CleanSafe Aqueous Cleaners Product Overview

Precision Cleaning Products
Agenda

I. Experience

II. Aqueous Cleaning Principles

III. CleanSafe™ Aqueous Cleaners

IV. RustSafe™ Corrosion Inhibitors

V. Target Markets and Applications
Experience

- Bearings
- Diesel fuel Injectors
- Power train components
- Marine valves
- Precision stampings
- Tubs/bins
- A/C clutch components
- Bellows
- Steering assembly tubes
- A/C tubes
- Head gasket manifolds
- Aluminum strip
- Air bag components
- Water pump hubs

- Hydraulic cylinders
- Die castings
- Fasteners
- Hydraulic valves
- Heat shield
- Steel stock tubes
- Cable
- Automotive door panel
- Seat belt pins
- Seat recline hinges
- Biotech devices
- Medical devices
- Semiconductor devices
- Cutting Tools

- Heart valve assemblies
- Surgical razors
- Contact lens
- Hearing aid devices
- Catheters
- Guidewires
- Stents
- Endodontic drill bits
- X-Ray components
- Precision needles
- Endoscopic tubes
- Medical gauges
- Biomedical probes
- Sensor rings
Aqueous Categories

1. Strong Alkaline: pH 12-14
2. Alkaline: pH 10-12
3. Mild Alkaline: pH 8-10
4. Neutral: pH 6-8
5. Acid: pH 1-6

(Note: Aqueous cleaners with very high or low pH levels may attack or discolor non-ferrous alloys, such as aluminum, copper, brass, bronze, and zinc.)
Aqueous Cleaning Essentials

- Temperature
- Cleaner & Concentration
- Agitation
- Cleaning Time
How Do Aqueous Cleaners Work?

1. **Wetting**
   - Components in cleaner reduce surface tension, allowing cleaner to penetrate soils.

2. **Rollback**
   - Cleaner will start to undercut soils causing the oil to “rollback onto itself.”

3. **Displacement**
   - The cleaner may separate the soil from the substrate. Agitation is often necessary in order to fully displace.

4. **Emulsification**
   - Once the soil has been displaced, surfactants surround oil droplets and keep them suspended in the liquid.

5. **Dispersion**
   - The suspended soils are evenly disperse preventing soil redeposition.
Typical Aqueous Cleaning Process

1. Cleaning solution is added to heated Wash Bath at selected concentration.
2. Component is introduced to Wash Bath for soil removal.
3. Component is agitated by spray, ultrasonics, vertical oscillation, air, rotation, etc.
4. Component advances through heated Rinse stages, removing cleaner and soil.
5. Component may be agitated in Rinse stages.
6. Component is introduced to Drying stage.
Aqueous Cleaning

**Advantages**
- Biodegradable
- Removes Inorganic & Organic Soils
- Non-Flammable
- Low Toxicity
- Non-Ozone Depleting Potential
- No Global Warming Potential
- Low Cleaner Cost
- Oil Separation
- Brightening/Etching
- Compatibility (depending on pH)
- Customization/Formulating Flexibility
- Excellent Cavitation

**Considerations**
- Cleaning/Rinsing/Drying in Tight Spaces
- More Energy Requirements
- Equipment Footprint Larger
- Wastewater Disposal
- More Monitoring Methods
- Drying May Extend Process Time
- Additional Costs if Using DI Rinsing
- Water Induced Corrosion
- Requires Mechanical Agitation
- Attack on Non-ferrous Alloys
CleanSafe Cleaners

**Alkaline Cleaners**
- CleanSafe 7448
- CleanSafe 787C
- CleanSafe 686

**Acidic Cleaners**
- CleanSafe 50E Plus

**Corrosion Inhibitors**
- RustSafe 21
- RustSafe 2400
CleanSafe Characteristics

- Water-Based
- Biodegradable
- Non-Flammable
- Immersion or Spray
- Compatible with all substrates
- Oil-Splitting
- 1% - 12% Concentration
- Low Foaming @ 120ºF (50ºC) and Above
- 120ºF - 180ºF (50º - 80ºC) Operating Temperature Range
- Built-in Rust Protection (7-14 Days)
- Low-VOC*

*SCAQMD (South Coast Air Quality Management District) – A management body in Southern California which regulates the use of cleaners containing Volatile Organic Compounds (VOCs). A product with <25g/l at use concentration may qualify for SCAQMD approval.
CleanSafe 7448

- **Type:** Strong Alkaline
- **Equipment:** Spray-In-Air, Agitated Immersion
- **Substrates:** Ferrous
- **pH (neat):** 13-14
- **Conc.:** 5-15%
- **Temp.:** 140-160°F (60-71°C)
- **Removes:** Mineral oils, water-soluble oils, grease, buffing/lapping compounds, smut, baked-on-oils
- **Features:** Removes heavy soils, low-foaming, corrosion protection for ferrous alloys.
CleanSafe 787C

