

February 20, 2023

Gary Carney  
Ashuelot Pond Dam Village District (APDVD)  
PO Box 105  
Washington, NH 03280-0105

SUBJECT: Construction Observation Report  
Temporary Gate Installation Project  
Ashuelot Pond Dam: D245005  
Washington, NH 03280

Dear Mr. Carney:

NH Dams is pleased to provide you with this letter report summarizing our observations of the construction to reline the existing low-level-outlet (LLO) at Ashuelot Pond Dam as well as the installation of a temporary LLO gate, in preparation for the installation of a permanent gate to replace the existing gate, and allow for the full structural evaluation of the gate house structure, in accordance with NHDES Dam Bureau requirements.

M&K Commercial Diving (M&K) contracted directly with the APDVD to construct new reinforced concrete face walls at the LLO, at the invert of the LLO and both sidewalls, as well as a new upstream face to the gate house to allow for full seating of the temporary and permanent LLOs. The work was to be done in accordance with (IAW) the design drawings submitted September 13, 2022, and approved by Dam Bureau September 15, 2022.

In order to provide a finished product of consistent quality placed under water, M&K submitted a concrete mix design from Carroll Concrete, for a 4,000 psi Portland cement product with fine aggregate and admixtures to facilitate pumping the concrete through the tremie tubes to provide full coverage of the steel reinforcement (Appendix 1) and adequate depth for securing the proposed LLO gate and rails. The design was for a minimum 4,000 psi mixture. The concrete mix was approved by Dam Bureau on September 20, 2022.

M&K mobilized to the site October 18, 2022, installing dowels and reinforcing steel into the existing stone LLO channel IAW the design drawings, and constructing forms with tremie tubes for concrete placement. Sandbags were replaced at the base of the existing gate structure to minimize flow through the gate house during concrete placement.

On November 3, 2022 Carroll Concrete was onsite with 6 cubic yards of the specified concrete mix (Truck # 405) and their in-house concrete testing technician. In addition, Randy Rhoades of M&W Soils Engineering, Inc was onsite to provide independent concrete testing services. M&K was onsite with a peristaltic grout pump and diving crew. The intent was to complete concrete placement in a single pour.

Concrete placement started at the floor of the gate house structure and gate base slab, including the lower right corner (as viewed facing downstream) of the inlet to the gate house. Approximately  $\frac{3}{4}$  cubic yards of concrete was pumped into the void observed in the lower right corner of the gate house. Placement proceeded at the vertical walls in the gate house and side walls of the inlet opening.

Water quality in the downstream channel was monitored during concrete placement. During placement of concrete at the upstream face of the gate house structure, “smoking” turbidity was observed in the downstream channel, and placement was halted while the source of the smoking could be determined. M&K located the source of smoking and placed fabric and sandbags at the form work to mitigate the smoking. After approximately 30 minutes, concrete placement resumed once the downstream channel cleared.

Approximately ½ cubic yard was placed and additional smoking was observed downstream. It was decided to suspend concrete placement to allow for the completed pour to cure. Approximately 4 cubic yards was placed in total during the first pour.

A second placement of approximately ½ cubic yard was completed November 11, 2022 to finish the upstream face of the gate house structure. The seven day cylinder break of the sampled concrete demonstrated the concrete mix design exceeded 4,000 psi (Appendix 2)

Concrete form work was removed November 14, 2022. Quality of the placement was found to be excellent, with a few locations requiring grinding where mix had leaked through form work joints and at the interface with the existing gate house stone foundation.

The gate structure, including supports, slides, gate and trash rack were fabricated and painted between November 15 and December 1, 2022. The gate superstructure and rails were installed December 1, with the temporary gate installed and tested December 5, 2022.

On December 12, 2022 the temporary gate was lowered to dewater the gate house water pit (area between the temporary gate and existing gate). At this time M&K observed significant inflow to the water pit from the ceiling of the existing gate house inlet. The inflow was substantial enough to prevent dewatering of the water pit.

Given dropping water temperatures and need for further consultation with NHDES Dam Bureau, in coordination with NH Dams, APDVD, M&K raised the temporary gate, rewatering the gate house water pit, and secured the temporary gate in place. Once secured, M&K raised the upper section of the existing gate to lower pond water levels consistent with annual drawdown procedures.

The concrete design intent was to maintain the existing outlet dimensions of the existing gate house inlet to the extent possible, while providing a new seating face for the temporary gate. Placement of reinforced concrete at the outlet ceiling may impact discharge capacity of the inlet. Options to provide adequate structural integrity to withstand hydrostatic pressure and eliminate leakage while maintaining discharge capacity need to be evaluated, designed and approved by Dam Bureau to permit project completion prior to raising water levels in the spring.

Photographs taken during onsite observation are included below.



