ii) would require the City to pay amounts that Supplier does not fund in full, (iii) would not result in the City's full and complete release from all liability to the plaintiffs or claimants who are parties to or otherwise bound by the settlement.

23.0 WORKER'S COMPENSATION INSURANCE:

On any City award with a labor component or any award where Supplier delivery people make deliveries for City sites, Worker's Compensation Insurance as shown in the Insurance Section is required.

24.0 INSURANCE:

- 24.1 If performance of this award requires Supplier to provide labor in addition to supplies, labor and materials, the Supplier shall have and maintain in effect insurance coverage and furnish certificates of insurance showing the City as an additional insured, in duplicate form, prior to the beginning of the award. The City shall be named as an additional insured on all such policies except Worker's Compensation. **The issuer of any policy shall have a Certificate of Authority to transact insurance business in the State of Texas or have a Best's rating of at least B+ and a Best's Financial Size Category of Class VI or better, according to the most current edition of Best's Key Rating Guide, Property-Casualty United States.** Comprehensive General Liability including Contractual Liability and Automobile Liability insurance shall be in at least the following amounts: Automobile Liability Insurance for autos furnished or used in the course of performance of this award including Owned, Non-owned, and Hired Auto coverage (Any Auto coverage may be substituted for Owned, Non-owned and Hired Auto coverage.) If no autos are owned by Supplier, coverage may be limited to Non-owned and Hired Autos. If Owned Auto coverage cannot be purchased by Supplier, Scheduled Auto coverage may be substituted for Owned Auto coverage. EACH AUTO USED IN PERFORMANCE OF THIS AWARD MUST BE COVERED IN THE LIMITS SPECIFIED - \$1,000,000.00 Combined Single Limit.
- 24.2 Worker's Compensation including Broad Form All States endorsement shall be in statutory amount.
- 24.3 All insurance policies required by this award shall require by endorsement, that the insurance carrier waive any rights of subrogation against the City, and that it shall give thirty (30) days written notice to the City before they may be cancelled. Within such thirty (30) day period Supplier, covenants that it will provide other suitable policies in lieu of those about to be cancelled so as to maintain in effect the coverage required under the provisions hereof. Failure or refusal of the Supplier to obtain and keep in force the above-required insurance coverage shall authorize the City, at its option, to terminate this award at once.
- 24.4 ONLY UNALTERED ORIGINAL INSURANCE CERTIFICATES, EXCLUDING ANY ALTERATION AND INITIALS REGARDING CANCELLATION WHICH IS MADE TO MEET CITY REQUIREMENTS, AS ENDORSED BY THE UNDERWRITER ARE ACCEPTABLE. PHOTOCOPIES ARE UNACCEPTABLE.
- 24.5 All certificates of insurance submitted by Contractor shall be accompanied by endorsements for additional insured coverage in favor of the City for Commercial General Liability and Automobile Liability policies; and waivers of subrogation in favor of the City for Commercial General Liability, Automobile Liability, and Worker's Compensation/Employers' Liability policies. For a list of pre-approved endorsement, forms see [http://purchasing.houstontx.gov/forms/Sample Insurance Endorsements.pdf](http://purchasing.houstontx.gov/forms/Sample%20Insurance%20Endorsements.pdf). The Director will consider all other forms on a case-by-case basis.

25.0 SUCCESSORS AND ASSIGNMENTS:

Supplier may not assign this award or dispose of substantially all of its assets without the written consent of the City Purchasing Agent. Supplier's failure to obtain such consent shall be an event of default, authorizing the Purchasing Agent to terminate this award according to its terms.

26.0 MINORITY AND WOMEN BUSINESS ENTERPRISES:

26.1 Contractor shall comply with the City's Minority and Women Business Enterprise ("MWBE") programs as set out in Chapter 15, Article V of the City of Houston Code of Ordinances. Contractor shall make good faith efforts to award subcontracts or supply agreements in at least 3% of the value of this Agreement to MWBEs. Contractor acknowledges that it has reviewed the requirements for good faith efforts on file with the City's Office of Business Opportunities ("OBO") and will comply with them.

