

# MASTERFLOW® 928

*Extended work-time, high-precision, non-shrink, natural aggregate grout*

## DESCRIPTION:

MASTERFLOW® 928 grout is a high precision, nonshrink, natural aggregate grout with extended working time. It is ideally suited for grouting machines or plates requiring precision load-bearing support. This specially formulated precision grout can be placed at a variety of consistencies - from fluid to damp-pack - over a wide temperature range - 45 to 90 °F (7 to 32 °C). MASTERFLOW 928 grout meets the requirements of ASTM C 1107 and the Army Corp of Engineers' CRD C 621, Grades B and C.

## RECOMMENDED FOR:

- Precision nonshrink grouting of:
  - Machinery and equipment, baseplates and soleplates
  - Precast wall panels, beams and columns, curtain walls, concrete systems, and other structural and nonstructural building members
  - Machinery, and concrete surface and crack repair in federally inspected meat and poultry plants
- Grouting anchor bolts, reinforcing bars and dowel rods
- Repairing concrete, including grouting voids, rock pockets and large cracks
- Applications requiring high one-day and later-age compressive strengths
- Applications requiring nonshrink grout to achieve maximum bearing for optimum load transfer
- Application requiring a grout to be pumped
- Marine applications
- Freeze/thaw environments

## FEATURES/BENEFITS:

- Meets ASTM C 1107 and CRD C 621, Grades B and C, requirements at a fluid consistency over a temperature range of 45 to 90 °F (7 to 32 °C) over a 30 minute working time
- Can be mixed at a wide range of consistencies to ensure proper placement under a variety of application conditions
- Extended working time to ensure sufficient time for placement
- Hardens free of bleeding, segregation or settlement shrinkage
- Contains high quality, well-graded quartz aggregate for optimum strength and workability
- Sulfate resistant
- Freeze/thaw resistant

## PACKAGING/ESTIMATING:

MASTERFLOW 928 grout is packaged in 55 lb (25 kg) moisture-resistant bags. It is also available in 3,300 lb (1,500 kg) bulk bags.

One 55 lb (25 kg) bag of MASTERFLOW 928 grout mixed with approximately 10.5 lb (4.8 kg) or 1.26 U.S. gal (4.8 L) of water yields approximately 0.50 ft<sup>3</sup> (0.014 m<sup>3</sup>) of grout.

Note: The water requirement may vary due to mixing efficiency and other variables.

## PERFORMANCE DATA:

The following data was developed under controlled laboratory conditions. Reasonable variations from these results can be expected.

### Typical Compressive Strengths

(ASTM C 109, ASTM C 942, Modified)

|         | Plastic <sup>1</sup> |     | Consistency Flowable <sup>2</sup> |     | Fluid <sup>3</sup> |     |
|---------|----------------------|-----|-----------------------------------|-----|--------------------|-----|
|         | psi                  | MPa | psi                               | MPa | psi                | MPa |
| 1 days  | 4,500                | 31  | 4,000                             | 28  | 3,500              | 24  |
| 3 days  | 6,000                | 41  | 5,000                             | 34  | 4,500              | 31  |
| 7 days  | 7,500                | 52  | 6,700                             | 46  | 6,500              | 45  |
| 28 days | 9,000                | 62  | 8,000                             | 55  | 7,500              | 52  |

### Volume Change (ASTM C 1090)

|         | % Change | Requirement per ASTM C 1107, % |
|---------|----------|--------------------------------|
| 1 days  | 0.04     | 0.0 to 0.30                    |
| 3 days  | 0.04     | 0.0 to 0.30                    |
| 14 days | 0.05     | 0.0 to 0.30                    |
| 28 days | 0.06     | 0.0 to 0.30                    |

### Setting Time (ASTM C 191)

|                     | Consistency          |                       |                    |
|---------------------|----------------------|-----------------------|--------------------|
|                     | Plastic <sup>1</sup> | Flowable <sup>2</sup> | Fluid <sup>3</sup> |
| Initial Set (h:min) | 2:30                 | 3:00                  | 4:30               |
| Final Set (h:min)   | 4:00                 | 5:00                  | 6:00               |

### Flexural Strength (ASTM C 78)\*

|         | psi   | MPa |
|---------|-------|-----|
| 3 days  | 1,000 | 6.9 |
| 7 days  | 1,050 | 7.2 |
| 28 days | 1,150 | 7.9 |

### Modulus of Elasticity (ASTM C 469, Modified)\*

|         | psi                    | MPa                    |
|---------|------------------------|------------------------|
| 3 days  | 2.82 x 10 <sup>6</sup> | 1.94 x 10 <sup>4</sup> |
| 7 days  | 3.02 x 10 <sup>6</sup> | 2.08 x 10 <sup>4</sup> |
| 28 days | 3.24 x 10 <sup>6</sup> | 2.23 x 10 <sup>4</sup> |

### Coefficient of Thermal Expansion (ASTM C 531)\*

6.5 x 10<sup>-6</sup> in./in./°F (11.7 x 10<sup>-6</sup> mm/mm/(°C))

### Split Tensile and Tensile Strength

(ASTM C 496 and ASTM C 190)\*

|         | Split Tensile |     | Tensile |     |
|---------|---------------|-----|---------|-----|
|         | psi           | MPa | psi     | MPa |
| 3 days  | 575           | 4.0 | 490     | 3.4 |
| 7 days  | 630           | 4.3 | 500     | 3.4 |
| 28 days | 675           | 4.7 | 500     | 3.4 |