*Photo 1 – APDVD representatives on site for the November 3*



*Photo 2 – M&K setting up the peristaltic grout pump November 3, dive crew control trailer in background*



*Photo 3 – M&K observing mix condition from Carroll Concrete truck # 405 November 3*



*Photo 4 – Carroll Concrete Truck #405 onsite for November 11 placement*



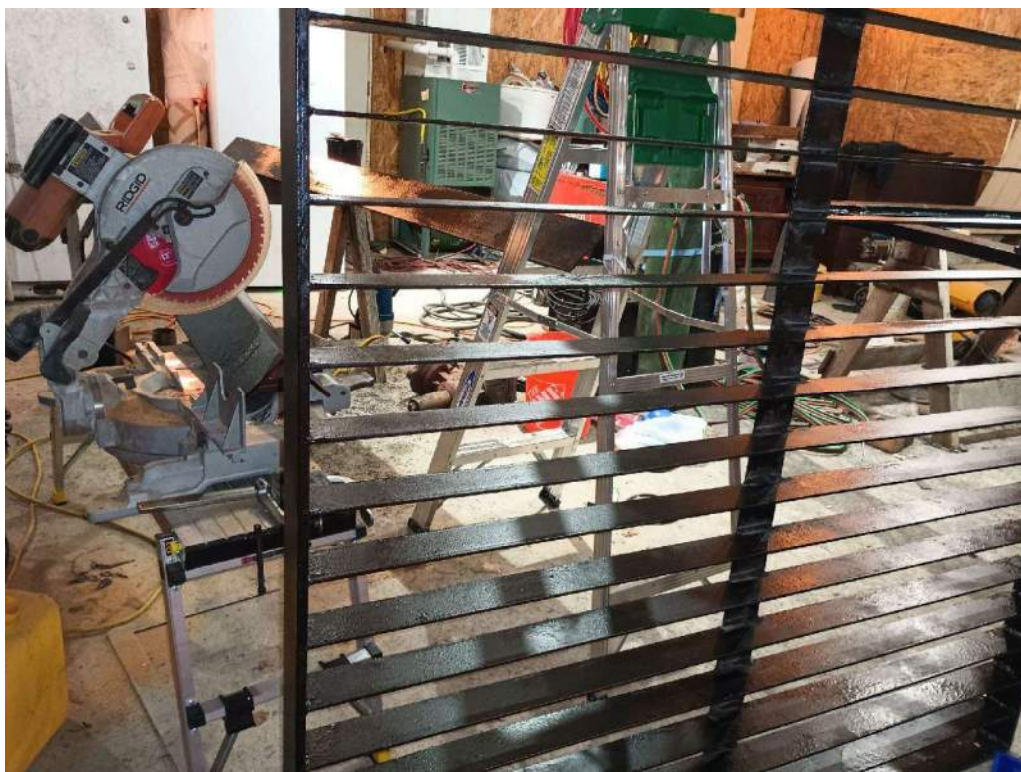
*Photo 5 – Dive safety signage at November 11 concrete pour*



*Photo 6 – Gate Rail Fabrication in process*



*Photo 7 – Gate rail assembly painted*



*Photo 8 – Trash rack assembly painted*



*Photo 9 – Gate assembly in fabrication*





*Photo 10 – M&K Onsite installing gate rails*

The next step is for NH Dams to provide NHDES Dam Bureau with a revised design for the ceiling at the gate house inlet. Once approved, M&K will construct in early spring to allow for dewatering of the gate house water pit, and subsequent evaluation by a structural engineer. NH Dams will provide a proposed schedule for completion of additional work by the end of February for APDVD consideration and submission to Dam Bureau.

Should you have any questions or require additional information please feel free to contact me at [NHDam@gmail.com](mailto:NHDam@gmail.com) or at (603) 716-6376.

Sincerely,  
NH Dams, LLC

Robert K. Carter, CSS, CFM  
Owner

CC: Josh Watson – M&K  
Jim Weber, P.E. – NHDES Dam Bureau

Appendix 1 – Concrete Mix Design



## Concrete Submittal Summary

Date: 10/17/2022

To: M&K Commercial Diving

From: Scott Jordan

RE: Washington, NH

The mixes chosen for this submittal were based on the documents provided by and conversations had with the requesting party. It is the responsibility of the appropriate project representatives to determine if the submitted mixes meet all of the project specifications and are approved for the stated use on this submittal.

**The mixes below have been included with this submittal for your review:**

Mix	Use	Slump	Air	W/CM	Specified Strength
GRT95 9.5 bag grout	Grout	4-8"	2-4%	0.41	4000 psi @ 28 Days

Concrete mix designs will meet performance criteria only if tested in accordance with the current applicable standards. Concrete mix design ingredients may be adjusted to maintain yield, consistency and performance. Aggregate mass and specific gravity is reported in the saturated surface dry condition and must be adjusted for the moisture condition of the aggregates at the time of batch. Concrete will be batched in accordance with the applicable portions of the ASTM C94 standards unless otherwise agreed upon.

Sincerely,  
Scott Jordan  
603-863-1000 x6113  
ScottJordan@carrollconcrete.us



Newport  
 PO Box 1000, 8 Reeds Mill Road  
 Newport, NH 03773  
 (603) 863-5558

## Concrete Mix Submittal

### Submittal Information

Submittal Name Washington, NH  
 Date Submitted 10/17/2022  
 Customer M&K Commercial Diving  
 Project Name Washington, NH

### Mix Information

Mix ID GRT95  
 Mix Name 9.5 bag grout  
 Compressive Strength (f'c) 4000 psi @ 28 Days  
 Aggregate Nominal Size #4 (4.75mm)

Use Grout

Air Entrained

### Mix Properties

Slump	4-8"	Sack Content	9.3	94 lb/sack	Total Mass	3843	lb
Air	2-4%	Total Water	42.9	gal	Total Volume	27.00	ft3
W/CM Ratio	0.41	Water/Sack	4.6	gal	Unit Weight	142.3	lb/ft3