26.2 Contractor shall require written subcontracts with all MWBE subcontractors and shall submit all disputes with MWBEs to binding arbitration to be conducted in Houston, Texas if directed to do so by the OBO Director. MWBE subcontracts must contain the terms set out in "Section A, Table 2".

27.0 TAXES:

The City is exempt from the Federal Excise and Transportation Tax, and the limited Sales and Use Tax. Unless the Bid Form or Specifications specifically indicate otherwise, the price bid must be net exclusive of above-mentioned taxes, and will be so construed. A Supplier desiring refunds of, or exemptions from, taxes paid on merchandise accepted by the City, must submit the proper forms, and the City Purchasing Agent, if satisfied as to the facts, will approve or issue the necessary certificates.

28.0 AWARD:

28.1 The City reserves the right to consider and make awards of bids on articles of similar nature that will in all respects serve the purpose for which the purchase is being made. The City reserves the right to be the sole judge as to whether such articles will serve the purpose.

28.2 Unless otherwise specified, the City reserves the right to accept or reject in whole or in part any bid submitted or to waive any informality for the best interest of the City.

29.0 REJECTIONS:

29.1 Articles not in accordance with samples and specifications must be removed by the Supplier and at his expense. All disputes concerning quality of supplies delivered under this invitation to bid will be determined by the City Purchasing Agent or designated representative.

29.2 All articles enumerated in the invitation to bid shall be subject to inspection on delivery by an officer designated for the purpose and if found inferior to the quality called for, or not equal in value to the Department's samples, or deficient in weight, measurements, workmanship or otherwise, this fact shall be certified to the City Purchasing Agent who shall have the right to reject the whole or any part of the same.

30.0 BRAND NAME

Any manufacturer's names, trade names, brand names, or catalog numbers used in the specifications are for the purpose of describing and establishing the general quality level, design and performance desired. Such references are not intended to limit or restrict bidding by other Suppliers, but are intended to approximate the quality design or performance, which is desired. Any bid, which proposes like quality, design or performance, will be considered. Equivalent products will be considered, provided a complete description and product literature is provided. Unless a specific exception is made, assumption will be that the item is bid exactly as specified on the Invitation to Bid.

31.0 CHANGE ORDER

- 31.1 At any time during the term of the award, the City Purchasing Agent or Director upon written authorization by the City Purchasing Agent may issue a Change Order to increase or decrease the scope of services or change plans and specifications, as he or she may find necessary to accomplish the general purposes of this award. The Supplier shall furnish the services or deliverables in the Change Order in accordance with the requirements of this award plus any special provisions, specifications, or special instructions issued to execute the extra work.
- 31.2 The City Purchasing Agent or Director upon written authorization by the City Purchasing Agent will issue the Change Order in substantially the following form:

CHANGE ORDER

TO: [Name of Supplier]
FROM: City of Houston, Texas (the "City")
DATE: [Date of Notice]
SUBJECT: Change Order under the award between the City and [Name of Supplier]

Subject to all terms and conditions of the award, the City requests that Supplier provide the following:

[Here describe the additions to or changes to the equipment or services and the Change Order Charges applicable to each.]

Signed:

[Signature of City Purchasing Agent or Director upon written notice to the City Purchasing Agent]

- 31.3 The City Purchasing Agent or Director upon written authorization by the City Purchasing Agent may issue more than one Change Order, subject to the following limitations:
- 31.3.1 Council expressly authorizes the City Purchasing Agent or Director upon written authorization by the City Purchasing Agent, to approve a Change Order of up to \$50,000. A Change Order of more than \$50,000 over the approved awarded amount must be approved by the City Council.
- 31.3.2 If a Change Order describes items that Supplier is otherwise required to provide under this award, the City is not obligated to pay any additional money to Supplier.
- 31.3.3 The total of all Change Orders issued under this section may not increase the original award amount by more than 25%.
- 31.4 Whenever the Supplier receives a Change Order, Supplier shall furnish all material, equipment, and personnel necessary to perform the work described in the Change Order. Supplier shall complete the work within the time prescribed. If no time for completion is prescribed, Supplier shall complete the work within a reasonable time. If the work described in any Change Order causes an unavoidable delay in any other work Supplier is required to perform, Supplier may request a time extension for the completion of the work. The City Purchasing Agent's or Director's decision regarding a time extension is final.
- 31.5 A product or service provided under a Change Order is subject to inspection, acceptance, or rejection in the same manner as the work described in the original award and is subject to the terms and conditions of the original award as if it had originally been a part of the award.

