



REMR MATERIAL DATA SHEET CM-PC-1.7

CONCRETE PATCHING MATERIAL: MASTERFLOW 713 GROUT

1. NAME

Masterflow 713 Grout

2. MANUFACTURER

Master Builders
23700 Chagrin Blvd.
Cleveland, OH 44122
Telephone: 216-831-5500

3. DESCRIPTION

Masterflow 713 grout is a ready-to-use, nonshrink, high-strength product formulated for use at any consistency from extremely fluid to damp pack. It contains specially graded, natural aggregates and is the ideal product to use for applications requiring precision support.

4. APPLICABLE SPECIFICATION

CRD-C 621, "Corps of Engineers Specification for Nonshrink Grout."

5. USES & LIMITATIONS

Uses: Masterflow 713 grout should be used for grouting precision equipment, baseplates, soleplates, and columns; grouting applications where shrinkage must be eliminated and where a high-strength grout, similar in appearance to concrete and mortar, is required or desired; or nonshrink grouting of pre-cast wall panels, beams, and columns, concrete systems, structural building members, and curtain walls.

Limitations: Do not use Masterflow 713 grout in precision equipment grouting where complete presaturation of base concrete and thorough curing of grout are not possible. Also do not use this grout in grouting prestressed and posttensioned cables and rods designed for stresses in excess of 80,000 psi (552 MPa). (Refer to Masterflow 814 cable grout and Masterflow 813 grout for grouting applications of highly stressed steel.)

6. MANUFACTURER'S TECHNICAL DATA

Masterflow 713 grout is packaged in 55-lb (25-kg) moisture-resistant bags. The strength of the grout is often the determining factor in deciding when loads can be put on structural members or machinery that were grouted. The strength of the grout is dependent on the amount of mixing water, temperature of the object grouted, curing, and age of the hardened grout.

Typical compressive strengths of Masterflow 713 grout are given on the following page. (Note: The data shown are based on controlled laboratory tests. Reasonable variations from the results shown above can be expected. Field and laboratory tests should be controlled on the basis of the desired placing consistency rather than strictly on the water content. If the work requires that strength tests be made at the job site or in the laboratory, do not use cylinder molds. Consult a Master Builders representative for special procedures required when mixing and casting cubes of fluid, nonshrink grout for compressive strength tests. Use of iced

water to produce an ideal, as-mixed grout temperature of 45° to 60° F (7° to 16° C) will reduce water required for a given consistency and increase strengths and working time accordingly.)

Days	Plastic Consistency*	
	psi	MPa
3	4,900	34
7	6,600	46
28	7,800	54
	Flowable Consistency**	
	psi	MPa
3	3,800	26
7	5,500	38
28	7,200	50
	Fluid Consistency†	
	psi	MPa
3	2,800	19
7	4,500	31
28	6,500	45

* 100-percent flow on flow table, ASTM C 230, 5 drops in 3 sec.

** 130-percent flow on flow table, ASTM C 230, 5 drops in 3 sec.

† 20- to 30-sec flow, by Corps of Engineers Flow Cone Method, CRD-C 611.

7. MANUFACTURER'S GUIDANCE FOR APPLICATION

Surface preparation: Clean out bolt holes and have foundation area to be grouted thoroughly cleaned and roughened but level to achieve a good bonding surface. Saturate the clean foundation and bolt holes with water for 24 hr. Remove all free water immediately before grouting. When bolt holes are to be grouted, grout them first before the baseplate to prevent sagging of the grout into the holes. For precision results, whenever equipment or plates are to be

grouted by pouring, rodding, strapping, pumping, or damp packing, such equipment or plates must be rigidly bolted down on shims or leveling screws to prevent their movement during installation.

Forms: Forms should facilitate rapid, continuous placement and complete filling of the space to be grouted. On the grout-placing side, slant the form at an angle of approximately 45 deg outward and extend this form suitably high to provide a head of grout during placement. Grout should be placed directly on the sloped form to minimize entrapment of air during placement. On other sides, at least 1/2-in. (13-mm) horizontal clearance should be allowed between baseplate and forms, and forms should be at least 1 in. (25 mm) higher in elevation than the underside of the plate. Methods of forming that will allow the grout to flow by gravity between the plate and the foundation should be used, and the grout should be kept in full contact with these surfaces until it has hardened.

