



Science.  
Applied to Life.™

3M™ Pavement Marking

**Visibility & safety  
for the life of  
the road**





# Contents

3M™ All Weather Reflective Elements for All Weather Thermoplastic .....	01
3M™ Raised Pavement Marker .....	05
3M™ Stamark™ Pavement Marking Tape .....	08
3M™ Stamark™ Removable Tapes .....	11

# Ultimate nighttime performance wet or dry

3M™ Reflective Elements utilize the most advanced technologies to deliver true reflected color and optimized visibility tailored to meet your needs. Featuring unique 3M microcrystalline ceramic beads, 3M™ Reflective Elements are tougher and more efficient than other glass-beaded optics systems, so you can expect superior performance in any condition.

All Weather Thermoplastic is a long-lasting, cost-effective traffic safety solution. Featuring 3M's unique dual-optics system, it ensures high levels of reflectivity in both dry and wet conditions.

- Exceeds LLM/GP/T21-10 and JKR/SPJ/2012-S6 JKR 21300-0037-12 minimum wet and dry reflectivity requirements.



# Expect more from your thermoplastic

## All Weather Thermoplastic with 3M™ All Weather Elements

Thermoplastic is long lasting, easy to apply and affordable, making it the most popular durable pavement marking in the world. Most thermoplastics, however, lack wet-weather visibility and quickly lose their retroreflective performance.

All Weather Thermoplastic with 3M All Weather Elements features 3M's unique, dual-optic elements that maximize both dry and wet reflectivity, while extending retroreflective functionality long after other thermoplastics have become ineffective. 3M offers different element blends - for wet or dry or all weather conditions - that are ideal for your roadway visibility requirements.

The result of All Weather Thermoplastic with 3M All Weather Elements: Motorists get the high visibility guidance they need, and agencies get an effective, durable pavement marking that minimizes traffic disruptions and improves roadway safety.

- **Superior reflective performance and retained visibility**

The retro reflective elements in 3M all weather thermoplastic are unlike anything else in the industry. They feature 3M's unique microcrystalline ceramic beads, which are far tougher and more durable than conventional glass beads. That means they will retain their visibility much longer.

- **Maximum dry reflectivity**

3M's unique, exceptionally durable dry reflective elements are made with 1.9 index microcrystalline ceramic beads - the most efficient dry reflective optics available today - and high efficiency pigments, ensuring the highest levels of reflectivity on dry pavement surfaces.

- **Maximum wet reflectivity**

3M's wet reflective elements - made with 2.4 index microcrystalline ceramic beads, coupled with high efficiency pigments—provide maximum reflectivity under wet and rainy conditions. In fact, 3M's 2.4 index optics actually work with water for true, all-weather performance.

- **Easy application**

3M™ All Weather Thermoplastic is applied quickly and easily with conventional, double-drop thermoplastic equipment.

- **3M technical assistance**

As a global company with local resources, 3M is much more than just a supplier of pavement markings. Our experienced representatives and technicians can show you how to improve roadway visibility and safety, reduce long-term costs, properly apply pavement marking materials, and maintain your roadway marking projects.

3M's unique, tough microcrystalline ceramic elements - applied via double drop and available in dry or both dry- and wet-reflective formulations

Conventional glass beads surface-dropped during application

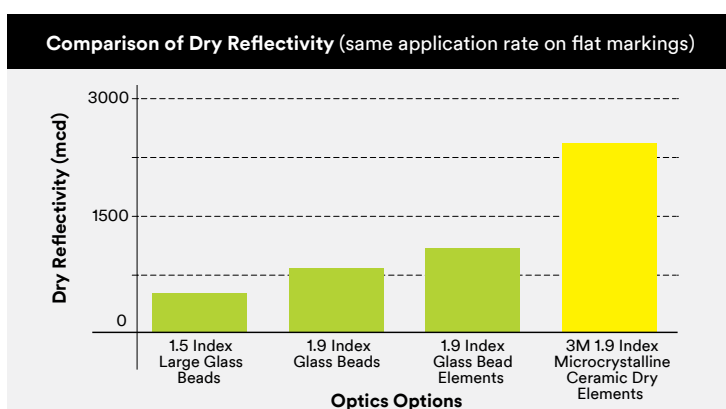


Intermix contains conventional glass beads and optionally 3M elements

## 3M™ Reflective Elements more efficient than the rest

### Compare Dry Reflectivity to Conventional Optics

3M's 1.9 refractive index microcrystalline ceramic beads outperform other commercial elements in dry retroreflective performance.