32.0 TERMINATION OF AWARD

- 32.1 By the City for Convenience:

The City Purchasing Agent may terminate this award at any time upon 30-calendar days notice in writing to the Supplier. Upon receipt of such notice, Supplier shall, unless the notice directs otherwise, discontinue all services in connection with the performance of the award and shall proceed to cancel promptly all existing orders and awards insofar as such orders and awards are chargeable to this award. As soon as practicable after the receipt of notice of termination, the Supplier shall submit a statement to the appropriate department(s) showing in detail the services performed or items delivered under this award to date of termination. The City agrees to compensate the Supplier for that portion of the prescribed charges for which the services were actually performed or items delivered under this award and not previously paid.

32.0 TERMINATION OF AWARD (CONTINUED):

32.2 By the City for Default by Supplier:

32.2.1 In the event that the materials and/or services furnished by the Supplier do not conform to the standard set forth herein, or if the deliveries and servicing of this award do not conform to the requirements detailed herein, the City through a written notice from the Purchasing Agent to the Supplier describing such default may as its options:

- (a) Terminate the award for default and the City shall have no further obligation under the award.
- (b) Allow the Supplier to cure default within a reasonable time as specified in the notice. The City, at its sole option, may extend the proposed date of termination to a later date. If prior to the proposed date of termination, Supplier cures such default to the City's satisfaction, then the proposed termination shall be ineffective. If Supplier fails to cure such default prior to the proposed date of termination, then the City may terminate its performance under this award as of such date and have no further obligation under the award.

32.2.2 In the event of failure to deliver any or all of the items or to perform required services, the City may cover its loss by reasonably procuring from another source the items not delivered or the services not performed. Supplier shall be responsible for and shall pay to the City immediately upon demand the difference in price between that offered by the Supplier and that which the City was forced to pay for covering Supplier's failure to deliver or perform services.

32.3 By the Supplier for Default by City:

32.3.1 Default by the City shall occur if the City fails to perform or observe the terms and conditions of the award required to be performed or observed by the City, and the Supplier gives notice in writing to the City within 30 calendar days of the act or omission claimed by the Supplier to constitute default on the part of the City.

32.3.2 Upon receipt of such notice in writing from the Supplier, however, the City shall have 30 calendar days to cure such default. The Supplier, at its sole option, may extend the proposed date of termination to a later date.

32.3.3 If City cures such default prior to the proposed date of termination, the proposed termination shall be ineffective. If the City fails to cure such default prior to the proposed date of termination, then the Supplier may terminate its performance as of such date.

33.0 PATENTS

The Supplier agrees to indemnify and save harmless the City, the City Purchasing Agent and assistants from all suits and actions of every nature and description brought against them or any of them, for or on account of the use of patented appliances, products or processes, and he shall pay all royalties and charges which are legal and equitable. Evidence of such payment or satisfaction shall be submitted, upon request of the City Purchasing Agent, as a necessary requirement in connection with the final estimate for payment in which such patented appliance, products or processes are used

34.0 SUPPLIER DEBT

If Supplier, at any time during the term of this award, incurs a debt, as the word is defined in section 15-122 of the Houston City code of ordinances, it shall immediately notify the City Controller in writing. If the City Controller becomes aware that Supplier has incurred a debt, the City Controller shall immediately notify Supplier in writing. If Supplier does not pay the debt within 30 days of either such notification, the City Controller may deduct funds in an amount equal to the debt from any payments owed to Supplier under this award, and Supplier waives any recourse therefore.