Temperature: Store and mix grout to produce the desired mixed grout and placing temperatures under jobsite conditions. Consider using ice water in warm weather or warm water in cold weather. Ideally, the foundation and baseplate should be in the 50° to 65° F (10° to 18° C) range, but never below 45° F (7° C). Mixed grout temperature should fall between 45° F (7° C) and 70° F (21° C).

The use of ice water will reduce water required for a given consistency and increase working time and strength accordingly. When grouting at minimum temperatures, care must be taken to see that foundation, plate, and grout temperatures do not fall below 45° F (7° C) until after final set and that the grout is protected from freezing (32° F or 0° C) until it has reached 4,000 psi (27.6 MPa) compressive strength.

The following temperature guidelines are recommended:

	<u>Absolute Minimum</u>	<u>Preferred Range</u>	<u>Suggested Maximum</u>
Foundation and plates	45° F 7° C	50° to 65° F 10° to 18° C	85° F 29° C
Dry grout storage	35° F 2° C	50° to 65° F 10° to 18° C	100° F 38° C
Mixing water	32° F 0° C	40° to 50° F 4° to 10° C	80° F 27° C
Grout as mixed and placed	45° F 7° C	50° to 65° F 10° to 18° C	70° F 21° C

Mixing: Use drinkable water only. Do not mix by hand. Use one or more mortar mixers to permit mixing and placing operations to proceed simultaneously without interruption. Masterflow 713 Grout is designed to be placed at fluid consistency at a flow of between 20 to 30 sec on the flow cone (CRD-C 611). The exact amount of water needed will depend upon the temperature of the grout following mixing and the size of batch mixed. Use ice or cold water to lower mixed grout temperature and warmer water to raise it. Do not use water in an amount or at a temperature that produces a flow of less than 20 sec or causes bleeding or segregation. Put estimated water required to develop 20- to 30-sec flow in the mixer first and then slowly and steadily add the grout. Mix until smooth (2 to 3 min) and place at once. Do not mix more than can be placed in approximately 10 min. Do not retemper grout by adding water or remixing after it stiffens.

Placing: Place grout quickly and continuously. Discard grout that becomes unworkable. Grout should be placed from only one side of the plate to avoid entrapment of air. Make sure grout fills the entire space to be grouted and remains in contact with the plate throughout all of the grouting placement. Do not vibrate.

Curing: After grout is placed, immediately cover all exposed grout with clean wet rags (not burlap) and keep moist until grout surface is ready to be finished or until final set. Do not remove forms or cut back grout below underside of object grouted before grout has hardened sufficiently to prevent penetration with a pointed mason trowel. Following removal of moist rags and forms and finishing of shoulders, coat all exposed grout with Masterseal or MB-429 curing compound for long-term curing.

Estimating: Fifty-five pounds (25 kg) of Masterflow 713 grout mixed with 11.0 lb or 1.32 gal (5.0 litres) of water produces approximately 0.51 cu ft (0.014 cu m) of grout. More or less water may be necessary to meet consistency requirements, thus increasing or decreasing the yield.

Material precautions: The temperature of the mixed grout should be in the range of 45° to 70° F (7° to 21° C). Do not use water in an amount or at a temperature that will produce a flow of less than 20 sec (CRD-C 611) or cause mixed grout to bleed or segregate. If outside that range, special information on high- and low-temperature grouting techniques is available from the local Master Builders representative.

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When the grout will be in contact with steel that is or will be stressed to over 80,000 psi (552 MPa), use Masterflow 813 grout for appropriate applications described in this sheet and Masterflow 814 cable grout for post-tensioned cables and strands.

Safety precautions: As with other products containing portland cement,

the cementitious material in Masterflow 713 grout may cause irritation. Avoid contact with eyes and prolonged contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 min. Call a physician. In case of contact with the skin, wash skin thoroughly. Keep product out of the reach of children.

