

# Highlighting Guide for

Swimming Pool Contractor

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## ACI 506 Guide to Shotcrete

		2016	2022
1.2	Definitions <b>collated fiber to wetting</b>	ACI 506-16 (pg. 4-5)	5
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2.6.1.6.1	Dry-mix should be placed within 45 minutes after being mixed	19	19
3.3	Alignment control	24	24
3.3.1	<i>Ground (shooting) wires piano wire 18 ga.</i>	24	24
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A.6 in the ACI-506-2005	Pay items A.6.1 Class A <i>Lump sum, Area, &amp; Vol.</i>		
A.6.2 Class B	<i>Per diem, Time &amp; Materials, Cost Plus fee</i>		
A.6.3 Class C	<i>Bag cement, Volume conversion</i>		

## NFPA 70: National Electrical Code

### Article 680: Swimming Pools, Fountains, & Similar Installations

680.2	Definitions starting with <b>Cord-and-Plug-Connected Lighting Assembly</b> through <b>Wet-Niche-Luminaire</b> .
680.6	<b>Grounding.</b> (1)-(7)
680.10	<b>Electric Pool Water Heaters</b> (up to 48 amperes less than 125%
Table 680.9(A)	Overhead Conductor Clearances A,B, & C – Clearance Parameters (feet) Fig. 680.9 (A)
680.22	<b>Lighting, Receptacles, &amp; Equipment</b> (4) GFCI Protection;
	(B) <b>Luminaires, Lighting Outlets, &amp; Ceiling Suspended (Paddle) Fans</b> (1) outdoor and (2) indoor clearances
680.23 (5)	Location, wall-mounted Luminaires – not less than 18” below water level
680.26	<b>Equipment Bonding</b> (B) Bonded Parts – not smaller than 8 AWG
	(5) Metal Fittings required bonded; (6) Electrical Equipment (a) Double-Insulated Water Pump Motors Solid 8 AGW copper conductor
	(7) Fixed Metal Parts – Exception No.1 thru 3.
680.27	Specialized Pool Equipment (A) Speakers
<b>Part III Storable Pools, Spas, and Hot Tubs</b>	
680.31	Pumps – cord-connected pool filter pumps must have a GFCI interrupter with-in 12”
<b>Part IV Spas and Hot Tubs</b>	
680.41	Emergency Switch – 5’ away, adjacent to, and within sight of spa or tub
680.43	Indoor Installation – Three exceptions. (B) Paddle Fans (1) Elevation; GFCI not less than 12’ high (E) Methods of Bonding (1-3). (F) Grounding (1 &2).
<b>Part V Fountains – Operating voltage 150 V, Submersible pumps operate @ less than 300 V.</b>	
680.57	Signs installed within a fountain shall not be less than 5’ inside the fountain.
<b>Part VIII Electrically Powered Pool Lifts – Exceptions1-3</b>	

## Design & Control of Concrete Mixtures

	16 <sup>th</sup> Ed.	17 <sup>th</sup> Ed.
Finishes can be directly applied to <b>shotcrete</b> walls while the material is still fresh or after hardened. <b>Auto Aerated Concrete</b>	59	481
<b>Bulk Density</b> of cement is the mass of cement particles plus air between particles per unit volume. The bulk density of cement may vary greatly upon the way it is handled or stored. 52lbs/ft <sup>2</sup> to 103 lbs/ft <sup>2</sup> caused by vibration.	139	51
Concentrations of 20,000 ppm of sodium <b>chlorides</b> are generally tolerable in concrete that will be dry in service and has low potential for corrosive reactions.	177	89/230
<b>Abrasion</b> & Skid Resistance on pool decks, the siliceous particle content of the fine <b>aggregate</b> should be at least 25%. Found on	201	110
<b>Calcium chloride</b> is among the most effective time of concrete set and early strength accelerator. <b>Accelerating admixture, see chemical ad mixture</b>	222	129
The use of accelerators such as <b>calcium chloride</b> will increase drying shrinkage of concrete structures	295	132
<b>Shotcrete</b> is concrete that is pneumatically projected onto a surface@ high velocity	407, Fig.16-19	307
Shotcrete is applied either by a wet or dry process. Pumped through a hose into a nozzle, where compressed air is added to increase the speed and deposit the mixture onto the surface. Page 421. The velocity will determine the maximum distance to hold the nozzle, 1.5 to 5.0 feet from the target. Page 422. To improve flexural strength, toughness, and ductility steel or polypropylene fibers are added to the <b>shotcrete</b> mix (4.5 lb/yd <sup>3</sup> ) page 422.	421-422	324
Concrete gains very little compressive strength at low temperatures. Frozen in just the first few hours before the concrete reaches 500 psi approximately 50% of it's ultimate strength is lost. Concrete exposed to deicers before it reaches 4,500 psi should not be exposed to freezing thaw cycles. <b>Cold Weather Concreting</b>	482	399
<b>High-Performance Concrete</b> has been primarily used in tunnels, bridges & tall buildings for durability, wind loads, pools and strength. in <b>shotcrete</b> repairs, parking garages and agricultural applications.	537	493

## Pool & Spa Operator – Handbook

	2017	2022
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Failure to comply results in pool closure- note: 8 items listed in dark shaded box	3	3
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The Center for Disease Control & Prevention (CDC) provides downloadable publications from the NSPF Web site.	19, see Appendix C on page 265 C-1 through C-5	18
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Conversions For every cubic foot of water there are 7.5 gallons of water.	27	27
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Makeup Water Pools lose water in various ways. (book gives 4 ways)	32	32
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Calculating Gallons in a Multi-Depth Circular Spa.	33	33
Diarrheal Discharge – chlorine level 20 ppm. 7.5 pH level or higher for how many hours?	41	40
The most common processes to prevent disease contraction are <u>disinfection and filtration</u>	50	49-50

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Chemical Feed & Control – CLOSE facility when dispersing chemicals over time by jurisdictional code. NEVER ADD WATER TO CHEMICALS. ALWAYS ADD CHEMICALS TO WATER. AAA always add acid	102	101
TURNOVER RATES – standard in most jurisdictions Swimming pools – 6 hours Spas – ½ hour Wading pools – 1 to 2 hours Waterparks/specially pools – 1 to 4 hours Hospital/health club pools ¾ hours	121	118-119
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Total Dynamic Head (TDH) by adding the suction head and the pressure side head yields TDH	129	126
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## Placing Reinforcing Rebar

9 <sup>th</sup>	10 <sup>th</sup>	Topics in the index or table of contents
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