Group	Material Description	Supplier	Absorption	Specific Gravity	Mass lb	Volume ft3
Cement	Portland Type I/II Ciment Quebec Type I-II	Ciment Quebec		3.15	870	4.426
Aggregate	Fine Aggregate Washed sand	Newport Sand & Gravel	0.8	2.66	2614	15.746
Water	Water			0.9982	358	5.748
Admixture	Glenium 7500 Dosage: 3 fl oz/100 lb CM	Master Builders		1		
	MasterLife CI30 Dosage: 3 gal/yd3	Master Builders		1		
	MasterSet R100 Dosage: 3 fl oz/100 lb CM	Master Builders		1		
	Anti-Washout MasterMatrix UW 450 Dosage: 7 oz/100 lb CM	Master Builders		1		
Fiber	Polypropylene Master Fiber M 70	Master Builders		0.91	1.0	
Air	Air					1.080

Submittal Notes Admixtures may need to be adjusted to meet specifications.  
 Contractor to confirm use of MasterLife CI30, MasterSure UW450 and MasterFiber M70.

Contact Scott Jordan  
 Phone 603-863-1000 x6113  
 Email ScottJordan@carrollconcrete.us

# ANALYSIS CERTIFICATE

Portland Cement type

**I/II**

June - 2022

Physical tests
Chemical analysis (%)
Time of Set Vicat (minutes)

Initial..... 135

Final..... 295

Fineness
Specific surface

 (Blaine) (m<sup>2</sup>/kg)..... 392

Retained on 45 µm

sieve (%)..... 5

Autoclave
expansion (%).....0.07

Air content (%)..... 7

Compressive strength (MPa[psi])

3 days..... 25.8 [3740]

7 days..... 30.0 [4350]

28 days (May-22)..... 37.3 [5410]

Expansion of mortar bars
at 14 days (%)..... 0.007

 SiO<sub>2</sub>..... 19.3

 Al<sub>2</sub>O<sub>3</sub>..... 4.8

 Fe<sub>2</sub>O<sub>3</sub>..... 3.5

CaO..... 61.6

Free calcium oxide..... 1.4

MgO..... 2.6

 SO<sub>3</sub>..... 4.0

Loss on ignition..... 2.0

Insoluble residue..... 0.6

Alkalies

 (Na<sub>2</sub>O equivalent)..... 0.78

 Carbon dioxide (CO<sub>2</sub>)..... 1.4

Limestone..... 3.8

 Calcium carbonate (CaCO<sub>3</sub>)

in limestone..... 84

Mineralogical Composition (Potential)

 C<sub>3</sub>S..... 51

 C<sub>2</sub>S..... 16

 C<sub>3</sub>A..... 7

 C<sub>4</sub>AF..... 11

 Sum C<sub>3</sub>S + 4.75 C<sub>3</sub>A..... 82

We hereby certify that the cement delivered complies  
with the ASTM Standard C 150 and AASHTO M 85, Type I/II.

For any information regarding this certificate, please contact our technical service at (418) 329-2100

I/IIAstm

  
 Louis Lefrançois Perreault  
 M. Sc. Chemist

<b>Aggregate type</b>	<b>Source</b>		<b>Specific Gr SSD</b>	<b>Absorption %</b>	<b>Fine Agg FM</b>	<b>Dry rodded unit w</b>
1 1/2" Gravel	Newport S&G, Newport, NH		2.72	0.8		100.42 lbs
3/4" Gravel	Newport S&G, Newport, NH		2.7	0.9		104.63 lbs
3/8" Gravel	Newport S&G, Newport, NH		2.68	1.1		100.78 lbs
Washed sand	Newport S&G, Newport, NH		2.66	0.8	2.62	105.41 lbs
<b>Average gradations-% Passing</b>						
	<b>Size #4</b>	<b>Size #67</b>	<b>Size #8/89</b>			
<b>Sieve</b>	<b>1 1/2" Gravel</b>	<b>3/4" Gravel</b>	<b>3/8" Gravel</b>	<b>Washed sand</b>		
2" (50 mm)	100					
1 1/2" (37.5 mm)	99.4					
1" (25 mm)	45.7	100				
3/4" (19 mm)	10.1	96.6				
1/2" (12.5 mm)	3.4	60	100			
3/8" (9.5 mm)	2.8	33.7	99.5	100		
# 4 (4.75 mm)	2.5	6.7	29.8	99.8		
# 8 (2.36 mm)	2.4	3.9	5.3	89.2		
# 16 (1.18 mm)			2.9	72.4		
# 30 (600 um)				48.8		
# 50 (300 um)				22.7		
# 100 (150 um)				5		
# 200 (75 um)				1.4		

3	03 30 00	Cast-in-Place Concrete
	03 40 00	Precast Concrete
4	03 70 00	Mass Concrete
	04 05 16	Masonry Grouting



# MasterGlenium® 7500

## Full-Range Water-Reducing Admixture

### Description

MasterGlenium 7500 full-range water-reducing admixture is very effective in producing concrete mixtures with different levels of workability including applications that require self-consolidating concrete (SCC).

MasterGlenium 7500 admixture meets ASTM C 494/C 494M compliance requirements for Type A, water-reducing, and Type F, high-range water-reducing, admixtures.

