Aluminum Boiler Overview

- Purified Tannin technology for closed loops
- Aluminum Boiler treatment with purified tannin
- Call us for Support
New Treatment for CLOSED LOOPS

- Optimized Purified Tannin blend will inhibit Fe, Cu and Al in both hot and chilled loops
  - Absorbed film tenacious on all three metallurgies
  - Ideal pH target is 9.0
- Replacement for molybdate where its discharge is prohibited
- Replacement for nitrite where microbial fouling is an issue
- Alternative to orthophosphate where calcium-based fouling is an issue
- Product is ideal for low conductivity systems
- Product is safe where cross-contamination of process is a concern.
New Treatment for CLOSED LOOPS

• Safe:
  - Product is safe handle
  - Product is safe to discharge
  - Product is safe for food processes (FDA/USDA/Kosher acceptable)
  - Product is renewable & environmentally friendly.

• Simple:
  - Product is simple to apply
  - Product is simple to monitor/test
  - Product allows for a higher system pH
  - The increased pH range will reduce the need for pH adjustment.

• Effective:
  ✓ Product is effective on multi-metal systems (Al included)
  ✓ Product is effective in hot and/or cold systems
  ✓ Product helps preserve the operating efficiency of the condensing boilers and reduces the environmental footprint of the HVAC industry.
Harsco/Patterson-Kelley

- Partners with TGWT
- TG 3304 PM2 is approved
- Product available through ETI

New Aluminum Boiler Treatment now Available!
• Product dose to boiler at 2000 to 2400 PPM
  - 16.5 lbs to 20 lbs per 1000 gals
  - Roughly 2 gallons per 1000 gals
• Target system residual (filtered) is 100 to 120 PPM
• Residual tannin testing equipment is readily available

Ask us about field testing options!
## Water Quality Standards for Peak Efficiency

<table>
<thead>
<tr>
<th>Boiler Material</th>
<th>Cast Aluminum</th>
<th>Stainless Steel</th>
<th>Cast Aluminum &amp; Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.5 – 8.5</td>
<td>6.5 – 9.0</td>
<td>8.0 – 9.0</td>
</tr>
<tr>
<td>Conductivity (μS/cm)</td>
<td>&lt; 3000 μS/cm</td>
<td></td>
<td>&lt; 3000 μS/cm</td>
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<tr>
<td>Total Alkalinity (ppm as CaCO3)</td>
<td>&lt; 300 ppm</td>
<td></td>
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<tr>
<td>Copper (ppm as Cu)</td>
<td>&lt; 3 ppm</td>
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<tr>
<td>Iron (ppm as Fe)</td>
<td>&lt; 20 ppm</td>
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</tr>
<tr>
<td>Aluminum (ppm as Al)</td>
<td>&lt; 3 ppm</td>
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<tr>
<td>TSS (ppm)</td>
<td>&lt; 20 ppm</td>
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<tr>
<td>Chlorides (ppm as Cl-)</td>
<td>&lt; 100 ppm</td>
<td>&lt; 20 ppm</td>
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<tr>
<td>Hardness (ppm as CaCO3)</td>
<td>&lt; 200 ppm (as CaCO3)</td>
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</tr>
</tbody>
</table>

*Tannin-Based Water Treatment

- Residual Tannins: 100-120 ppm
- Recommended Product: TG 3304 PM2
The GREEN TECHNOLOGY Treatment for Closed Loops

ETI Field Study Results:

- Fed at 1600 PPM product, getting 95 PPM filtered residual
  - pH elevated to 8.2 to 8.4
- Closed process loop with 400 F skin temperatures
- Circulating chemistry: low Hardness with moderate MAI & TDS
- Corrosion rate probe data: <0.01 mpy for Fe & Cu

TGWT Field Experience:

- Applications in CW and HW loops
  - Loops up 150K gallons volume
  - Including HW loop with aluminum exchanger

Copper Coupon – 3 years (<0.01 mpy)  
Steel Coupon – 3 years (<0.1 mpy)