

SCIENCE. SERVICE. SOLUTIONS.



# WATERPROOFING

## MiraDRAIN® Aggregate-Free Drainage System

A Guide for Design Professionals



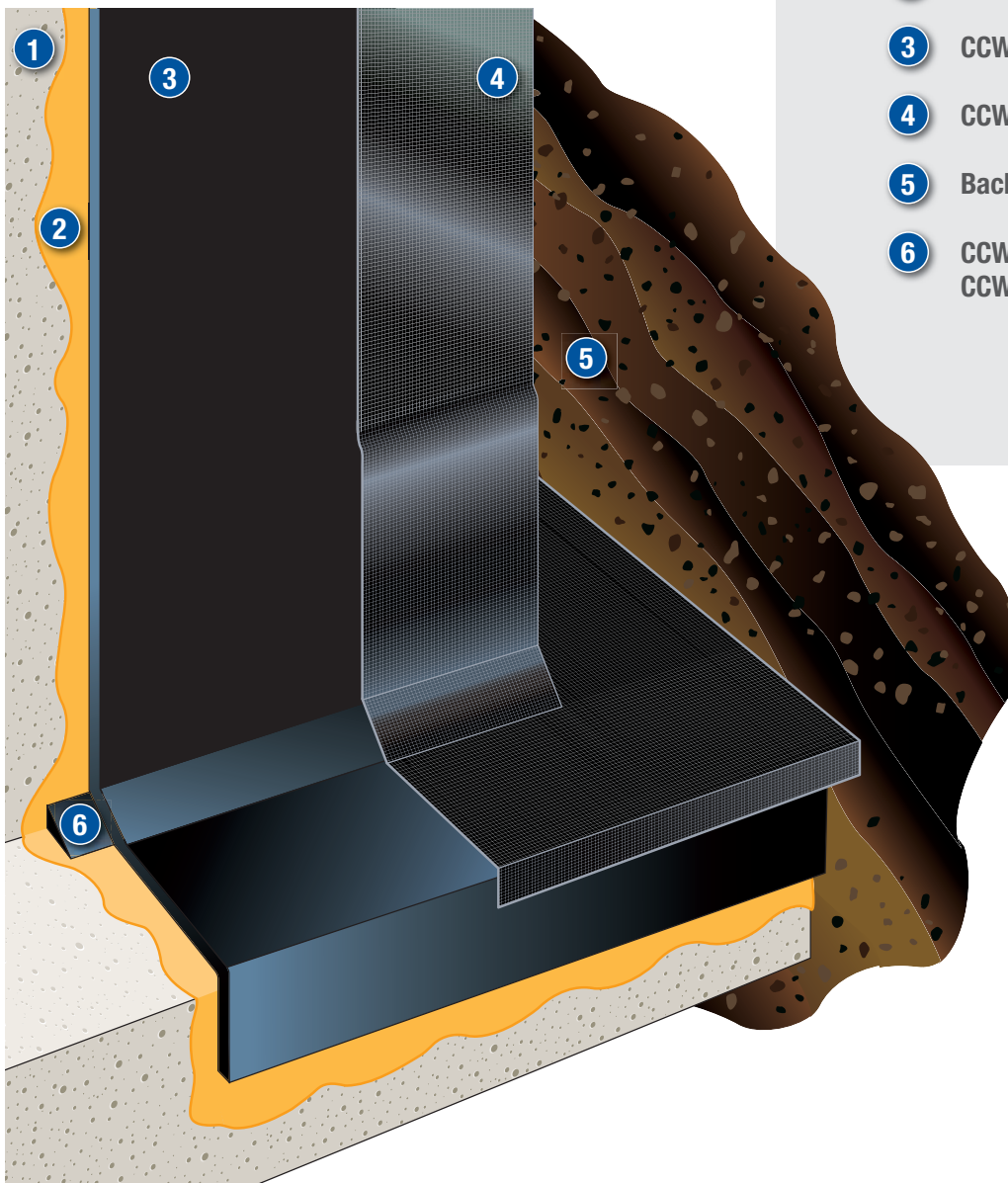
# WATERPROOFING

## MiraDRAIN Aggregate-Free Drainage System

Proper water drainage is an important, and sometimes overlooked, of a complete waterproofing system. CCW offers many drainage solutions to meet virtually any project requirement. CCW MiraDRAIN products provide a channel for water migration, relieve hydrostatic pressure and protect the waterproofing system. CCW MiraDRAIN products also replace much heavier traditional drainage systems, reducing higher shipping weight and cost.