### Applications

Recommended for use in:

- Concrete with varying water reduction requirements (5-40%)
- Concrete where control of workability and setting time is critical
- Concrete where high flowability, increased stability, high-early and ultimate strengths, and improved durability are needed
- Producing self-consolidating concrete (SCC)
- Strength-on-demand concrete, such as 4x4™ Concrete
- Pervious concrete

### Features

MasterGlenium 7500 full-range water-reducing admixture is based on the next generation of polycarboxylate technology found in all of the MasterGlenium 7000 series products. This technology combines state-of-the-art molecular engineering with a precise understanding of regional cements to provide specific and exceptional value to all phases of the concrete construction process.

- Dosage flexibility for normal, mid-range and high-range applications
- Excellent early strength development
- Controls setting characteristics
- Optimizes slump retention/setting relationship
- Consistent air entrainment

### Benefits

- Faster turnover of forms due to accelerated early strength development
- Reduces finishing labor costs due to optimized set times
- Use in fast track construction
- Minimizes the need for slump adjustments at the jobsite
- Less jobsite QC support required
- Fewer rejected loads
- Optimizes concrete mixture costs

### Performance Characteristics

Concrete produced with MasterGlenium 7500 admixture achieves significantly higher early age strength than first generation polycarboxylate high-range water-reducing admixtures. MasterGlenium 7500 admixture also strikes the perfect balance between workability retention and setting characteristics in order to provide efficiency in placing and finishing concrete. The dosage flexibility of MasterGlenium 7500 allows it to be used as a normal, mid-range, and high-range water reducer.

## Guidelines for Use

**Dosage:** MasterGlenium 7500 admixture has a recommended dosage range of 2-15 fl oz/cwt (130-975 mL/100 kg) of cementitious materials. For most mid- to high-range applications, dosages in the range of 5-8 fl oz/cwt (325-520 mL/100 kg) will provide excellent performance. For high performance and producing self-consolidating concrete mixtures, dosages of up to 12 fl oz/cwt (780 mL/100 kg) of cementitious materials can be utilized. Because of variations in concrete materials, jobsite conditions and/or applications, dosages outside of the recommended range may be required. In such cases, contact your local sales representative.

**Mixing:** MasterGlenium 7500 admixture can be added with the initial batch water or as a delayed addition. However, optimum water reduction is generally obtained with a delayed addition.

## Product Notes

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterGlenium 7500 admixture will neither initiate nor promote corrosion of reinforcing steel embedded in concrete, prestressing steel or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of MasterGlenium 7500 admixture.

**Compatibility:** MasterGlenium 7500 admixture is compatible with most admixtures used in the production of quality concrete, including normal, mid-range and high-range water-reducing admixtures, air-entrainers, accelerators, retarders, extended set control admixtures, corrosion inhibitors, and shrinkage reducers.

**Do not use MasterGlenium 7500 admixture with admixtures containing beta-naphthalene sulfonate. Erratic behaviors in slump, workability retention and pumpability may be experienced.**

## Storage and Handling

**Storage Temperature:** MasterGlenium 7500 admixture must be stored at temperatures above 40 °F (5 °C). If MasterGlenium 7500 admixture freezes, thaw and reconstitute by mechanical agitation.

**Shelf Life:** MasterGlenium 7500 admixture has a minimum shelf life of 9 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterGlenium 7500 admixture has been exceeded.

## Packaging

MasterGlenium 7500 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

## Related Documents

Safety Data Sheets: MasterGlenium 7500 admixture

## Additional Information

For additional information on MasterGlenium 7500 admixture or on its use in developing concrete mixtures with special performance characteristics, contact your local sales representative.

*Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.*

*Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.*



## Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC (“Master Builders Solutions”) warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.



# MasterLife<sup>®</sup> CI 30

## Corrosion-Inhibiting Admixture

Formerly Rheocrete CNI\*

### Description

MasterLife CI 30 calcium nitrite based corrosion-inhibiting admixture is used for reinforced concrete. MasterLife CI 30 admixture contains a minimum of 30% active ingredients by mass and meets ASTM C 494/C 494M requirements for Type C, accelerating admixtures as well as the requirements of ASTM C 1582/C 1582M.

### Applications

Recommended for use in:

- All types of steel reinforced concrete, including precast/ prestressed and post-tensioned concrete applications
- Parking garages, bridge decks, marine structures, slabs, floors and other reinforced concrete applications requiring corrosion protection against chlorides from de-icing salts or marine exposure
- Strength-on-demand concrete, such as 4x4 concrete

### Features

- Effective corrosion protection against chlorides in concrete

### Benefits

- Extended service life of reinforced concrete structures
- Set acceleration, which may be desirable in cold weather applications

### Performance Characteristics

In the alkaline environment of concrete, a natural passive ferric oxide layer forms on the surface of embedded reinforcing steel and protects the steel from corrosion. This passive oxide layer may break down in the presence of chlorides and moisture resulting in corrosion of the steel.

MasterLife CI 30 admixture delays corrosion by re-passivating defects on the steel surface. These defects are ferrous oxide ions that are susceptible to chloride attack. When chloride ions attack the ferrous ions, they combine to create a ferrous chloride complex (rust) and initiate pitting corrosion on the reinforcing steel. If untreated, chloride ions continue to attack newly exposed ferrous ions and form additional expansive corrosion products leading to staining, cracking and spalling of the concrete.