### Simply the best

The visibility, efficiency and toughness of 3M's microcrystalline ceramic beads are superior to other commercial marking systems.

### High efficiency pigments for better performance

3M's microcrystalline ceramic beads feature 3M's high efficiency pigments to deliver improved reflectivity.

# Why use 3M™ Reflective Elements?

## Most efficient optics for liquid - applied markings

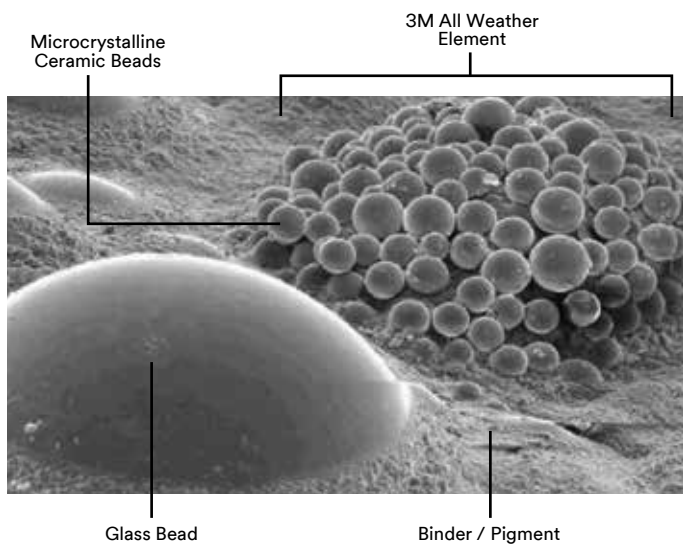
Each all-weather element is a complete pavement marking optical system which comprises of microcrystalline ceramic beads, binder and pigments.

## Factory optimized

3M's bonded core elements consist of microcrystalline ceramic beads embedded on a center core to provide optimal performance in all weather conditions.

## Easily installed using the Double-drop System

As the first drop of a double-drop system, the elements provide visibility to motorists in both wet and dry conditions. They are effective as either new marking applications or as part of a maintenance marking application.



# It starts with the unique 3M Microcrystalline Ceramic Beads

## Microcrystalline toughness

3M's microcrystalline ceramic beads are engineered to prevent cracks from starting and propagating, resulting in unprecedented toughness.

**Effects of bead microstructure on toughness as demonstrated in the sandblast test**

Transmission Electron Micrograph (TEM) of standard 1.9 index

Amorphous glass - no microstructure

0.2 μm

Sandblast 1.9 Index

Glass Beads

Transmission Electron Micrograph (TEM) of microcrystalline ceramic beads

Microcrystalline ceramic beads showing microcrystalline structure

0.2 μm

Sandblast 1.9 Index

Microcrystalline Ceramic Beads

# True reflected color, superior visibility

## Yellow elements — Yellow beads

Standard glass beads are clear, putting the entire burden for color performance on the binder. 3M incorporates yellow microcrystalline ceramic beads in its yellow elements to improve reflected color.

