

**3M** Science.  
Applied to Life.™



# Make bright the standard

Upgrade to Type XI reflective sheeting


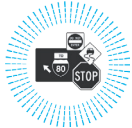












# Why upgrade to 3M™ Diamond Grade™ DG<sup>3</sup> Sheeting?

Brighter signs, safer roads. You can make a difference during the day, and especially at night, by using 3M™ Diamond™ Grade DG<sup>3</sup> Reflective Sheeting to make signage brighter and more visible, giving drivers more time to react. Let's compare.

Prismatic sheeting that meets ASTM D4956 Type IX performance standard is commonly made using truncated cube corner technology.

3M™ Diamond Grade™ Reflective Sheeting (DG<sup>3</sup>) meets ASTM D4956 Type XI. This highly reflective sheeting uses full-cube prismatic technology that reflects almost twice the amount of light back to its source as Type IX reflective sheeting.

	3M™ Truncated Cube Corner Tech		3M™ Diamond Grade™ DG <sup>3</sup>	
	Type IX		Type XI	
Luminance		Intermediate Luminance		<b>High luminance</b> Returns nearly twice the amount of light as Type IX with 58% efficiency
Specification and standards		<b>Mid to High performance standards</b> Meets ASTM D4956 Type IX		<b>High performance standards</b> Meets ASTM D4956 Type XI
Technology developed		1990s		2000s
Sight distance		Performs best at Short distances		Ideal for all distances
Retroreflective efficiency		<b>Intermediate Retroreflection</b> 32% Retroreflection efficiency		<b>High Retroreflection</b> 58% Retroreflection efficiency ideal for large and small vehicles
Retroreflective technology		<b>Truncated cube technology</b> Reflects more light than glass-bead technology found in some engineer grade sheeting		<b>Full cube technology</b> Reflects more light than truncated cube corner and glass-bead technology found in lower-grade sheeting



## Don't get "accidentally downgraded"

Many traffic sign fabricators already use Type XI sheeting, even when road authorities' specifications might only call for Type IX. That's why those who are committed to achieving the highest possible traffic safety outcomes know that the technology in 3M™ Diamond Grade™ DG<sup>3</sup> Sheeting provides solutions to help make roadways safer.



## Make bright the standard

Upgrade your specification to type XI by using 3M™ Diamond Grade™ DG<sup>3</sup> Sheeting to deliver bright visible signs that will help provide the best driving experience for all drivers on the road. Signs will remain bright with lasting durability, in both urban and rural areas.



# Sign-viewing geometries

Type XI sheeting's characteristics make it versatile and effective across a range of vehicle types and sign geometries. Type XI sheeting reflects almost twice the amount of light back to its source as Type IX reflective sheeting.

## ASTM-4956 Specification Table for Types IX and XI (white)

Obs./Ent. Angles	Type IX Luminance	Type XI Luminance
0.2 / -4	380	580
0.2 / 30	215	220
0.5 / -4	240	420
0.5 / 30	135	150
1.0 / -4	80	120
1.0 / 30	45	45

Values in the grey highlighted rows represent the most common sign viewing geometries.

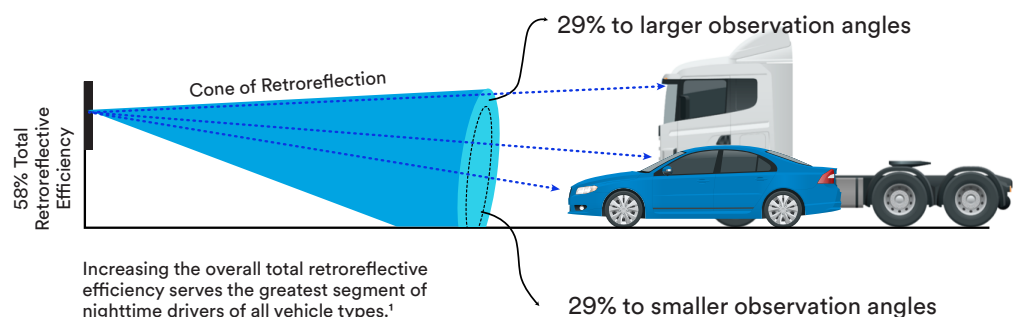
A study done by the University of Iowa showed that a 50% reduction in sign brightness required an additional 20% reading time, on average, to achieve the same response accuracy level, meaning less bright signs actually require a longer reaction time.<sup>1</sup>

Boost road sign visibility with 3M™ Diamond Grade™ DG<sup>3</sup> Sheeting.

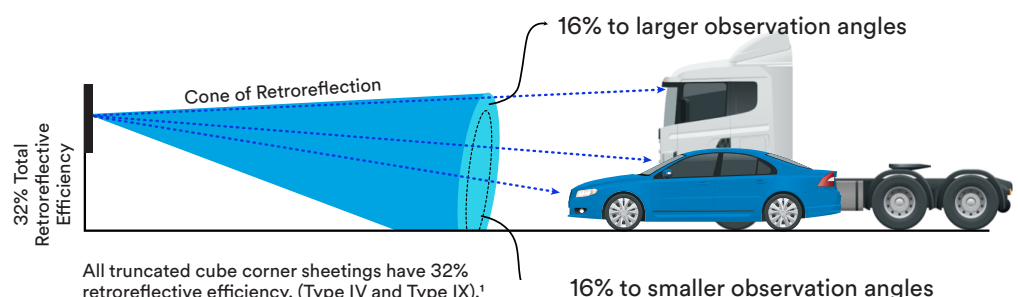
3M's Type XI sheeting reflects more light than Type IX sheeting, increasing sign visibility at greater distances to give more reaction time for drivers of all vehicle types.