Nitrite ions contained in MasterLife CI 30 admixture are effective in preventing ferrous chloride complex formation by reacting with defective ferrous oxide ions prior to chloride attack and stabilizing the passive layer. Nitrite ions surround the defective ferrous oxide ion and convert it to a more stable ferric ion species less susceptible to corrosion. This oxidation reaction serves to re-passivate the reinforcing steel and re-establish the barrier between the steel and chlorides that initiate corrosion.

**Concrete Setting Time:** Concrete setting times may be accelerated with the use of MasterLife CI 30 admixture. In most applications a retarding or hydration control admixture must be added to the concrete mixture to offset the acceleration effects of MasterLife CI 30 admixture. Please contact your local sales representative for additional information on the proper choice of retarding admixture for concrete to be treated with MasterLife CI 30 admixture.

**Guidelines for Use**

**Dosage:** MasterLife CI 30 admixture is recommended for use within a dosage range of 1.0-6.0 gal/yd<sup>3</sup> (5.0-30.0 L/m<sup>3</sup>) of concrete, depending upon the severity of the corrosion environment and the anticipated chloride loading of the structure.

The dosage of MasterLife CI 30 admixture for a given application may be selected from the table below or computed by using the following expression:

$$\text{Dosage (gal/yd}^3\text{)} = 0.441 \times \frac{\text{Anticipated Chloride Loading (lb/yd}^3\text{)}}{\text{Chloride-to-Nitrite Ratio}}$$

$$\text{Dosage (L/m}^3\text{)} = 3.69 \times \frac{\text{Anticipated Chloride Loading (kg/m}^3\text{)}}{\text{Chloride-to-Nitrite Ratio}}$$

MasterLife CI 30 admixture may be used to offset the potentially corrosive effects of chloride-bearing concrete ingredients and in applications where the initial chloride ion content of the concrete may exceed code requirements or other specified chloride limits.

Chloride protection limits for MasterLife CI 30 admixture are as given in the dosage table.

The limits for applications involving the use of chloride-bearing materials are based on a critical chloride-to-nitrite ratio of 0.90 in accordance with the recommendations of the Federal Highway Administration (FHWA). These limits may also be used in very severe corrosion environments for enhanced protection, if desired. The chloride protection limits given for all other applications, such as parking structures and bridges, are based on critical chloride-to-nitrite ratios that range from 1.20 to 1.50. Please contact your local sales representative for additional information regarding the dosage of MasterLife CI 30 admixture for your application.

**Chloride Protection Limit, lb/yd<sup>3</sup> (kg/m<sup>3</sup>)**

MasterLife CI 30 Dosage gal/yd <sup>3</sup> (L/m <sup>3</sup> )	With Chloride-Bearing Materials	All Other Applications
1.0 (5.0)	2.1 (1.2)	–
2.0 (10.0)	4.1 (2.4)	6.0 (3.6)
3.0 (15.0)	6.1 (3.6)	9.9 (5.9)
4.0 (20.0)	8.1 (4.8)	13.0 (7.7)
5.0 (25.0)	10.1 (6.0)	15.0 (8.9)
6.0 (30.0)	12.1 (7.2)	16.0 (9.5)

Master Builders Solutions recommends that steel reinforced concrete structures that will be exposed to chlorides in service should be designed in accordance with ACI 318 (318M), ACI 357R, CSA, AASHTO or other applicable codes and standards.

**Product Notes**

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterLife CI 30 admixture is a corrosion-inhibiting admixture and will neither initiate nor promote corrosion of reinforcing and prestressing steel embedded in concrete, or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of this admixture.

**Compatibility:** MasterLife CI 30 admixture may be used in combination with any Master Builders Solutions admixture. When used in conjunction with other admixtures, each admixture must be dispensed separately into the concrete mixture.

**CAUTION:** While MasterLife CI 30 and MasterSet DELVO admixtures are compatible in the same concrete mixture when added separately, these two admixtures are NOT compatible in the same STORAGE TANK OR CONTAINER, in any ratio, as potentially harmful gas may result from blending the two. Contact a Master Builders Solutions representative if there are any questions regarding admixture storage or admixture compatibility.

**Storage and Handling**

**Storage Temperature:** MasterLife CI 30 admixture can be stored at temperatures between 10 and 100 °F (-12 and 38 °C). If MasterLife CI 30 admixture freezes, it can be fully reconstituted by thawing and mechanical agitation. Do not use pressurized air for agitation.

**Shelf Life:** MasterLife CI 30 admixture has a minimum shelf life of 6 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterLife CI 30 admixture has been exceeded.

**Packaging**

MasterLife CI 30 admixture is available in 55 gal (208 L) drums, 275 gal (1040 L) totes, and by bulk delivery.

**Chemical Composition**

MasterLife CI 30 admixture contains a minimum of 30% calcium nitrite by mass as an active ingredient. MasterLife CI 30 admixture is identical in composition and mechanism to other commercially available 30% calcium nitrite corrosion-inhibiting admixtures; and at equal dosages, provides similar performance and corrosion protection.

The water content of MasterLife CI 30 admixture is approximately 7.3 lb/gal (0.88 kg/L). This water contributes to the consistency of the concrete mixture and the hydration

of the cementitious materials. The water contributed by MasterLife CI 30 admixture should be used in the calculation of the water-to-cementitious materials ratio of the concrete.

## Related Documents

Safety Data Sheets: MasterLife CI 30 admixture

## Additional Information

For additional information on MasterLife CI 30 admixture or its use in developing a concrete mixture with special performance characteristics, contact your local sales representative.

*Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.*

*Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.*

## Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC ("Master Builders Solutions") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

# MasterSet<sup>®</sup> R 100

## Set Retarding Admixture

### Description

MasterSet R 100 ready-to-use liquid admixture is used for producing more uniform and predictable quality concrete. Placing and finishing requirements are facilitated because this admixture retards setting time. MasterSet R 100 admixture meets ASTM C 494/C 494M requirements for Type B, retarding, and Type D, water-reducing and retarding, admixtures.

### Applications

Recommended for use in:

- Prestressed concrete
- Precast concrete
- Reinforced concrete
- Shotcrete
- Lightweight concrete
- Pumped concrete
- 4x4<sup>™</sup> Concrete
- Pervious concrete
- Self-consolidating concrete

### Features

- Reduced water content required for a given workability
- Retarded setting characteristics
- Controlled retardation – depending on the addition rate
- Full-form deflection can take place (before concrete sets) in extended pours for bridge decks, cantilevers, nonshored structural elements, etc.

### Benefits

- Improved workability
- Reduced segregation
- Superior finishing characteristics for flatwork and cast surfaces
- Flexibility in scheduling of placing and finishing operations
- Offsets effects of early stiffening during extended delays between mixing and placing
- Helps eliminate cold joints
- Peak temperature and/or rate of temperature rise in mass concrete lowered thereby reducing thermal cracking
- Increased compressive and flexural strengths

## Performance Characteristics

**Rate of Hardening:** The temperature of the concrete mixture and the ambient temperature (forms, earth, reinforcement, air, etc.) affect the hardening rate of concrete. At higher temperatures, concrete stiffens more rapidly, which may cause problems with placing and finishing. MasterSet R 100 admixture retards the set of concrete. Within the normal dosage range, it will generally extend the setting time of concrete containing normal portland cement approximately 1.5 to 8 hours compared to that of a plain concrete mixture, depending on job materials and temperatures. Trial mixtures should be made with materials approximating job conditions to determine the dosage required.

**Compressive Strength:** Concrete produced with MasterSet R 100 admixture will have rapid strength development after initial set occurs. If retardation is within the normal ASTM C 494/C 494M Types B and D specifications, MasterSet R 100 admixture will develop higher early (24-hour) and ultimate strengths than plain concrete when used within the recommended dosage range and under normal, comparable curing conditions.

When MasterSet R 100 admixture is used in heat-cured concrete, the length of the preheating period should be increased until initial set of the concrete is achieved. The actual heat-curing period is then reduced accordingly to maintain existing production cycles without sacrificing early or ultimate strengths.

## Guidelines for Use

**Dosage:** MasterSet R 100 admixture is recommended for use at a dosage of  $3 \pm 1$  fl oz/cwt ( $195 \pm 65$  mL/100 kg) of cementitious materials for most concrete mixtures using typical concrete ingredients. Because of variations in job conditions and concrete materials, dosage rates other than the recommended amounts may be required. In such cases, contact your local sales representative.

MasterSet R 100 admixture may be used at less than the recommended dosage for the purpose of retardation only.

## Product Notes

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterSet R 100 admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

**Compatibility:** MasterSet R 100 admixture may be used in combination with any Master Builders Solutions admixtures. When used in conjunction with other admixtures, each admixture must be dispensed separately into the mixture.

## Storage and Handling

**Storage Temperature:** MasterSet R 100 admixture should be stored above freezing temperatures. If this product freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. **Do not use pressurized air for agitation.**

**Shelf Life:** MasterSet R 100 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterSet R 100 admixture has been exceeded.

## Packaging

MasterSet R 100 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

## Related Documents

Safety Data Sheets: MasterSet R 100 admixture

## Additional Information

For additional information on MasterSet R 100 admixture or its use in developing a concrete mixture with special performance characteristics, contact your local sales representative.

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Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

# MasterMatrix<sup>®</sup> UW 450

## Anti-Washout Admixture

### Description

MasterMatrix UW 450 anti-washout admixture is a patented, ready-to-use, liquid cellulose-based admixture that is specially developed for underwater concrete applications. Concrete containing MasterMatrix UW 450 admixture exhibits superior resistance to washout of cement and fines, while impeding the blending of external water into the plastic concrete.

MasterMatrix UW 450 admixture meets the requirements of the U.S. Army Corps of Engineers CRD-C661-06, Specification for Anti-Washout Admixtures for Concrete.

### Applications

Recommended for use in:

- All types of underwater concreting where conventional concrete or placing techniques would result in a high percentage of material loss due to washout
- Mortar and grouting applications where mixtures are typically more fluid and have a higher potential for washout

### Features

- Reduction in washout of cement and fines
- Reduction in segregation, even with highly fluid, high water-to-cementitious materials ratio concrete mixtures
- Thixotropic action that provides concrete stiffening after placement
- Reduction or elimination of concrete bleeding

### Benefits

- Superior and predictable in-place concrete properties
- Dewatering costs reduced/eliminated
- Environmental impact of cement washout in water minimized
- Flexibility in batching procedures

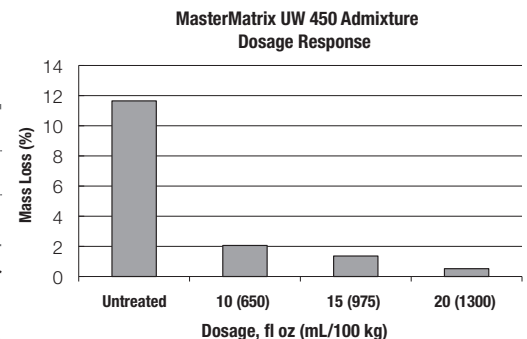
### Performance Characteristics

**Washout Resistance:** Washout is determined by Army Corps of Engineers CRD-C 61, "Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water". Test results show that the addition of MasterMatrix UW 450 anti-washout admixture to concrete significantly reduces the washout of cement and fines, compared to untreated concrete.