## Color recognition day and night — wet or dry

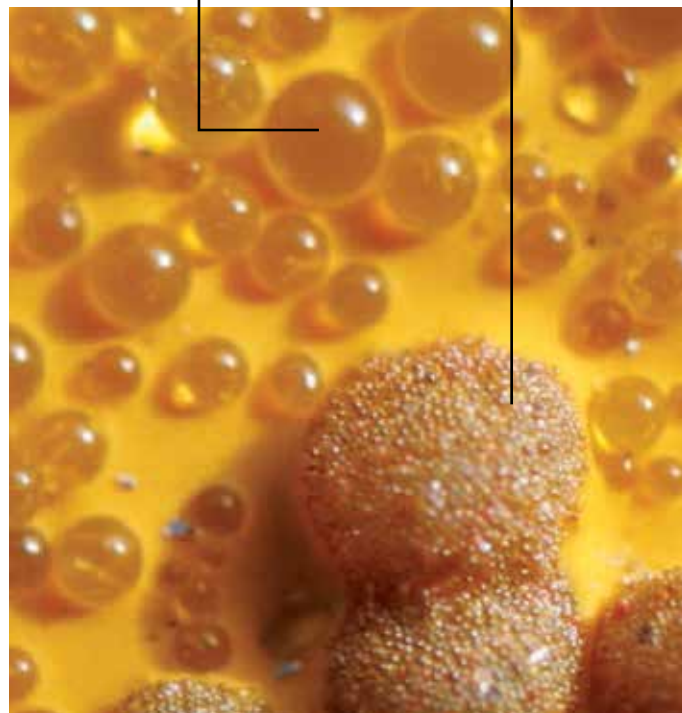
Most pavement markings have acceptable daytime color. Conventional yellow markings use clear glass beads which often result in a washed out appearance at night. 3M's yellow beads improve nighttime color, making the markings conspicuous at any time of day or night.

## Optimized index for wet and dry conditions

- For optimum performance under dry conditions, 3M elements feature 1.9 refractive index microcrystalline ceramic beads.
- 3M's all-weather optics include ultra-high, 2.4 refractive index microcrystalline ceramic beads. The high refractive index results in good measurable wet reflectivity, the highest practical level achieved to date. The 2.4 refractive index microcrystalline ceramic bead has the same microcrystalline structure and level of toughness found in lower index microcrystalline beads.
- As a system, 3M's all-weather optics have dry reflective beads at peak efficiency, and wet reflective beads much higher in efficiency than any other commercial beads.

Standard glass beads are clear, putting all the burden for color performance on the binder.

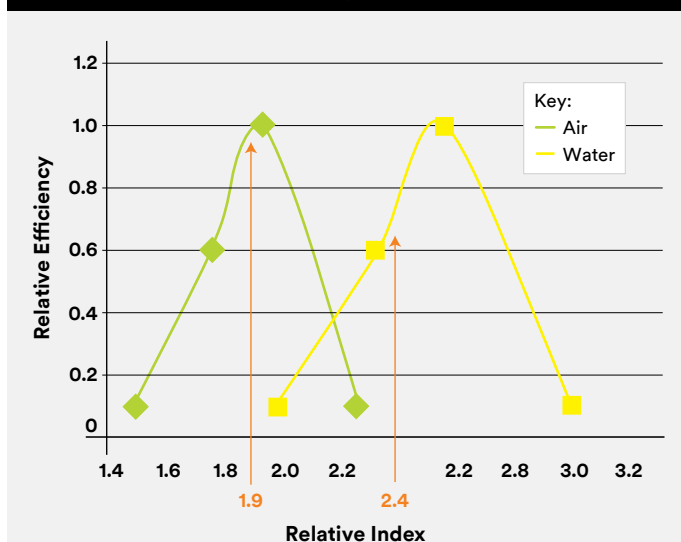
Yellow elements feature yellow microcrystalline ceramic beads



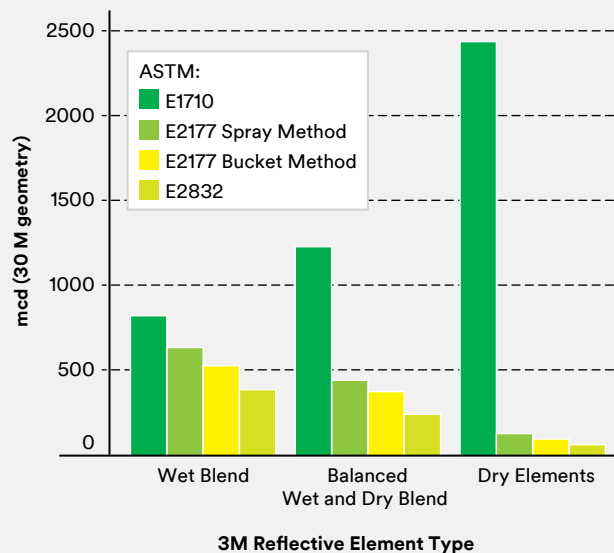
## Tailored performance to meet agency needs

3M offers optics systems for both wet and dry climates, with each system boasting superior performance in its intended conditions.

