

# WET PROCESS SHOTCRETE

PRODUCT NO. 1228-56, -57, -58, -59

## DIVISION 3

Shotcrete  
03 – 37 – 13

### PRODUCT DESCRIPTION

QUIKRETE® Wet Process Shotcrete products are high performing, pneumatically applied concrete products designed for new construction and large rehabilitation projects. They are ideal products for jobs requiring high quality, wet process shotcrete placement and for applications where relatively low dust levels are imperative.

### PRODUCT NAMES

50# QUIKRETE® Wet Process Shotcrete Coarse 1228-56  
50# QUIKRETE® Wet Process Shotcrete MS Coarse 1228-57  
50# QUIKRETE® Wet Process Shotcrete Fine 1228-58  
50# QUIKRETE® Wet Process Shotcrete MS Fine 1228-59

### PRODUCT USE

QUIKRETE® Wet Process Shotcrete products are designed to be used in the construction of highway tunnels, rail tunnels, retaining walls, etc. They may be used in rehabilitation projects requiring structural repair of bridges, tunnels, parking garages, ramps, beams, piers, sewer pipes and dams. They can be used for structural concrete on vertical, horizontal, and overhead surfaces. QUIKRETE® Wet Process Shotcrete products are well proportioned blends of Portland cement, aggregates, and proprietary additives. The QUIKRETE® Wet Process Shotcrete MS products are modified with micro silica allowing for high strength, improved sulphate resistance, high adhesion, low permeability, low rebound, and low sag. QUIKRETE® offers both Type FA and Type CA versions as well as a variety of fibered versions (steel, glass, and polypropylene) upon request to help ensure customers are able to meet their specific job requirements. QUIKRETE® Wet Process Shotcrete products are available in bulk bags. QUIKRETE® also offers dry process shotcrete products (#1228 & #1229).

### SIZES

•QUIKRETE® Wet Process Shotcrete products are packaged in 3000 lb (1362 kg) bulk bags, 50 lb (22.7 kg) bags, and 80 lb (36.3 kg) bags.

### YIELD

• Applied at ½" (13 mm) thickness, each 50 lb (22.7 kg) bag will cover approximately 9 ft² (0.84 m²).

### TECHNICAL DATA

#### APPLICABLE STANDARDS

ASTM International

- ASTM C39, *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*
- ASTM C42 *Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (AASHTO T24)*
- ASTM C78 *Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)*
- ASTM C109 *Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)*



- ASTM C1202 *Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration*
- ASTM C1399, *Standard Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete*
- ASTM C1480 *Standard Specification for Packaged, Pre-Blended, Dry, Combined Materials for Use in Wet or Dry Shotcrete Applications*

### PHYSICAL /CHEMICAL PROPERTIES

The performance of field applied wet process shotcrete cannot be duplicated in the laboratory. Still, laboratory data is important for quality control purposes and for making comparisons between formulations. QUIKRETE® Wet Process Shotcrete products have been extensively tested both in the laboratory and in the field. The greatly enhanced performance in the field shows the benefits of low water/cement ratio and high compaction. The field test data are offered as an example of what can be achieved with qualified operators using proper techniques. The quality of wet process shotcrete is heavily dependent on the skills of the operator. Table 1 shows typical laboratory data for wet process shotcretes with and without fibers. Typical, field results for QUIKRETE® Wet Process Shotcrete MS – Coarse are shown in Tables 2 & 3. Similar field results can be expected for other QUIKRETE® Wet Process Shotcrete products. All of the QUIKRETE® Wet Process Shotcrete products in Tables 1 through 3 comply with the requirements of ASTM C1480 Grade GU (General Utility). Additionally, Wet Process Shotcrete MS - Coarse complies with ASTM C1480 LP (Low Permeability) and steel fibered versions comply with Grade FR (Fiber Reinforced), Class II. QUIKRETE® also offers custom designs to meet other types and grades of ASTM C1480, as well as job specific specifications. Consult a local QUIKRETE® representative for details.

### INSTALLATION

#### EQUIPMENT

QUIKRETE® Wet Process Shotcrete products are applied using wet process shotcrete machinery. Wet process shotcrete is a very efficient method for making repairs to horizontal, vertical, and overhead surfaces. The process allows for the placement of the repair material at a very low water/cement ratio with a high degree of compaction. The result is a repair that is superior to other methods of placement of repair material.

\* Refer to [www.quikrete.com](http://www.quikrete.com) for the most current technical data, MSDS, and guide specifications

**METHODS**

QUIKRETE recommends that American Concrete Institute (ACI) Committee 506 procedures be followed for surface preparation, equipment, nozzle/certification, shotcrete placement, and curing procedures. Refer to the following publications:

- ACI 506R-05 Guide to Shotcrete
- ACI 506.2-95 Specifications for Shotcrete
- ACI 506.1R-08 Guide to Fiber-Reinforced Shotcrete
- ACI CCS-4(08) Shotcrete for the Craftsman

**SURFACE PREPARATION**

**PREPARATORY WORK**

*APPLICATION OVER CONCRETE SURFACES*

Remove all spalled, severely cracked, deteriorated, loose and unsound concrete from existing concrete surface by chipping, water blasting or other mechanical methods. Adequate pre-wetting of the concrete substrates should be done prior to shotcreting. Surfaces should be damp with no glistening water.

