

# Product in Focus

## Master X-Seed<sup>®</sup> 55 Strength-Enhancing Admixture

### Dry Cast Pipe Production

#### The Challenge

Concrete pipe producers are under increased pressure to manufacture a high-quality product and meet demanding schedules, while reducing material costs and inventory.

#### The Solution

##### Master X-Seed Admixture Technology

Master X-Seed 55 strength-enhancing admixture is based on a proprietary BASF 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.

Master X-Seed 55 strength-enhancing admixture permits the producer to:

1. Reduce total cementitious materials content or increase supplementary cementitious materials content, while meeting strength requirement. In many cases, the use of Master X-Seed 55 admixture permits the producers to meet strength requirements with a cementitious materials content of 470 lb/yc<sup>3</sup> (280 kg/m<sup>3</sup>), the minimum permitted by ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. Reduce inventory costs by shipping finished product sooner, as a result of the higher early strengths achieved.
3. Improve the appearance of pipe and reduce the amount of rejected pipes.
4. 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 that could meet the specified requirements.
5. 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.



# Master X-Seed 55 Strength-Enhancing Admixture

## Typical Data

### Set 1

Mixture	Class 5	Class 3	
	Control	Control	With Master X-Seed 55
<b>Proportions, lb/yd<sup>3</sup> (kg/m<sup>3</sup>)</b>			
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)
<b>Compressive Strength, psi (MPa)</b>			
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
<b>Proportions, lb/yd<sup>3</sup> (kg/m<sup>3</sup>)</b>		
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)
<b>Compressive Strength, psi (MPa)</b>		
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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## Contact

**United States**  
 23700 Chagrin Boulevard  
 Cleveland, Ohio 44122-5544  
 Tel: 800 628-9990 ■ Fax: 216 839-8821

**Canada**  
 1800 Clark Boulevard  
 Brampton, Ontario L6T 4M7  
 Tel: 800 387-5862 ■ Fax: 905 792-0651