Theoretical Efficiency vs. Refractive Index



Typical White Retroreflective Values for 3M Standard Reflective Elements





3M™ Raised Pavement Marker

# High performance delineation guides to greater safety



## Tough construction for longer lasting lens performance

The computer aided design body combined with innovative materials gives the Series 290 marker its strength. Manufactured from a high impact resistant resin and durable aluminium, the inner ribbed contour of the marker is shaped to dissipate the impact, increase strength and reduce damage. The tough retroreflective lens is coated with a superior protective material that combines ceramic and polymeric elements, adding more resistance to abrasion. The result is a marker that demonstrates high impact strength and hold up longer on today's heavily traveled highway and urban streets in Malaysia.



# High-performance delineation guides drivers to greater safety

## Superior design provides more reliable visibility

Series 290 raised pavement markers are extremely valuable as lane line supplements to enhance pavement markings. They stand above the line to alert motorists to roadway changes such as hills, curves and exit ramps and improve lane line guidance. Designed for application on asphalt and Portland cement concrete road surfaces, these markers provide highly effective, long life visibility particularly at night and in wet weather. The marker's high performance lens yields high intensity retroreflected light when illuminated by the car's headlights. Whereas traditional raised pavement markers are equipped with a basic molded lens. Series 290 markers feature a tough polycarbonate lens with built in microcube corners.

This improved ceramer coated lens is highly resistant to abrasion and cracking, conditions that can dull the performance of a standard lens. In effect, the marker yields greater cleanability, increased brightness and high retained retroreflectivity. The markers are available in color combinations that comply with federal guidelines. Colored markers help identify traffic lane separations, edge lines, fire hydrants, airport taxiways and other special applications. In addition to the visual alert, a "rumble" sound and effect caused by the vehicle tires crossing the raised markers gives motorists and drivers an audible warning. As a result, Series 290 marking systems increase awareness and guide drivers with safer, more visible lines in rain or fog, day and night.

## General features

- Application with commercially available bitumen or epoxy adhesives.
- Impact and abrasion resistance.
- Asphalt and port cement application.
- Wet & dry retroreflectivity.
- Durable.
- Rumble effect.
- Widest entrance angle.
- High night time visibility.
- One Way and Two Way lens application.
- Lens color: white, yellow.
- Brightest point of light on the market.
- Single lens break do not effect other lens.



## Raised Pavement Marker Series 290AI



3M Raised Pavement Markers Series 290AI, is the latest in the long line of 3M innovative products. Designs are made to provide the road users with brighter raised pavement markers of application on sharp curves, gore areas, lane delineation and other applications.

**The RPM 290AI comes in the following designs**

- One Way - The colour combinations are One Way White, Red & Yellow.
- Two Ways - Two Ways Yellow, Two Ways Red, Two Ways White & Two Ways Red-White.



Day and night view of the RPM 290AI

## Raised Pavement Marker Series 290PL



**The new RPM 290PL comes in the following designs**

- Lightweight & molded in body colors.
- Application finger grips.
- Engineered thermoplastic body.
- Anti-skid feature; safe for pedestrian.
- Low profile body; safe for motorist.
- Flush to body lens allow self cleaning by tyre contact.
- The colour combinations are:
  - Two Ways Yellow.
  - Two Ways White.



Day and night view of the RPM 290PL



3M™ Stamark™ Pavement Marking Tape

# The roadway safety leader

Designed for superior visibility and long-lasting performance, 3M™ Stamark™ Pavement Marking Tape Series 380 is ideal for lane and edge lines, gore and transverse markings, symbols and legends — anywhere you're looking for the ultimate in durability and safety.

- Exceeds LLM/GP/T21-10 and JKR/SPJ/2012-S6 JKR 21300-0037-12 minimum wet and dry reflectivity.





# The original durable pavement marking

## 3M™ Stamark™ Pavement Marking Tape Series 380

This tape sets the standard for durability and visibility in pavement markings. Born from 3M innovations in retroreflective science, polymer chemistry, and adhesive and ceramic technology, 3M™ Stamark™ Pavement Marking Tape has created high-visibility guidance and improved roadway safety for more than two generations of drivers. Continuous innovation and technological improvements have made this tape the premier pavement marking solution in the world.