### CCW MiraDRAIN Aggregate Free Drainage System System

- 1 Concrete Wall
- 2 CCW Primer
- 3 CCW MiraDRI 860/861 Membrane
- 4 CCW MiraDRAIN
- 5 Backfill
- 6 CCW LM-800XL or CCW-201 min. 3/4" Fillet



## The Evolution

Drainage plays a critical role in the design and construction of below-grade applications. Without proper drainage, groundwater seepage may cause hydrostatic pressure, and leakage, resulting in structural damage.

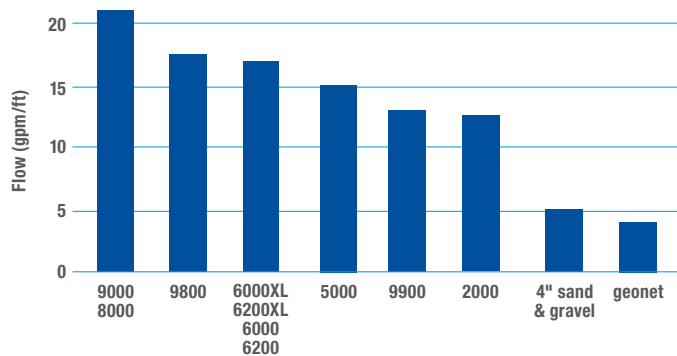
Effective drainage is essential. Yet, the costly and time-consuming installation of a conventional aggregate drainage system often compels builders and designers to compromise on drainage. This compromise can result in maintenance costs that far outweigh those associated with installing an effective drainage system.

## End of The Stone Age

In 1983 MiraDRAIN revolutionized the building industry by offering a cost-effective, high drainage capacity, prefabricated drainage composite.

Each panel consists of a uniquely molded three-dimensional dimpled core, formed out of high-impact polystyrene. This high-strength, crush-resistant core is laminated to filter fabrics (geotextiles) that prevent soil particles from entering the drainage channels. The integrally bonded core and fabric system prevents backfill from pushing the fabric into the flow channels. Due to the unique design of CCW MiraDRAIN, drainage flow capacities of the aggregate free system are three to five times that of traditional aggregate systems.

## Drainage Composite Flow Comparison



## Rock-Solid Performance

Since its introduction, more than nearly one-half billion square feet MiraDRAIN drainage composites have been installed worldwide without failure. CCW MiraDRAIN's multi-directional flow design allows a continuous path for water discharge, eliminating the potential for hydrostatic pressure buildup. It allows water to pass freely into the drainage core, where it is gravity fed down to the foundation drainage system. The dimpled flow channels, covered by filter fabric, face the soil while the flat backside of the core fits directly against wall surfaces - providing maximum compatibility with a wide variety of waterproofing systems.

## Features & Benefits

- High-flow drainage, three to five times the capacity of aggregate or sand
- No-clogging filter fabrics
- Relieves hydrostatic pressure buildup against below-grade structures
- High-compressive strength core, withstands installation and natural earth stresses
- Enhances waterproofing system by channeling water away
- Provides a protection course for the waterproofing system
- Consistent and proven long-term performance
- Lightweight product allows for cost-efficient installation
- Allows backfilling with the excavated soil

## Economic Choice

Besides its superior performance characteristics, the CCW MiraDRAIN aggregate free system makes economical sense. One installer can carry a 200 sq ft. roll, the equivalent of a small dump truck of traditional aggregate. Zero aggregate, labor savings and faster installation all contribute to the success of the CCW MiraDRAIN aggregate free system, the market leader in innovative drainage solutions.

## A Solid Foundation

Carlisle Coatings & Waterproofing provides a variety of single-source waterproofing and drainage systems. To build the highest factors of safety in your design, the CCW MiraDRAIN aggregate free system can be combined with CCW 860/861 peel and stick membranes; CCW-500R hot applied system; MiraSEAL; MiraPLY; CCW-525 liquid membranes; CCW's Barricoat Membrane; and CCW MiraCLAY bentonite systems.

## Packaging Information

CCW MiraDRAIN panels are available in a standard roll size of 4' by 50' (1.22 m by 15.24 m). Consult your local Carlisle Coatings & Waterproofing representative for distributor locations.

## Technical Support

Complete technical assistance is available from Carlisle Coatings & Waterproofing and its sales representatives. Services include assistance during design and specification stages as well as initial stages of installation. For technical assistance, please call 1-888-229-2199 or visit our web site at [www.carlisle-ccw.com](http://www.carlisle-ccw.com).