#### Concrete Mixture Data (Non-Air-Entrained Concrete)

Cement Content	650 lb/yd <sup>3</sup> (386 kg/m <sup>3</sup> )
Water-Cement Ratio	0.49
Slump	4 ± 0.5 in. (100 ± 10mm)

**Slump:** Concrete that is designed for underwater placement applications is typically batched at an 8-10 in. (200-250 mm) slump. After MasterMatrix UW 450 admixture is added, a decrease in slump will be noted. It may be necessary to add additional high-range water-reducing admixture to achieve the slump required for placement. Slump evaluations for a 60-minute period show that MasterMatrix UW 450 admixture does not adversely affect concrete slump retention.





**Air Content:** A slightly higher dosage of air-entraining admixture may be required to achieve the desired air content when using MasterMatrix UW 450 admixture.

**Setting Time:** MasterMatrix UW 450 admixture has little to no effect on concrete setting time at commonly used dosages of 4-12 fl oz/cwt (260-780 mL/100 kg). Slight retardation of setting time may be experienced at dosages over 12 fl oz/cwt (780 mL/100 kg).

**Compressive Strength:** Using test specimens that are cast in air, concrete containing MasterMatrix UW 450 admixture may obtain slightly lower compressive strength when compared to untreated concrete. However, when strength is evaluated using test specimens that are cast underwater, concrete containing MasterMatrix UW 450 admixture achieves higher strength because washout is minimized. In addition, most underwater concrete mixtures that are proportioned in accordance with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete", exceed compressive strengths that are required for underwater applications. If necessary, a lower water-to-cementitious materials ratio may be used to achieve the desired results.

## Guidelines for Use

**Dosage:** MasterMatrix UW 450 admixture is recommended for use at a dosage range of 4-20 fl oz/cwt (260-1300 mL/100 kg) of cementitious materials for most concrete mixtures. Because of variations in concrete materials, jobsite conditions and/or applications, dosages outside of the recommended range may be required.

**Mixing:** For underwater concrete placements, ACI 304R, Chapter 8, "Concrete Placed Underwater" provides certain basic mixture proportions such as:

- A minimum total cementitious material content of 600 lb/yd<sup>3</sup> (356 kg/m<sup>3</sup>)
- Use of pozzolans approximately 15% by mass of cementitious materials
- A maximum water-to-cementitious materials ratio of 0.45
- Fine aggregate contents of 45-55% by volume of total aggregate
- Air contents of up to 5% are listed as desirable
- A slump of 6-9 in. (150-230 mm) is generally necessary and occasionally a slightly higher slump range is needed

MasterMatrix UW 450 admixture should be added with a water-reducing admixture, such as Master Builders Solutions MasterPolyheed® or MasterSet® admixture lines. For achieving high slump concrete, use MasterMatrix UW 450 admixture in conjunction with a MasterGlenium® high-range water-reducing admixture. This combination will produce a

high-performance, flowing concrete that exhibits superior resistance to washout of cement and fines. MasterMatrix UW 450 admixture should be added after all other concreting ingredients have been batched and thoroughly mixed, either at the batch plant or at the jobsite.

**Concrete Placement:** Concrete containing MasterMatrix UW 450 admixture is easily pumped throughout the typical slump ranges that are used for underwater concreting. It is recommended that concrete containing MasterMatrix UW 450 admixture is placed by pump or tremie. Concrete placement should be continuous and without interruption. Keep the discharge point of the placement device immersed in the fresh concrete during placement.

It is not recommended that concrete containing MasterMatrix UW 450 admixture be allowed to free-fall through water during placement.

## Product Notes

**Corrosivity – Non-Chloride, Non-Corrosive:** MasterMatrix UW 450 admixture will neither initiate nor promote corrosion of reinforcing and prestressing steel embedded in concrete, or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of this admixture.

**Compatibility:** Do not use MasterMatrix UW 450 admixture with naphthalene-based high-range water-reducing admixtures. Erratic behaviors in slump, pumpability and washout may be experienced.

## Storage and Handling

**Storage Temperature:** MasterMatrix UW 450 admixture must be stored at temperatures above 44 °F (7 °C) to avoid dispensing difficulties due to thickening. Do not allow MasterMatrix UW 450 admixture to freeze since it cannot be reconstituted after thawing.

**Shelf Life:** MasterMatrix UW 450 admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterMatrix UW 450 admixture has been exceeded.

**Handling:** Contact with water in hoses, pumps, tanks or receiving vessels must be avoided to prevent gelling when transferring MasterMatrix UW 450 admixture to other containers.

**Dispensing:** Consult your local sales representative for the proper dispensing equipment for MasterMatrix UW 450 admixture. If dispensing directly from the 55 gal (208 L) drum, it is recommended that the larger 2 in. (50 mm) opening be used.

## Packaging

MasterMatrix UW 450 admixture is supplied in 53 gal (201 L) drums and 264 gal (999 L) totes.

