TB-0608 — ADVA® Cast 575 Technical Bulletin

/ concrete / mix design

ADVA®Cast 575, a polycarboxylate-based ASTM C494 Type F and ASTM C1017 Type I High Range Water Reducer is recommended for use in both conventional and self-consolidating concrete (SCC) when excellent workability, segregation resistance and high early strength properties are desired. ADVA®Cast 575 allows for production of very high flow, yet cohesive concrete which typically does not require vibration to achieve consolidation, even at low w/c ratios.

ADVA®Cast 575 dosage rates typically range from, but are not limited to, 130–455 mL/100 kg (2–7 oz/100 lbs) and will vary depending on mix design specifics, aggregate gradations, material properties and ambient and concrete temperatures. Higher dosage rates of ADVA®Cast 575 are often used when making SCC concrete. ADVA®Cast 575 is fully compatible in concrete containing supplemental cementitious materials (SCM) including fly ash, slag and silica fume. This technical bulletin details plastic and hardened properties of several field evaluated ADVA®Cast 575 concrete mix designs (table below), along with field usage best practices and recommendations.

	Conventional Superplasticized Concrete 28 MPa (4000 psi)		Self-Consolidating Concrete (SCC) 55 MPa (8000 psi)	
	Non-Air Entrained	Air Entrained	Non-Air Entrained	Air Entrained
Mix Specifics kg/m^3 (lbs/yd^3)	380 (639) Cement 165 (277) Water 815 (1375) ¾ in. CA 275 (465) ⅜ in. CA 765 (1296) FA	360 (608) Cement 160 (274) Water 745 (1255) ¾ in. CA 315 (531) ⅜ in. CA 735 (1240) FA	370 (627) Cement 160 (267) GGBFS 175 (295) Water 910 (1533) ⅜ in. CA 775 (1309) FA	335 (569) Type I Cement 85 (144) Type C Fly Ash 165 (282) Water 470 (790) ¾ in. CA 435 (734) ⅜ in. CA 800 (1346) FA
Admixtures mL/100 kg (oz/100 lbs)	325 (5) ADVA® Cast 575	195 (3) ADVA® Cast 575 65 (1) DARAVAIR® 1000	230 (3.5) ADVA® Cast 575	260 (4) ADVA® Cast 575 37 (0.57) DAREX® II AEA
Concrete Temp C (F) Ambient Temp C (F)	27 (81) 23 (73)	28 (83) 25 (77)	24 (75) 19 (66)	31 (88) 34 (94)
Slump (Flow) mm (inches)	210 (8.25)	230 (9.0)	635 (25) flow	635 (25) flow
Plastic Air (%)	1.0%	5.8%	1.6%	7.4%
Unit Weight kg/m^3 (lbs/ft^3)	2405 (150.1)	2308 (144.1)	2398 (149.7)	2294 (143.2)
Early Age C.S. MPa (psi)	2 Day – 31.5 (4,589)	1 Day – 20.8 (3,016)	1 Day – 32.9 (4,772)	3 Day – 35 (5,079)
7 Day C.S. MPa (psi)	38.3 (5,556)	30 (4,348)	56.1 (8,138)	41.4 (6,010)

28 Day C.S. MPa (psi)	50.3 (7,288)	39.6 (5,748)	69 (10,011)	54 (7,830)
Set Time (hrs:min)	2:35	3:26	3:22	5:05

C.S. – Compressive Strength

Water Reduction

ADVA®Cast 575 is a powerful dispersant admixture that meets ASTM C494 Type F requirements at 144 mL/100 kg (2.2 oz/cwt) and ASTM C1017 requirements at 137 mL/100 kg (2.1 oz/cwt). Water reduction typically remains robust and linear as dosage rates are increased. Water reduction capabilities of over 30% are achievable at higher addition rates. ADVA®Cast 575 has also successfully been used as a mid-range water reducer at lower dosage rates.

Plastic and Hardened Properties

The outstanding dispersion properties of ADVA®Cast 575 results in excellent early age compressive and flexural strengths, when compared to most other conventional and polycarboxylate superplasticizers. Later age compressive and flexural strength products tend to be similar to other superplasticizers. ADVA®Cast 575 has neutral set properties throughout a wide range of dosage rates. In hotter climates, ADVA®Cast 575 is often used in conjunction with an ASTM C494 Type D retarder to slow down set times and extend slump life. In cooler climates, the neutral set properties of ADVA®Cast 575 has proven to be very beneficial, as even at higher dosage rates, set times are not extended.

Air Entrained Concrete

ADVA®Cast 575 was extensively field tested in a wide range of air-entrained concrete mix designs, and consistently provides stable and good quality air void systems. Air-entraining agent dosage rates for ADVA®Cast 575 concrete will be higher compared to most commercially available polycarboxylate-based superplasticizers. Trial mixes are recommended to establish AEA dosage rates for a specific mix design.

Unique SCC Benefits

Extensive field testing has demonstrated that even at very high slump flow (>760 mm, >30 in.) ADVA® Cast 575 self-consolidating concrete remains cohesive with minimal or no segregation. ADVA®Cast 575 provides excellent rheological properties to self-consolidating concrete that may be produced with lower cementitious contents, resulting in concrete placements requiring little or no vibration. These properties also allow for ADVA®Cast 575 concrete to easily pass through congested rebar configurations and narrow openings without aggregate “blocking”.

Compatibility with Other Admixtures

ADVA®Cast 575 is a polycarboxylate-based technology that is fully compatible with most other admixtures including water reducers, accelerators, retarders, air-entraining agents and specialty admixtures. ADVA®Cast 575 has been shown to have a synergistic effect when used with all ZYLA® products, resulting in improved water reduction, compressive strength and finishability. It is recommended that ADVA®Cast 575 be added to the concrete mix at the end of the batch sequence for optimum performance. However it may be added at other times in the batching sequence if testing shows acceptable performance. Admixtures should be added separately and not contact each other before they enter the concrete mix. Pretesting of the concrete should be performed to optimize addition rates and sequence times of these admixtures. Pretesting of a concrete mix is recommended before production and as project conditions change.

GCP Applied Technologies Inc., 62 Whittemore Avenue, Cambridge, MA 02140 USA.
In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.
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Last Updated: 2020-03-09
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