*APPLICATION OVER MASONRY SURFACES*

Prepare as required for concrete surfaces. However, prevention of water absorption from the shotcrete into the masonry surface is critical. Surface should be pre-dampened with no glistening water.

**APPLICATION**

QUIKRETE® recommends that job mock-ups be prepared by the contractor and tested prior to beginning a project.

Ensure the mix time utilized allows for the activation of the proprietary additives.

Shotcrete nozzle must be held at a 90 angle to the substrate surface. Move nozzle in a circular motion to achieve proper consolidation and reduce rebound.

**CURING**

Shotcrete, like concrete, must be properly cured so that its potential strength and durability are fully developed. This is particularly true for the thin sections, textured surfaces, and low water cement ratios associated with shotcrete.

The best method for curing is keeping the shotcrete wet continuously for 7 days while maintaining a temperature over 40° F (4° C).

Curing compounds are satisfactory for curing if drying conditions are not severe and where no additional shotcrete or paint is to be applied and the appearance is acceptable. Where the surface has a natural gun or flash finish, the liquid membrane curing compound should be applied heavier than on surfaces with a finer finish.

**WARRANTY**

The QUIKRETE® Companies warrant this product to be of merchantable quality when used or applied in accordance with the instructions herein. The product is not warranted as suitable for any purpose or use other than the general purpose for which it is intended. Liability under this warranty is limited to the replacement of its product (as purchased) found to be defective, or at the shipping companies' option, to refund the purchase price. In the event of a claim under this warranty, notice must be given to The QUIKRETE® Companies in writing. This limited warranty is issued and accepted in lieu of all other express warranties and expressly excludes liability for consequential damages.

The QUIKRETE® Companies  
 One Securities Centre  
 3490 Piedmont Rd., NE, Suite 130 Atlanta, GA 30305  
 (404) 634-9100 • Fax: (404) 842-1425

**TABLE 2 – TYPICAL FIELD TEST RESULTS**

	<i>Wet Process Shotcrete MS - Coarse</i>
Water content / bag	~ 2/3 gal (2.5 L) per 50 lb (22.7 kg) bag
Unit Weight/Bulk Density	~ 140 lbs / ft³ (2,243 kg/m³)
Rebound	very low

**TABLE 3 TYPICAL FIELD APPLIED PHYSICAL PROPERTIES**

	<i>Wet Process Shotcrete MS - Coarse</i>
Rapid Chloride Permeability Test, ASTM C1202	
Coulombs	< 500
Rating	very low
Compressive Strength, ASTM C 39	
1 day	4,500 PSI (31.0 MPa)
3 day	6,500 PSI (44.8 MPa)
7 days	7,500 PSI (51.7 MPa)
28 days	8,500 PSI (58.6 MPa)
Flexural Strength, ASTM C 78	
7 days	900 PSI (6.2 MPa)
28 days	1,000 PSI (6.9 MPa)

**TABLE 1 TYPICAL LABORATORY TEST RESULTS<sup>1</sup> for QUIKRETE® WET PROCESS SHOTCRETE PRODUCTS**

	Shotcrete Fine	Shotcrete MS Fine	Shotcrete MS Coarse	Shotcrete MS Fine w polypropylene fibers	Shotcrete MS Coarse w steel fibers
Compressive strength, ASTM C109 / ASTM C39					
1 day	1500 psi (10.3 MPa)	1750 psi (12.1 MPa)	1750 psi (12.1 MPa)	1750 psi (12.1 MPa)	2500 psi (17.2 MPa)
7 days	3050 psi (21.0 MPa)	3500 psi (24.1 MPa)	3500 psi (24.1 MPa)	3500 psi (24.1 MPa)	4000 psi (27.6 MPa)
28 days	5075 psi (35.0 MPa)	5500 psi (37.9 MPa)	5500 psi (37.9 MPa)	5500 psi (37.9 MPa)	7000 psi (48.3 MPa)
Flexural strength, ASTM C78					
1 day	250 psi (1.7 MPa)	350 psi (2.4 MPa)	350 psi (2.4 MPa)	350 psi (2.4 MPa)	450 psi (3.1 MPa)
7 days	500 psi (3.4 MPa)	600 psi (4.1 MPa)	600 psi (4.1 MPa)	600 psi (4.1 MPa)	700 psi (4.8 MPa)
28 days	600 psi (4.1 MPa)	700 psi (4.8 MPa)	700 psi (4.8 MPa)	700 psi (4.8 MPa)	1000 psi (6.9 MPa)
Residual Strength, ASTM C1399					
7 days	-	-	-	-	500 psi (3.4 MPa)

<sup>1</sup>Laboratory testing is conducted in accordance with ASTM C1480.

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