# WATERPROOFING

## MiraDRAIN Aggregate-Free Drainage System

### Drainage Solutions for Every Application

	2000*	6000 6000XL	6200 6200XL	8000	9000	9800	9900	GR9400	HC
Below-Grade Walls Deeper than 10 ft.		●	●	●	●	●			
Foundation Walls	●	●	●	●	●	●			
Property Line/Shoring/Lagging		●	●	●	●	●			
Trench Drains/Interceptor drains									●
Landfills		●	●	●	●	●			
Rehab Walls		●	●	●	●	●			
Underground Structures/Tunnels		●	●	●	●	●			
Retaining Wall/Abutments		●	●	●	●	●			
Residential/Light Commercial	●								
Split Slab Construction				●	●		●		
Plaza Decks				●	●	●	●		
Parking Decks/Vehicular Traffic							●		
Planters/Landscaping		●	●	●	●	●			
Protected Roof Membrane Assembly					●	●	●		
Contaminated Soil Environments (Hydrocarbon)				●					
Green Roofs						●		●	●
Road & Highway Edge Drain									●



#### Foundation Walls

**Problem:** Excessive pressure buildup from saturated backfill may cause structural damage; constant hydrostatic head pressure may cause premature failure of waterproofing membrane.

**Solution:** CCW MiraDRAIN 6000XL, 6200XL

**Options:** CCW MiraDRAIN 2000, 6000, 6200, 8000, 9800



#### Trench Drains

**Problem:** Removing excessive storm water in natural and artificial depressions; seeping water that can cause erosion along slopes.

**Solution:** CCW MiraDRAIN HC

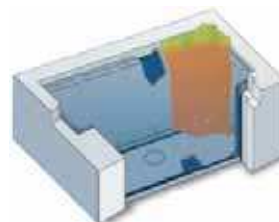


#### Retaining Walls

**Problem:** Increased earth stresses created by undrained backfill, resulting in unacceptable movement of retaining walls.

**Solution:** CCW MiraDRAIN 6000XL, 6200XL

**Options:** CCW MiraDRAIN 2000, 6000, 6200, 9800



#### Planters

**Problem:** Specifying and designing an efficient drainage system for a planter in which constant irrigation requires a reliable drainage medium.

**Solution:** CCW MiraDRAIN 9800

**Options:** CCW MiraDRAIN 9000, 6000, 6200, 6000XL, 6200XL



## Plaza Decks

**Problem:** Water seeping into intermediate levels of the building, damaging the structure and contents below.

**Solution:** CCW MiraDRAIN 9900

**Options:** CCW MiraDRAIN 8000, 9800



## Underground Structures

**Problem:** Water seepage that could lead to structural and interior tunnel damage.

**Solution:** CCW MiraDRAIN 6000XL, 6200XL

**Options:** CCW MiraDRAIN 6000, 6200, 9800



## Shoring / Lagging

**Problem:** Site water removal; consistent drainage path at property line walls.

**Solution:** CCW MiraDRAIN 6000XL, 6200XL

**Options:** CCW MiraDRAIN 6000, 6200, 9800



## Split Slabs / Vehicular Traffic

**Problem:** Water encroaching into low-level mechanical rooms and basements from below-the-floor slab; buildup of hydrostatic pressure leading to structural damage.

**Solution:** CCW MiraDRAIN 9900

**Options:** CCW MiraDRAIN 8000, 9000

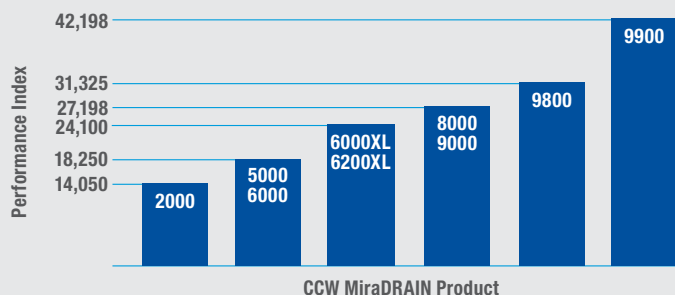
## Performance Index

### How critical is your drainage performance?

Carlisle Coatings & Waterproofing has eliminated the guesswork when selecting the CCW MiraDRAIN panel best suited for your project.