<sup>1</sup> 100 to 125% flow on flow table per ASTM C 230

<sup>2</sup> 125 to 145% flow on flow table per ASTM C 230

<sup>3</sup> 25 to 30 seconds through flow cone per ASTM C 939

\*Test conducted at a fluid consistency

## PERFORMANCE DATA (CONTINUED):

### Typical Ultimate Tensile and Shear Loads Anchor Bolt Tests (ASTM E 488)\*

|  | Ultimate<br>Tensile Load |        | Ultimate<br>Shear Load |        |
|--|--------------------------|--------|------------------------|--------|
|  | lb                       | kg     | lb                     | kg     |
| <b>1-1/4 in. Bolts</b><br>9 in. embedment<br>in a 2-1/2 in diameter hole | 56,000                   | 25,450 | 27,500                 | 12,500 |
| <b>7/8 in. Bolts</b><br>6 in. embedment<br>in a 1-3/4 in diameter hole   | 27,500                   | 12,500 | 12,700                 | 5,770  |
| <b>1/2 in. Bolts</b><br>4 in. embedment in a 1-1/8 in diameter hole      | 7,950                    | 3,610  | 2,100                  | 950    |

(Data based on threaded anchor bolts with washer and nut,  
1 in. = 25.4 mm)

### Punching Shear Strength (MB Method)\*

3 in. x 3 in. x 11 in (76 mm x 76 mm x 279 mm) beam

|                | psi   | MPa  |
|----------------|-------|------|
| <b>3 days</b>  | 2,200 | 15.2 |
| <b>7 days</b>  | 2,260 | 15.6 |
| <b>28 days</b> | 2,650 | 18.3 |

### Resistance to Rapid Freezing and Thawing

(ASTM C 666, Procedure A)

300 Cycles RDF 99%

\*Test conducted at a fluid consistency

## INSTALLATION:

Consult the MASTERFLOW 928 grout Installation Bulletin and the product bag for details on the installation of MASTERFLOW 928 grout.

Master Builders recommends that the user request the services of the local representative for a prejob conference to plan the installation.

### Mixing

MASTERFLOW 928 grout should be mixed with a mechanical mixer for a least 5 minutes. For a fluid consistency, start with 9 lb (4 kg) [1.1 U.S. gal (4.2 L)] per 55 lb bag. Adjust mixing water, as needed, to establish the recommended flow of 25 to 30 seconds through a flow cone (ASTM C 939/CRD C 611). Less mixing water will be required to achieve stiffer consistencies.

### Placing

MASTERFLOW 928 grout should be placed in a continuous pour. Discard grout that becomes unworkable. Grout should be placed from one side to avoid entrapment of air. Make sure that the grout fills the entire space to be grouted and remains in contact with the plate throughout the grouting process. Straps may be used to move the grout to ensure that the entire space is filled. DO NOT VIBRATE.

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### Curing

Immediately after placement, wet cure the MASTERFLOW 928 grout by covering all exposed grout with clean, damp rags (not burlap). Keep moist until grout surface is ready to be finished or until final set. Following the removal of the damp rags, immediately coat with a Master Builders recommended curing compound, such as MASTERKURE<sup>o</sup> curing compound.

### Jobsite Testing

If strength tests must be made at the jobsite, use 2 in. (50 mm) CUBE molds per ASTM C 109. DO NOT use cylinder molds. Testing should be controlled on the basis of the desired placing consistency rather than strictly on the water content. Consult with your local Master Builders representative for special procedures required when mixing and casting compressive strength tests of fluid, nonshrink grout.

## LIMITATIONS:

- The ambient and initial material temperature of the grout should be in the range of 45 to 90 °F (7 to 32 °C) for both mixing and placing. Ideally, the amount of mixing water used should be that which is necessary to achieve a 25 to 30 second flow per ASTM C 939 (CRD C 611). For placement outside of 45 to 90 °F (7 to 32 °C), contact your local Master Builders representative.
- For pours greater than 6 in. (150 mm) deep, consult your local Master Builders representative for special precautions and installation procedures.
- For precision applications, requiring a fluid consistency (25 to 30 second flow per ASTM C 939/CRD C 611) with extended working time over a temperature range of 45 to 90 °F (7 to 32 °C) and dynamic load bearing support, use EMBECCO<sup>o</sup> 885 grout.
- When the grout will be in contact with steel which is or will be stressed over 80,000 psi (550 MPa) use MASTERFLOW<sup>o</sup> 816 cable grout.
- MASTERFLOW 928, one-component, cement-based grout is formulated for industrial and professional use only, and must be kept out of the reach of children. This product contains chemicals which may be potentially HARMFUL to your health, if not stored and used properly. Hazards can be significantly reduced by observing all precautions which are found on Material Safety Data Sheets (MSDS), product labels, and technical literature. Please read this literature carefully before using product.

## RELATED BULLTEINS:

**Specification Bulletin #112636**

**Material Safety Data Sheet (MSDS)**

**Installation Bulletin #112664 - EMBECCO 885 &**

**MASTERFLOW 928**

**Installation Bulletin #112665 - Bulk Bags**

Visit us on the Web for the most current product information & news: [www.masterbuilders.com](http://www.masterbuilders.com)