31st NPC Annual Conference

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Houston, TX

PREVENTING INTERIOR POOL FINISH PROBLEMS

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Randy Dukes, C.L. Industries/Aquavations
CEMENT MANUFACTURING & TRANSPORTATION

- Preparation of the raw mixture
- Production of the **clinker**
- Preparation of the cement

270 - 470 FEET LONG 12 - 14 FEET IN DIAMETER
SHIP TO STORAGE

STORAGE TO GROUND TRANSPORT
PREVENTING SURFACE PROBLEMS

• PREPARATION
• APPLICATION
• PRESERVATION

SUBSTRATE PREPARATION

• Quality of the substrate
• Water to Cement Ratio - W/C
  – As defined by the American Concrete Institute
  • LOW PERMEABILITY
  • LOWER ABSORPTION RATE
  • .50 w/c = 4,000 PSI minimum low permeability exposed to water
  • .45 w/c = 5,000 PSI minimum exposed to freeze thaw
  • .40 W/C = 6,000 PSI minimum exposed to chlorides
BENEFIT OF LOW W/C

- Low permeability
- Low absorption rate
- Increased bond strength to steel
- Reduced cracking due to shrinkage
- Increased compressive strength
- Increased durability

PLASTER SPECIFICATIONS

- Read the Specs
- Note additives
  - Water proofing etc.
    - now referred to a damp proof or watertight
    - power wash substrate to remove all soft material on surface

Someone is always trying to outsmart us
TURBO TIP
WATER BLASTING

INFERIOR SHELL CRACKING
EXPOSURE PROCESS

Determining Exposure Tolerances
NPC Tech Manual 9th Edition 6.2.4 page 12

TRAPPED MOISTURE
HYDRATION
Trapped Moisture

IRON
SCALE

SALTWATER CHLORINATION
ALGAE TRAPPED UNDER SCALE

- Could not brush
- Chlorine would not effect it
- Dry acid removed the scale and oxidizer cleaned it up

TRICHLOR
TRICHLOR
SOLAR BACK FEEDING

WEEPER
CHLORINE ABUSE TEST

TRICHLOR 1 week
PEROXIDE 24 hours
ORP SALTWATER
CHLORINE 1 month

DELAMINATION

POOR SURFACE PREP
TOO THIN
STRUCTURAL

NO steel in the steps

TAKE A PICTURE WITH A TARGET
CEMENT CRACKING

• Plaster NOT delaminated
• The cracks are not open

ADMINISTRATIVE ASSISTANT

Daniel’s Administrative Assistant
EXTREMELY HIGH FAC

EXTREMELY HIGH CHLORINE
SOLVING SURFACE ISSUES IN THE FIELD

• Get the details
• PIE Form - Pool Inspection & Evaluation
PIE FORM

• Owner
• Contractor
• Plaster Company
• Service Company
• When Applicable

EQUIPMENT DOCUMENTATION

• Turn off equipment
• Document equipment
• Inspect equipment for signs of abuse
• Take pictures of irregularities
TEST WATER

- Test fill water
- Test pool water

TAKE PICTURES

- After pool has calmed take picture
- Use the pool brush for target
- Use 1 drop of liquid dish soap in wind to break surface tension
PRESERVATION

Langelier Saturation Index (LSI)

LSI CALCULATOR - HIGH END

EXAMPLE:
POOL WATER CHEMISTRY
pH 7.8
Total alkalinity 125 ppm (mg/l)
Calcium 300 ppm (mg/l)
Temperature (30°C) 86°F

LSI +0.6

-12.1 1000 – 2000 TDS, -12.2 up to 2000 – 3000 TDS, 3000+ -12.3
### LSI CALCULATOR - LOW END

**EXAMPLE: POOL WATER CHEMISTRY**

<table>
<thead>
<tr>
<th>pH</th>
<th>7.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total alkalinity</td>
<td>80 ppm (mg/l)</td>
</tr>
<tr>
<td>Calcium hardness</td>
<td>200 ppm (mg/l)</td>
</tr>
<tr>
<td>Temperature</td>
<td>66° F (19°C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pH</th>
<th>7.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity factor</td>
<td>1.9</td>
</tr>
<tr>
<td>Calcium factor</td>
<td>1.9</td>
</tr>
<tr>
<td>Temperature factor</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>11.5</td>
</tr>
<tr>
<td>Constant</td>
<td>-12.1</td>
</tr>
<tr>
<td>LSI</td>
<td>-0.6</td>
</tr>
</tbody>
</table>

**LSI CALCULATOR**

<table>
<thead>
<tr>
<th>TA ppm mg/l</th>
<th>CH ppm mg/l</th>
<th>Temp ° (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>FACTOR</td>
<td>FACTOR</td>
</tr>
<tr>
<td>50=0.7</td>
<td>50=1.3</td>
<td>32(0C)=0.0</td>
</tr>
<tr>
<td>25=1.4</td>
<td>75=1.5</td>
<td>37(3C)=0.1</td>
</tr>
<tr>
<td>50=1.7</td>
<td>100=1.6</td>
<td>46(8C)=0.2</td>
</tr>
<tr>
<td>75=1.9</td>
<td>125=1.7</td>
<td>53(12C)=0.3</td>
</tr>
<tr>
<td>100=2.0</td>
<td>150=1.8</td>
<td>60(16C)=0.4</td>
</tr>
<tr>
<td>125=2.1</td>
<td>200=1.9</td>
<td>66(19C)=0.5</td>
</tr>
<tr>
<td>150=2.2</td>
<td>250=2.0</td>
<td>76(24C)=0.6</td>
</tr>
<tr>
<td>200=2.3</td>
<td>300=2.1</td>
<td>84(29C)=0.7</td>
</tr>
<tr>
<td>300=2.5</td>
<td>400=2.2</td>
<td>94(34C)=0.8</td>
</tr>
<tr>
<td>400=2.6</td>
<td>800=2.5</td>
<td>105(41C)=0.9</td>
</tr>
</tbody>
</table>

-12.1 1000 – 2000 TDS, -12.2 up to 2000 – 3000 TDS, 3000+ -12.3

### LSI CALCULATOR - TDS & TEMPERATURE

**EXAMPLE: POOL WATER CHEMISTRY**

<table>
<thead>
<tr>
<th>pH</th>
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<tbody>
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<td>Total alkalinity</td>
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<td>Alkalinity factor</td>
<td>2.1</td>
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<tr>
<td>Calcium factor</td>
<td>2.0</td>
</tr>
<tr>
<td>Temperature factor</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
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<tr>
<td>TDS Constant</td>
<td>-12.3</td>
</tr>
<tr>
<td>LSI</td>
<td>-0.1</td>
</tr>
</tbody>
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-12.1 1000 – 2000 TDS, -12.2 up to 2000 – 3000 TDS, 3000+ -12.3
Start-up & Maintenance

Available in the NPC Online Store

Resources

Pool Surfaces, Problems & Solutions


Taking Care of Your Pool DVD

Available in the NPC Online Store
Contact

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Thank you for attending the 31st NPC Annual Conference