Each MiraDRAIN panel is rated with a Performance Index, which takes into account all of the critical factors relating to your drainage requirements: Compressive Strength; Puncture Resistance; Grab Tensile; and Grab Elongation. The performance index value provides a relative measure of ultimate product performance.

For maximum confidence in your drainage performance design, choose the CCW MiraDRAIN panel with the higher performance index.



## Warranty Availability

WARRANTY PERIOD (IN YEARS)	Watermark Warranty	Watermark Ultra Warranty (includes labor, material)	
		10	15
CCW MiraDRAIN 2000, 5000, 6000, 6200, 8000, 9000	X	X*	X*
CCW MiraDRAIN 6000XL, 6200XL	X	X*	X*
CCW MiraDRAIN 9800, 9900	X	X*	X*

\*Requirements include pre-approval and use of CCW waterproofing membranes and/or accessories. Contact your local CCW representative for complete warranty information. Extended warranty periods are available on all warranties at the discretion of Carlisle Coatings & Waterproofing.

# WATERPROOFING

## MiraDRAIN Aggregate-Free Drainage System

### Drain Connectors, Approved CCW Adhesives & Accessories



6" & 12" HC Endout Connectors



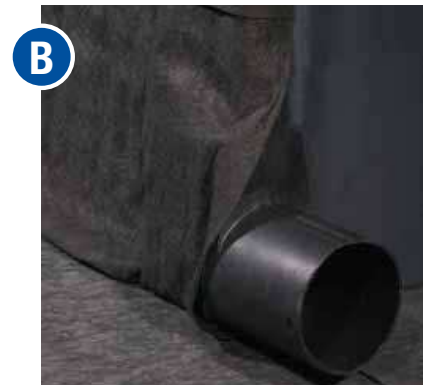
6" Endout Connector attached to CCW MiraDRAIN HC



6" Endout Connector covered with fabric



12" Endout Connector attached to CCW MiraDRAIN HC



12" Endout Connector covered with fabric



6" & 12" HC Sideout Connectors



6" Sideout Connector attached to CCW MiraDRAIN HC



6" Sideout Connector covered with fabric

# WATERPROOFING

## MiraDRAIN Aggregate-Free Drainage System

### CCW MiraDRAIN 2000

An economical drainage solution for shallow depth foundation walls. Its intermediate flow rate and compressive strength make CCW MiraDRAIN 2000 ideal for residential and light commercial applications.

Compressive Strength:	10,800 psf
Core Thickness:	0.25 in
Maximum Flow Rate:	12.5 gpm/ft
Geotextile Fabric:	non-woven
Performance Index:	14,050

### CCW MiraDRAIN 6000/6200

For years, CCW MiraDRAIN 6000 and 6200 have been the industry standard for high-flow, high-compressive strength, vertical single-sided subsurface drainage applications. CCW MiraDRAIN 6200 is designed for use over MiraDRI Waterproofing Membranes. The high-strength polymeric film adhered to the flat side of the drainage core protects the waterproofing membrane from potential die cutting.

Compressive Strength:	15,000 psf
Core Thickness:	0.40 in
Maximum Flow Rate:	17 gpm/ft
Geotextile Fabric:	non-woven
Performance Index:	18,250

### CCW MiraDRAIN 6000XL, 6200XL

CCW MiraDRAIN 6000XL and 6200XL are designed for use in high-flow, high-compressive strength, vertical drainage applications where single-sided subsurface drainage is needed. The new and superior high-strength filter fabric provides greater filtration for a wider range of soil conditions, higher survivability during installation, and greater long-term performance. CCW MiraDRAIN 6200XL is designed for use over CCW Waterproofing Membranes. The high-strength polymeric film adhered to the flat side of the drainage core protects the waterproofing membrane from potential die cutting.

Compressive Strength:	16,500 psf
Core Thickness:	0.40 in
Maximum Flow Rate:	17 gpm/ft width
Geotextile Fabric:	non-woven
Performance Index:	24,100

### CCW MiraDRAIN 8000

Utilizing a high-impact PVC core, CCW MiraDRAIN 8000 is recommended for applications where chemical run-off is a consideration, such as airports, helicopter pads, and industrial sites. It is resistant to petrochemicals and suitable for subgrade drainage around storage tanks. Available with a standard woven geotextile fabric, or with non-woven geotextile fabrics.

