

Improve Dry Cast Pipe Production

Reduce complexity and enhance pipe appearance with Master X-Seed[®] 55 admixture

The Challenge

The complexity of tight production schedules, requirement for multiple concrete mixture proportions and fluctuating production logistics can make it difficult for concrete pipe producers to compete effectively.

The Solution

The strength-enhancement provided by Master X-Seed 55 admixture allows concrete pipe producers to reduce the number of mixtures necessary, while also improving pipe quality and lowering production costs. The value of Master X-Seed 55 admixture in concrete pipe production includes:

Lower Material Costs: Reduce total cementitious materials content or increase supplementary cementitious materials content, while meeting strength requirements. In many cases, the use of Master X-Seed 55 admixture permits producers to meet strength requirements with a cementitious materials content of 470 lb/yd³ (280 kg/m³), the minimum permitted by ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

Better Pipe Aesthetics and Less Patching: Pipes produced with Master X-Seed 55 admixture experience improved swipe, less bug holes and hence, less patching, and enhanced appearance of pipe. This results in reduced number of rejected pipes (pipe on the right in the picture).

Improved Inventory Management: Reduce inventory costs by shipping finished product sooner, as a result of the higher early strengths achieved.

Meeting Multiple Pipe Classifications: Reduce complexity by producing all classes of pipe with the same mixture. This is achieved by adjusting the dosage of Master X-Seed 55 admixture to achieve higher strengths to meet the specified requirements.

Reduce the Environmental Impact: Reducing portland cement content in a concrete mixture helps reduce the embodied energy of the mixture. This has an overall impact on reducing the energy demand and emissions associated with the production of portland cement.



Reference vs. Master X-Seed 55 admixture

Reference concrete pipe (left) and pipe produced with Master X-Seed 55 admixture (right)

Product Overview

Master X-Seed 55 strength-enhancing admixture is based on a proprietary Master Builders Solutions technology that ensures a stable suspension of synthetically-produced crystalline calcium silicate hydrate (CSH) nanoparticles. These nanoparticles facilitate the growth of CSH crystals between cement grains. This improves the overall hydration of portland cement, which helps in increasing early- and late- age strength development, with minimal impact on the time of setting of concrete.

Typical Data

Set 1

Mixture	Class 5	Class 3	
	Control	Control	With Master X-Seed 55
Proportions, lb/yd³ (kg/m³)			
Cement – Type I/II	524 (311)	400 (237)	400 (237)
Fly Ash – Class F	131 (78)	175 (104)	175 (104)
#7 Coarse Aggregate	1350 (800)	1422 (843)	1422 (843)
Fine Aggregate	1800 (1068)	1800 (1068)	1800 (1068)
Water	208 (123)	217 (129)	217 (129)
MasterAir® AE 90, fl oz/cwt (mL/100 kg)	4.7 (305)	3.8 (250)	–
Master X-Seed 55, fl oz/cwt (mL/100 kg)	–	–	10 (650)
Compressive Strength, psi (MPa)			
1 day	4330 (29.9)	1240 (8.6)	2360 (16.3)
2-day	–	–	3890 (26.8)
7-day	5580 (38.5)	4470 (30.8)	5250 (36.2)
28-day	6660 (45.9)	6230 (43.0)	7530 (51.9)

Set 2

Mixture	Class 3	
	Control	With Master X-Seed 55
Proportions, lb/yd³ (kg/m³)		
Cement – Type I/II	541 (321)	541 (321)
#8 Coarse Aggregate	1415 (840)	1415 (840)
Fine Aggregate	2063 (1224)	2063 (1224)
Water	128 (76)	128 (76)
Master X-Seed 55, fl oz/cwt (mL/100 kg)	–	10 (650)
Compressive Strength, psi (MPa)		
1 day	2720 (18.8)	3250 (22.4)
7-day	5980 (41.2)	7290 (50.3)
28-day	7360 (50.8)	8770 (60.5)

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