<sup>1</sup>Schell T, Yekshatyan I., Daiker R., Konz J., *Effects of Luminance on Information Acquisition Time and Accuracy from Traffic Signs*. Journal of Transportation Research Board, 2008. UIWOA

## 3M™ Diamond Grade™ DG<sup>3</sup> Sheeting– Type XI



## 3M™ Truncated Cube Corner Tech – Type IX



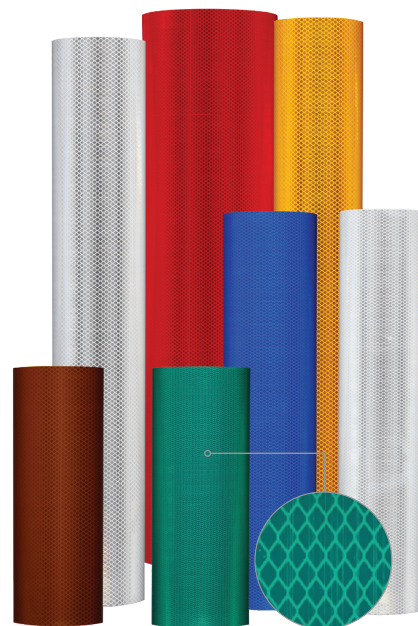
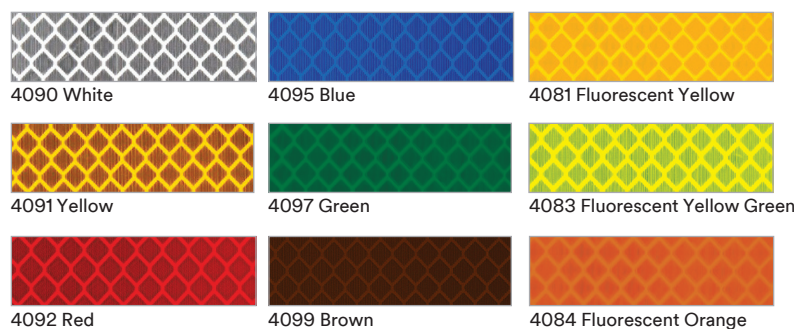
# Maximum total reflected light

## 3M™ Diamond Grade™ DG<sup>3</sup> Reflective Sheeting Series 4000

Achieve superb reflectivity at short and long distances with 3M full-cube technology.

- ▶ Meets the highest overall retroreflectivity requirements in global industry standards: ASTM D4956 Type XI
- ▶ Our recommended solution for signs positioned inside and outside of primary headlight illumination
- ▶ Performance warrantied for up to 12 years\*

\*For all colors except fluorescent yellow and fluorescent yellow-green (up to 10 years depending on geography), and fluorescent orange (up to 3 years).



## Guidance you can count on

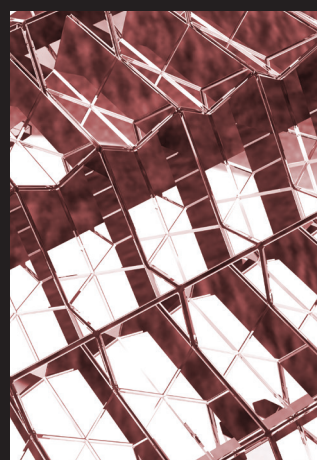
3M's most efficient polycarbonate full-cube technology

Returns almost 2X more light\*

Broad observation angles

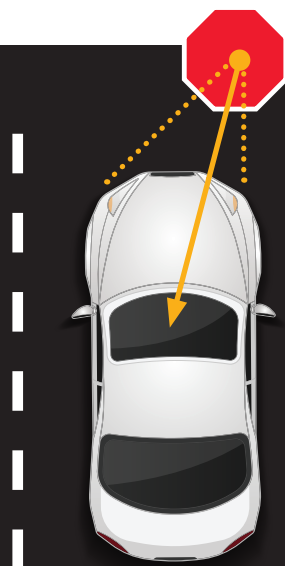
Polycarbonate, stable prismatic optics

\*vs type IV sheeting



### 3M Full Cube Technology

When returning twice as much light toward the driver as truncated cubes, visibility and safety are a natural result. Of the three technologies used on roadways today, only full cube microprismatic sheeting is the most efficient.



**14%** Encapsulated glass bead sheeting:  
Reflects 14% of light back to source

**32%** Truncated cube corner sheeting (most common):  
Reflects about 32% of light back to source

**58%** 3M™ Diamond Grade™ DG<sup>3</sup> Reflective Sheeting with 3M full cube technology:  
Reflects 58% of light back to source



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