## Related Documents

Safety Data Sheets: MasterMatrix UW 450 admixture

## Additional Information

For additional information on MasterMatrix UW 450 admixture or its use in developing concrete mixtures with special performance characteristics, contact your local sales representative.

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03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

# MasterFiber<sup>®</sup> M 70

## Monofilament Microsynthetic Fiber

### Description

MasterFiber M 70 product is a monofilament polypropylene fiber manufactured from 100% virgin homopolymer polypropylene resins. MasterFiber M 70 product meets the requirements of ASTM D 7508/D 7508M, ASTM C 1116/C 1116M, Section 4.1.3, Type III, and Note 2 and the requirements of ICC ES AC32 Section 3.1.1 (plastic shrinkage reinforcement).

MasterFiber M 70 product disperses well in the concrete matrix and visible evidence of a superior finishability makes it a good candidate for all residential applications.

### Applications

Recommended for use in:

- Sidewalks
- Decks
- Patios
- Residential driveways
- Pool decks
- Extruded curbs and gutter
- Basement and garage floors
- Stucco

### Features

- Excellent distribution
- Excellent finishability

### Benefits

- Modifies macro- and micro-cracking mechanisms
- Reduces plastic settlement
- Extends service life with reduced maintenance
- Enhances impact and surface abrasion resistance

### Performance Characteristics

#### Physical Properties

Specific Gravity	0.91
Melting Point	320 °F (160 °C)
Ignition Point	1,094 °F (590 °C)
Absorption	Nil
Alkali Resistance	Excellent
Tensile Strength	25,000 psi (170 MPa)
Modulus of Elasticity	300 ksi (2.07 GPa)
Length	0.75 in. (19 mm)
Denier (Diameter)	7 dpf (33 microns)

## Guidelines for Use

**Dosage:** The dosage of MasterFiber M 70 product is 0.75 to 1.5 lb/yd<sup>3</sup> (0.45 to 0.90 kg/m<sup>3</sup>) depending on local conditions, specifications and practices.

**Mixing:** Typically no modifications to the mixture proportions are required when the product is used at 1.0 lb/yd<sup>3</sup> (0.6 kg/m<sup>3</sup>) and standard mixing and finishing practices are followed. The MasterFiber M 70 product fibers can be introduced into the mixer at any time except when the cement is being introduced. Mixing time will vary based on when the fibers are introduced to the mixer. The normal range is 3-5 minutes of mixing with the higher number preferred when the fibers are added after all of the standard ingredients have been introduced and mixed.

## Engineering Specifications

MasterFiber M 70 product is engineered specifically to minimize plastic shrinkage cracking in concrete. For optimum performance, a dosage of 1.0 lb/yd<sup>3</sup> (0.6 kg/m<sup>3</sup>) is recommended.

MasterFiber M 70 product meets the requirements of ASTM D 7508/D 7508M, ASTM C 1116/C 1116M, Section 4.1.3 Type III, and Note 2, as well as ICC ES AC32 Section 3.1.1.

## Product Notes

MasterFiber M 70 product is not a replacement for structural steel reinforcement and therefore, should not be used to replace any of the load-carrying steel reinforcement in a concrete element.

## Packaging

MasterFiber M 70 product is packaged in pre-weighed 0.75 lb (0.34 kg), 1.0 lb (0.45 kg), and 5 lb (2.3 kg) degradable bags to ensure optimum dosing and homogeneous distribution of the product.

## Related Documents

Safety Data Sheets: MasterFiber M 70 product

## Additional Information

For additional information on MasterFiber M 70 product contact your local sales representative.

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Appendix 2 – Concrete break test results

**M & W SOILS ENGINEERING, INC.**  
**159 EAST STREET · PO BOX 1466**  
**CHARLESTOWN, NH 03603**

Phone: (603)826-5873

Fax: (603)826-4210

mwsoils@yahoo.com

Inspection Date: 11/3/22

Inspector: R. Rhoades

**CONCRETE INSPECTION & TESTING**

PROJECT: Ashuelot Pond - Washington, NH

GEN. CONTRACTOR: M & K Commercial Diving

CONCRETE SUPPLIER: Carroll Concrete

Design Strength: <u>4,000</u> PSI	Cement: _____ LBS/YD <sup>3</sup>
Water _____ LBS	_____
Course Aggr. (SSD) _____ LBS	Fine Aggr. (SSD) _____ LBS
Additives _____	

**FIELD REPORT**

Concrete Placed: 6 YD<sup>3</sup> # Of Cyl Made: 4

Placement Location: Low level outlet structure rehab

Weather Under Water Pour Reinf.: N/A Forms N/A Vibrator: N/A

Truck #	Arrived	Pouring	Slump	Air	Temp.	Finished	Remarks
405	2:30	3:00	9¼	3.6	74°	4:45	

Copies: All by e-mail

COMPRESSIVE STRENGTH POUNDS PER SQ. INCH									
Cylinder Marked	Type Brk.	Weight	Density Lbs/Cu.Ft.	Slump Inches	% Air	Age (Days)	Test Date	Ultimate Load (Lbs.)	Failure Stress(PSI)
AP-1		8.11	139.4	9¼	3.6	7	11/10/22	59,000	4,700
AP-2				9¼	3.6				
AP-3				9¼	3.6				
AP-4				9¼	3.6				

Delivered to Lab: