



## Product in Focus

### MasterSet<sup>®</sup> DELVO Admixture Technology Long-Haul Stabilization of Ready-Mixed Concrete

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#### Description

This Product in Focus pertains to one application of MasterSet DELVO admixture technology - Long-Haul Stabilization of ready-mixed concrete.

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#### Overview

Concrete loses slump and workability over time due to the hydration of hydraulic cement. The loss in slump and workability may be aggravated due to delays in transportation or concrete placement, or during summer months when elevated ambient and concrete temperatures accelerate the cement hydration process. As a result, ACI 301/301M, Specifications for Structural Concrete, and ASTM C94/C94M, Standard Specification for Ready-Mixed Concrete, limit the time-to-discharge of concrete to 90 minutes or 300 revolutions of the truck drum from the time of addition of water to the cement, unless otherwise specified. These specifications permit waiver of the time-to-discharge requirements, which tend to limit the service area of ready-mixed concrete producers, if the concrete meets the specified fresh properties and can be placed without the addition of water after the limits have been exceeded.

#### MasterSet DELVO Admixture Technology

BASF Corporation offers two ready-to-use hydration-controlling products - MasterSet DELVO admixture, a liquid, and MasterSet DELVO ESC admixture, a dry formulation - that can be used maintain the freshness of concrete, thereby permitting waiver of the time-to-discharge limits.

When dispensed into plastic concrete, both products can stop cement hydration for a period of time by forming a protective barrier around cementitious particles. This barrier effectively delays the hydration process and initial set, and helps to maintain the freshness and working time of concrete.

MasterSet DELVO and MasterSet DELVO ESC admixtures meet ASTM C 494M requirements for classification as Type B, Retarding, and Type D, Water-Reducing and Retarding, admixtures.

#### Benefits in Treating Ready-Mixed Concrete

MasterSet DELVO and MasterSet DELVO ESC admixtures can be used to stabilize ready-mixed concrete while providing the following benefits:

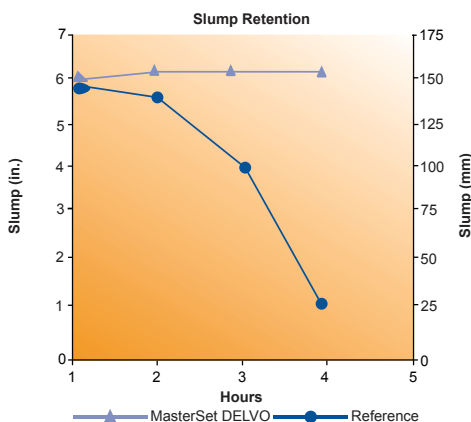
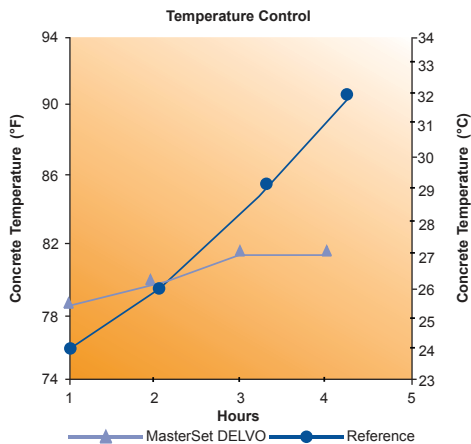
- Eliminate the need for portable batch plants to service jobs that would require a long haul from an existing plant
- Control/retain the slump of fresh concrete and extend the service area of ready-mix plants by increasing the working time of concrete
- Reduce or eliminate the labor cost associated with ice and liquid nitrogen used to reduce concrete temperature on jobs where a maximum concrete temperature is specified

## Hours of Additional Working Time (Retardation)

Concrete Temp. fl oz per 100 lb (mL per 100 kg) portland cement

Temp. °F	(°C)	0.5-1	>1-1.5	>1.5-2	>2-2.5	>2.5-3	>3-3.5
100-109	(38-43)	5(325)	6(390)	7(455)	8(520)	9(585)	10(650)
90-99	(32-37)	4(260)	5(325)	6(390)	7(455)	8(520)	9(585)
80-89	(27-32)	3(195)	4(260)	5(325)	6(390)	7(455)	8(520)
70-79	(21-26)	2(130)	3(195)	4(260)	5(325)	6(390)	7(455)
60-69	(16-21)	1(65)	2(130)	3(195)	4(260)	5(325)	6(390)

Note: For each additional 1/2 hour of working time (retardation) needed past the 3.5 hour limit on the chart, add an additional 1 fl oz per 100 lb. (65 mL per 100 kg) of DELVO stabilizer admixture to portland cement only.



The graphs above are an example of what can be achieved through the addition of MasterSet DELVO admixtures to ready-mixed concrete.

The specific dosage for a given concrete mixture will depend on the concrete-making materials and their proportions, the concrete temperature and the stabilization time required.

The guidelines above are for MasterSet DELVO admixture dosages for long-haul stabilization of ready-mixed concrete. These are only guidelines, therefore, it is recommended that trial batches be made with local materials to determine actual dosages.

When using MasterSet DELVO ESC admixtures, 1 puck is equal to 16 fl oz (470 mL) of MasterSet DELVO admixture.

## Stabilization Procedure

The procedure for stabilizing ready-mixed concrete for long-haul is easy, but it is important that each step be correctly followed.

1. From the batch ticket, identify the mix design and admixtures used.
2. After the fresh concrete is batched, immediately measure and record the concrete temperature.
3. Determine the total amount of portland cement per cubic yard (cubic meter) corresponding to the mix design of the fresh concrete.
4. Determine the total MasterSet DELVO admixture or MasterSet DELVO ESC admixture dosage per cubic yard (cubic meter) from the appropriate dosage chart [based on the concrete temperature, the total amount of portland cement, admixtures used, and length of working time (retardation) required].
5. Dispense MasterSet DELVO admixture or MasterSet DELVO ESC admixture material into the fresh concrete and mix for 7 to 9 minutes at normal mixing speed. This should be completed no later than one-half hour from initial batching.
6. After mixing is completed and the ready-mix truck is in transit to the job, the ready-mix truck drum must be turning as slowly as possible.

## More Information

The Master Builders Solutions brand brings expertise to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions brand encompasses concrete admixtures, cement additives, chemical solutions for underground construction, fiber reinforcement solutions, waterproofing solutions, sealants, concrete repair & protection solutions, performance grouts, and performance flooring solutions.

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