- **Type:** Alkaline
- **Equipment:** Spray-In-Air; Immersion equipment with eductor nozzles
- **Substrates:** Ferrous and Non-ferrous
- **pH (neat):** 13-14
- **Conc.:** 5-15%
- **Temp.:** 140-160°F (60-71°C)
- **Removes:** Grease, oil, metalworking fluids
- **Features:** Designed for ultra low-foaming and material compatibility, high soil loading; approved Boeing, GE Aviation, Pratt & Whitney, Rolls-Royce, others
CleanSafe 686

- Type: Alkaline
- Equipment: Agitated immersion, soak, ultrasonics
- Substrates: Ferrous and Non-ferrous
- pH (neat): 13-14
- Conc.: 5-15%
- Temp.: 140-160°F (60-71°C)
- Removes: Carbon, grease, oil, metalworking fluids
- Features: Excellent cleaning ability, rinses easily, works with minimal agitation, good materials compatibility, corrosion protection
Other CleanSafe Cleaners

- CleanSafe 7449 YHA - high pH cleaner inhibited for use on aluminum and other non-ferrous alloys. May be used on ferrous alloys but does not contain corrosion inhibitor additives.

- CleanSafe 7950 – non-silicated cleaner; suited for stainless steel, titanium; medical device cleaning
# Selection Guide

<table>
<thead>
<tr>
<th>Product</th>
<th>pH</th>
<th>Application</th>
<th>Who will use it</th>
</tr>
</thead>
<tbody>
<tr>
<td>CleanSafe 7448</td>
<td>13-14</td>
<td>Spray, Immersion</td>
<td>Applications with high soil loading or removing heavy soils such as grease, baked-on-oils, buffing/lapping compounds, smut from ferrous alloys.</td>
</tr>
<tr>
<td>CleanSafe 787C</td>
<td>13-14</td>
<td>Spray, Immersion with eductor agitation</td>
<td>Companies with highly agitated cleaning equipment. Applications that are sensitive to high foam levels. Compatibility concerns. Aerospace companies.</td>
</tr>
<tr>
<td>CleanSafe 686</td>
<td>13-14</td>
<td>Immersion, soak, ultrasonics</td>
<td>Anyone removing soils in immersion, soak tanks or ultrasonic cleaning equipment.</td>
</tr>
</tbody>
</table>
CleanSafe 50E Plus

- **Type:** Mild Acid
- **Equipment:** Ultrasonics, immersion soak or mild agitation
- **Substrates:** Copper, Brass, Bronze
- **pH (neat):** 4-5
- **Conc.:** 5-15%
- **Temp.:** 140-160°F (60-71°C)
- **Features:** Copper alloys cleaner and brightener, corrosion inhibition
- **Removes:** Grease, oil, metalworking fluids
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<tr>
<td>CleanSafe 50E Plus</td>
<td>4-5</td>
<td>Ultrasonics</td>
<td>Same as CleanSafe 9413 but when used in ultrasonic cleaning equipment.</td>
</tr>
</tbody>
</table>
RustSafe™ 2400

- **Type:** Solvent-based
- **Equipment:** Immersion
- **Substrates:** Ferrous
- **Protection:** 3-6 Months
- **pH (neat):** 7-8
- **Conc.:** 100%
- **Temp.:** Ambient
- **Features:** Long-term corrosion protection or ferrous alloys, Indoor/Outdoor storage, Water-displacing, Ultra-thin film
- **Compliance:** Humidity Cabinet on Polished Steel Panels – 60+ days
## Corrosion Prevention Overview

<table>
<thead>
<tr>
<th>Product</th>
<th>Days of Corrosion Protection</th>
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<tr>
<td>CleanSafe 7448, 787C, 686</td>
<td>7 to 14 Days</td>
</tr>
<tr>
<td>RustSafe 2400</td>
<td>3 to 6 Months</td>
</tr>
</tbody>
</table>
Target Markets

- Aerospace & Defense
- Medical Device
- Re-manufacturing
- Surface Finishing
- Metal Fabrication
- Automotive & Transportation
Target Applications

- Fine metal degreasing
- Removal of fines and other particulates
- Removal of corrosion inhibitors
- Cleaning during manufacturing process
- Cleaning during disassembly, repair or remanufacturing

- Prior to final assembly
- Prior to non-destructive testing (NDT)
- Prior to welding
- Prior to surface coatings
- Prior to inspection and packaging
- Prior to bonding and sealing
- Prior to subsequent operations
Questions