8. CORPS OF ENGINEERS' EVALUATION

Technical data:

<u>Properties</u>	<u>Test Method</u>	<u>Results</u>	
Flow, percent	ASTM C 230 5 drops in 3 sec	126	
Compressive strength, psi	ASTM C 39	24 hr 4,810	28 day 7,240
Modulus of elasticity, psi	ASTM C 469	2.96×10^6	3.27×10^6
Flexural strength, psi	ASTM C 78	790	1,030
Bond to concrete, psi	ASTM C 882	1,400	2,770
Shrinkage, percent* (unconfined condition)	GR-83-10**		0.18 [†]
(concrete patch)	GR-83-10**		-0.02 [†]

* Mix design used was 1,000 g of material and 135 ml of water.

** Bureau of Reclamation Technical Report Standard.

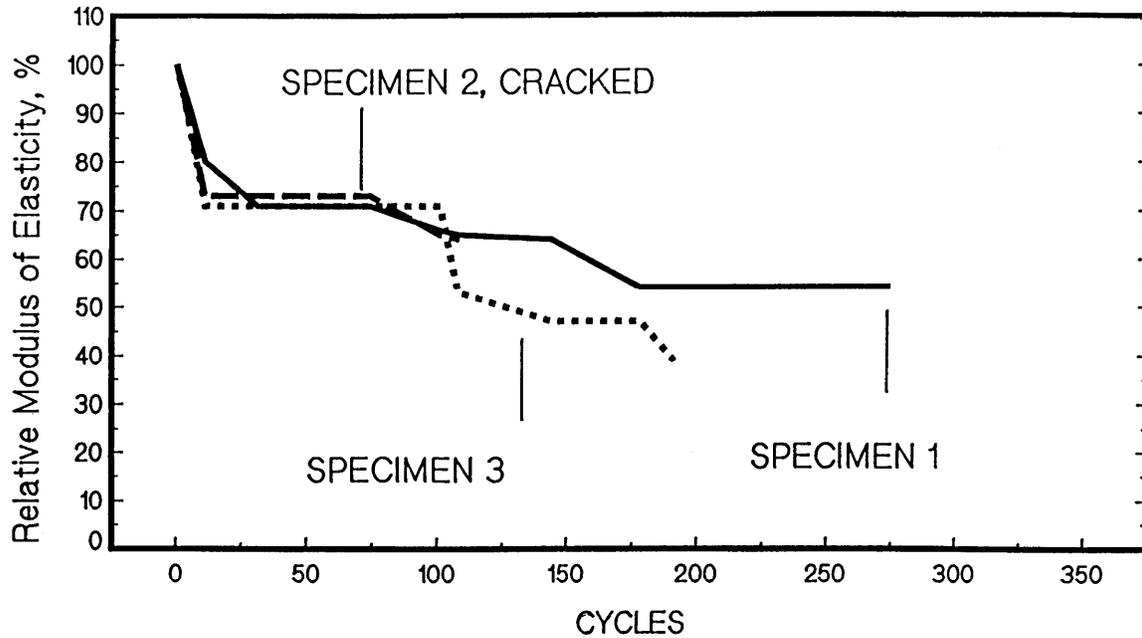
† No exotherm was recorded on the shrinkage specimen (4° F rise). Room temperature varied more than this.

9. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup phases of concrete patching activities involving potentially hazardous and toxic chemical substances. Manufacturer's recommendations to protect occupational health and environmental quality should be carefully followed. Material safety data sheets should be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on

occupational health or environmental quality are unknown, chemical substances should be treated as potentially hazardous toxic materials.

Rapid Freezing and Thawing,
ASTM C 666, Relative Dynamic Modulus
of Elasticity, %



10. AVAILABILITY & COST

Availability: This material is marketed throughout the United States through a network of local distributors. Distributors are also located throughout the rest of the world.

Costs: Cost is \$15.50 per 55-lb bag of material.

11. TECHNICAL SERVICE

For further assistance, contact your local Master Builders field service representative or Master Builders, Division of Martin Marietta Corp., Cleveland, OH 44122 and Toronto, Ontario MGM 3E4.