Compressive Strength:	18,000 psf
Core Thickness:	0.40 in
Maximum Flow Rate:	21 gpm/ft
Geotextile Fabric:	woven
Performance Index:	27,198

### CCW MiraDRAIN 9000

The industry leader for high-compressive strength horizontal applications, this geocomposite sheet drain features a high-strength woven geotextile fabric, which limits the intrusion of the fabric into the drainage channels under load. The woven fabric is better suited to receive a directly poured concrete topping than non-woven geotextile fabrics. Ideal for use in plaza deck, parking deck and split slab construction.

Compressive Strength:	18,000 psf
Core Thickness:	0.40 in
Maximum Flow Rate:	21 gpm/ft
Geotextile Fabric:	woven
Performance Index:	27,198

### CCW MiraDRAIN 9800

The superior, heavyweight, non-woven geotextile fabric on the new CCW MiraDRAIN 9800 provides unmatched filtration, preventing small particles of soil from clogging the drainage channel while allowing the water to flow through the dimple core and into the discharge system. Its high compressive strength meets the needs of most horizontal applications. Ideal for use on green roofs, landscaping and planters.

Compressive Strength:	18,000 psf
Core Thickness:	0.40 in
Maximum Flow Rate:	17.5 gpm/ft
Geotextile Fabric:	non-woven
Performance Index:	31,325

### CCW MiraDRAIN 9900

With 33,000 psf and a flow rate exceeding that of a geonet by more than 90%, the compressive strength of this system exceeds all geocomposite sheet drains and geonets available today. Its woven geotextile fabric is suited to receive a directly poured concrete topping. CCW MiraDRAIN 9900 withstands the stresses and strains caused by vehicular traffic and other high compressive strength situations. Ideal for use on plaza decks, split slab construction and in locations that encounter emergency traffic.

Compressive Strength:	33,000 psf
Core Thickness:	0.25 in
Maximum Flow Rate:	13 gpm/ft
Geotextile Fabric:	woven
Performance Index:	42,198

### CCW MiraDRAIN GR9400

CCW MiraDRAIN GR9200 is designed specifically for green roofs and large planter applications. Used with CCW waterproofing, this drainage composite provides adequate water retention for sedums, grasses and plant life, while providing a channel for excess water to drain.

Compressive Strength:	9,500 psf
Core Thickness:	1.0 in
Maximum Flow Rate:	81 gpm/ft
Retention Performance	31%-17%

### CCW MiraDRAIN HC

CCW MiraDRAIN HC utilizes a three-dimensional cone with non-woven fabric for demanding applications that encounter high volumes of water. This system is designed to replace traditional aggregate-filled french drains and can be used in conjunction with other MiraDRAIN products. MiraDRAIN HC is primarily used along roads and highways as an edge drain and at base of foundation walls as a trench drain. The MiraDRAIN Sideout and Endout Connectors are used to connect the MiraDRAIN HC to conventional discharge pipes.

Compressive Strength:	9,500 psf
Core Thickness:	1.0 in
Maximum Flow Rate:	81 gpm/ft
Geotextile Fabric:	non-woven
Performance Index:	12,750

## Physical Properties: MiraDRAIN 2000 • 6000/6200 • 6000XL/6200XL • 8000 • 9000

DRAIN Property	Test Method	Unit	2000	6000/6200	6000XL/6200XL	8000 (woven)	9000
<b>CORE</b>			<b>TYPICAL VALUES</b>				
Thickness	ASTM D1777	in (mm)	0.25 (6.35)	0.40 (10.16)	0.40 (10.16)	0.40 (10.16)	0.40 (10.16)
Compressive Strength	ASTM D1621	psf (kN/m <sup>2</sup> )	10,800 (517)	15,000 (719)	16,500 (790)	18,000 (862)	18,000 (862)
Maximum Flow Rate <sup>1</sup>	ASTM D4716	gpm/ft (l/min/m)	12.5 (155)	17 (213)	17 (213)	21 (260)	21 (260)
Installed Vertically <sup>2</sup>	ASTM D4716	gpm/ft (l/min/m)	8.5 (106)	12.5 (157)	14.5 (182)	18.5 (230)	18.5 (230)
Installed Horizontally <sup>3</sup>	ASTM D4716	gpm/ft (l/min/m)	X	X	X	3.8 (47)	3.8 (47)
<b>FABRIC</b>			<b>140NC</b>	<b>DCN04</b>	<b>160N</b>	<b>FW402</b>	<b>FW402</b>
Apparent Opening Size	ASTM D4751	US Std Sieve (mm)	70 (0.212)	40 (0.425)	70 (0.212)	40 (0.43)	40 (0.43)
Water Flow Rate	ASTM D4491	gpm/ft <sup>2</sup> (l/min/m <sup>2</sup> )	140 (5704)	200 (8148)	110 (4481)	145 (5907)	145 (5907)
Grab Tensile Strength	ASTM D4632	lbs (N)	100 (445)	80 (0.36)	160 (712)	365 (1624)	365 (1624)
Grab Tensile Elongation	ASTM D4632	%	60	60	50	24	24
CBR Puncture Strength	ASTM D4833	lbs (N)	X	X	410 (1825)	675 (3004)	675 (3004)
<b>SYSTEM</b>			<b>TYPICAL VALUES</b>				
Performance Index	*	X	14,050	18,250	24,100	27,198	27,198

## Physical Properties: MiraDRAIN 9800 • 9900 • GR9400 • MiraDRAIN HC

DRAIN Property	Test Method	Unit	9800	9900	MiraDRAIN HC
<b>CORE</b>			<b>TYPICAL VALUES</b>		
Thickness	ASTM D1777	in (mm)	0.40 (10.16)	0.25 (6.35)	1 (25.4)
Compressive Strength	ASTM D1621	psf (kN/m <sup>2</sup> )	18,000 (862)	33,000 (1650)	9,500 (455)
Maximum Flow Rate <sup>1</sup>	ASTM D4716	gpm/ft (l/min/m)	17.5 (219)	13 (161)	X
Installed Vertically <sup>2</sup>	ASTM D4716	gpm/ft (l/min/m)	15.5 (193)	X	82 (1300)
Installed Horizontally <sup>3</sup>	ASTM D4716	gpm/ft (l/min/m)	3.0 (38)	2.4 (30)	21 (260)
<b>FABRIC</b>			<b>180N</b>	<b>FW402</b>	<b>140NC</b>
Apparent Opening Size	ASTM D4751	US Std Sieve (mm)	80 (0.18)	40 (0.43)	70 (0.212)
Water Flow Rate	ASTM D4491	gpm/ft <sup>2</sup> (l/min/m <sup>2</sup> )	95 (3870)	145 (5907)	140 (5704)
Grab Tensile Strength	ASTM D4632	lbs (N)	205 (912)	365 (1624)	100 (445)
Grab Tensile Elongation	ASTM D4632	%	50	24	60
CBR Puncture Strength	ASTM D4833	lbs (N)	500 (2224)	675 (3004)	250 (1113)
<b>SYSTEM</b>			<b>TYPICAL VALUES</b>		
Performance Index	*	X	31,325	42,198	42,125

All flow rates were tested at 3600 psf. <sup>1</sup>In plane flow rate @ gradient of 1.0 <sup>2</sup>Installed flow rate @ vertical gradient of 1.0 with soil or concrete overburden <sup>3</sup>Installed flow rate @ horizontal gradient of 0.05 with soil or concrete overburden. \*Drainage Performance Index is a function of ASTM D 4833, D 4632 and D 1621 © Contact Carlisle Coatings & Waterproofing for performance values in these applications. NW=Nonwoven

Carlisle Coatings & Waterproofing, Inc. (CCW) provides a broad range of solutions to meet specific waterproofing needs. CCW offers technical services, research & development and manufacturing capabilities from its headquarters in Wylie, Texas and two additional manufacturing facilities in Terrell, TX and Carlisle, PA. The CCW network is further supported by over 50 manufacturer's sales representatives directed by regional sales offices throughout the country. CCW offers a complete line of waterproofing and moisture protection products for the architectural, general construction, industrial and maintenance industries. Carlisle Coatings & Waterproofing, Incorporated is part of the Construction Materials Division of Carlisle Companies, Inc., which is a publicly traded company on the NYSE.

### Limited Warranty

Carlisle Coatings & Waterproofing, Incorporated (Carlisle) warrants this product to be free of defects in workmanship and materials only at the time of shipment from our factory. If any Carlisle materials prove to contain manufacturing defects that substantially affect their performance, Carlisle will, at its option, replace the materials or refund its purchase price.

This limited warranty is the only warranty extended by Carlisle with respect to its materials. There are no other warranties including the implied warranties of merchantability and fitness for a particular purpose.

Carlisle specifically disclaims liability for any incidental, consequential or other damages including, but not limited to, loss of profits or damages to a structure or its contents arising under any theory of law whatsoever.

The dollar value of Carlisle's liability and buyer's remedy under this limited warranty shall not exceed the purchase price of the Carlisle material in question.

### Carlisle Coatings & Waterproofing

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