- **Superior retroreflective performance and retained visibility in all weather conditions**

The retroreflective optics in 3M™ Stamark™ Pavement Marking Tape Series 380 are unlike anything else in the industry. 3M's unique microcrystalline ceramic beads are far tougher, harder and more resistant to harsh roadway conditions than conventional glass beads. 3M microcrystalline ceramic beads retain their visibility — in dry and wet conditions — long after other beads have become ineffective.

- **Extended season application**

With an easy-to-use surface preparation adhesive, you can apply Stamark Series 380 tape beyond the seasonal application dates when the temperature is 40°F or higher, extending your effective striping season by several weeks and boosting productivity for your crews and contractors.

- **Easy application**

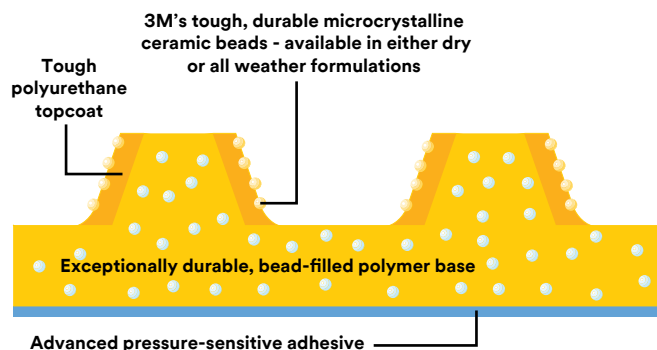
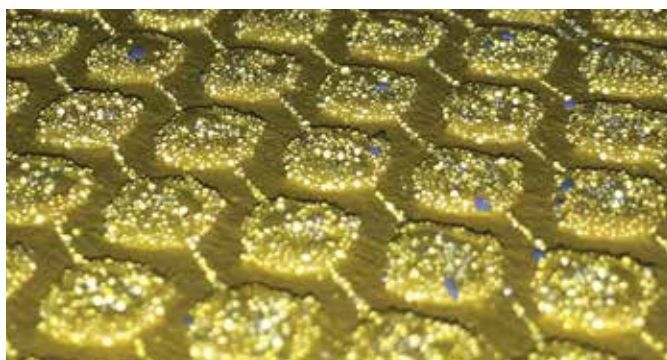
There's no need for surface preparation adhesives during the normal marking season with Stamark Series 380 tape. Adhesion to properly prepared pavement surfaces above 40°F is almost as easy as unwind, apply and tamp.

- **Whiter, brighter, longer**

Dirt- and abrasion-resistant technologies are built into each component of Stamark Series 380 tape, from 3M's tough microcrystalline ceramic beads to our brilliant white and yellow topcoats.

- **Durable nighttime yellow visibility**

3M's lead-chromate-free pigments and yellow microcrystalline ceramic beads create a distinct and long-lasting nighttime yellow color — in wet or dry conditions.



A cross-section of 3M™ Stamark™ Pavement Marking Tape Series 380 shows 3M's advanced technologies in every aspect of construction, inside and out.

Whether you need a pavement marking solution for all weather conditions, extended season applications, or concrete or asphalt roadways, there's a Stamark Series 380 tape that's engineered specifically for the job.

## 3M™ Stamark™ High Performance Tape 380I ES and Contrast Tape 380I-5 ES

This high performance, extended season tape is backed by decades of proven roadway performance.

- Exceptionally durable, 3M microcrystalline ceramic beads ensure long-lasting visibility.
- Ideal for interstate highways, dark rural roads and urban streets, where nighttime reflectivity is critical.

## 3M™ Stamark™ All Weather Tape 380AW and Contrast Tape 380AW-5



Both 3M™ Stamark™ Series 380I ES and Series 380AW are available in white, lead-chromate-free yellow, and with durable black borders that increase contrast with concrete and other light-colored pavement surfaces.

According to the Federal Highway Administration, 24 percent of vehicle crashes in the U.S. are weather-related,<sup>1</sup> and 75 percent of these occur on wet roadways. Pavement markings are critical to helping drivers navigate safely and stay in their lanes — especially during wet weather.

- 3M™ Stamark™ All Weather Tape 380AW includes 3M's advanced high-index optics that are highly visible and reflective, rain or shine, day or night.
- A high-profile diamond pattern is embedded with 3M's tough, innovative microcrystalline ceramic beads to ensure maximum wet reflectivity during rainy conditions.

## 3M™ Stamark™ Pavement Marking Tape Series 270

According to the FHWA, “... half of all highway crashes and injury crashes occur at, or are related to, intersections.”<sup>2</sup> 3M™ Stamark™ Pavement Marking Tape Series 270 can help improve intersection safety by clearly marking stop bars, crosswalks, symbols, legends and channelizing lines — for both day and night visibility.

### A durable solution for intersection safety

Intersections are not only tough places for vehicles, but also a challenging application for pavement marking products. Stamark Series 270 tape is designed to resist the destructive forces at intersections with high performance materials and strong, reinforced netting embedded into the tape. It's available in both white (270) and yellow (271).

<sup>1</sup> [www.ops.fhwa.dot.gov/weather](http://www.ops.fhwa.dot.gov/weather)

<sup>2</sup> FHWA Safety Program, March 2009

# Improving work zone guidance and safety

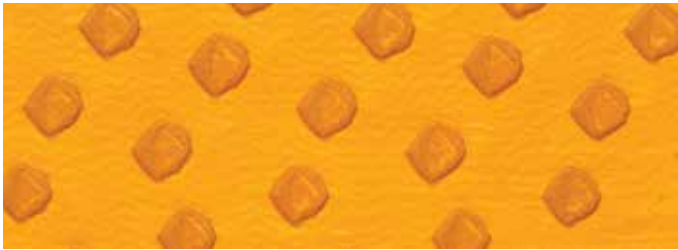


Work zones are some of the most dangerous areas on any roadway system. 3M™ Stamark™ Wet Reflective Removable Tapes can help improve work zone safety by marking temporary work zone lanes with removable, highly reflective, all-weather pavement markings. 3M™ Stamark™ Removable Black Line Mask covers and protects existing roadway markings when lanes and edge lines change.

- Exceeds LLM/GP/T21-10 and JKR/SPJ/2012-S6 JKR 21300-0037-12 minimum wet and dry reflectivity.



## 3M™ Stamark™ Wet Reflective Removable Tape Series 710



According to the Federal Highway Administration, 24 percent of vehicle crashes in the U.S. are weather-related,<sup>1</sup> and 75 percent of these occur on wet pavement. These tragic figures are further amplified in work zones, where confusion adds to the danger of slippery roads. Applying removable retroreflective pavement markings for traffic changeovers can be critical to helping drivers navigate work zones safely — especially during wet weather.

- **Exceptionally durable**  
3M™ Stamark™ Wet Reflective Removable Tape Series 710 features a raised pattern construction embedded with 3M's unique, microcrystalline ceramic beads to ensure long-lasting visibility.
- **Superior adhesion and conformability**  
A tough, conformable base material provides excellent adhesion to a wide range of road surfaces.
- **Fast and easy to apply and remove**  
Easy application and removability reduce the exposure of both workers and drivers to work zone hazards.
- **Eliminates grinding**  
When work zone markings are no longer needed, Series 710 removes easily, helping to avoid road scars left by grinding off other, more permanent markings.
- Available in white (710) and yellow (711).

## 3M™ Stamark™ Removable Black Line Mask 715



This durable, matte black tape is applied over existing pavement markings, eliminating the need to grind, sandblast or waterblast existing markings for temporary lane shifts. Aggressive, pressure sensitive adhesive adheres well to the roadway, yet is easy to remove without the use of heat or solvents when the project is complete. 3M black line mask tape blends well with the existing pavement, minimizing confusion for motorists and helping traffic to flow naturally into the new traffic control configuration.

- Ideal for masking lane and edge lines, gore markings and crossovers.
- Non-reflective, raised pattern virtually eliminates glare.
- Available in a wide variety of widths to completely cover existing gore lines, skip lines and edge lines.
- Effective day and night.

<sup>1</sup> [www.ops.fhwa.dot.gov/weather](http://www.ops.fhwa.dot.gov/weather)



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