DARACLEAN®

DARACLEAN® 236
Technical Manual

MAGNAFLUX®
A Division of Illinois Tool Works Inc.

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Description:

SAFE AND EFFECTIVE

DARACLEAN® 236 is a low-foaming, all-purpose neutral cleaning solution. Formulated with a blend of surfactants, emulsifiers, and corrosion inhibitors, DARACLEAN® 236 is an excellent general cleaner for use on a broad spectrum of soils. Designed to be used with immersion, spray, and ultrasonic applications, it is safe to use with most metals and is non-aggressive towards aluminum, brass, copper, titanium, and zinc alloys.

AEROSPACE QUALIFIED

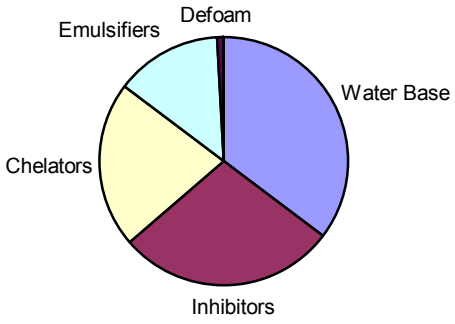
DARACLEAN® 236 has been tested and certified to meet and exceed most Aerospace industry specifications for aqueous and alkaline cleaners. Certifications include ARP, Boeing, and Pratt & Whitney. In addition, DARACLEAN® 236 has been certified to Title 22 California Department of Health 96-hour Acute Aquatic Toxicity and SCAQMD Clean Air regulations. DARACLEAN® 236 has been tested by outside laboratories and complies with ASTM F-483, F-484, F-485, F-502, F-945, and F-1110.

SOIL REJECTING

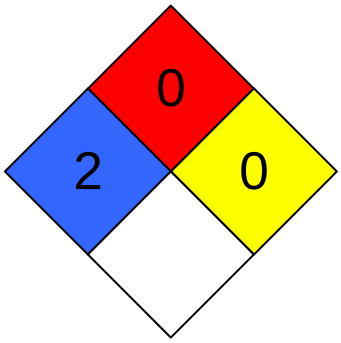
DARACLEAN® 236 has excellent soil-rejecting qualities. After soils are lifted from part surfaces, they are suspended in the cleaner for a short time. Solid particulate soils will slowly settle out of solution. Over time, oil and grease droplets will coalesce and float on the surface of the solution. Removal of particulate and oils can easily be accomplished using filters or skimmers as necessary. This action extends the useful life of DARACLEAN® 236 much further than emulsion-type cleaning solutions.

Formulation:

DARACLEAN® 236 Concentrate



NFPA Rating



pH Level →

13-14	Caustic
11-13	High Alkaline
9-11	Alkaline
7-9	Neutral

Higher pH cleaners are more aggressive and will clean tougher soils, but high pH levels can corrode or etch soft metal surfaces.

Foam Level →

- High
- Moderate
- Suppressed
- Low

High foam levels will penetrate cracks and holes better, but foam cannot be tolerated in spray applications.

Silicates

YES | NO ↑

Silicates prevent corrosion of metal surfaces, but can form mineral films at high temperatures.

Phosphates

YES | NO ↑

Phosphates provide excellent cleaning action, but are subject to environmental regulations.

Hard Water Tolerance →

- High
- Moderate
- Low

Hard water can suppress cleaning actions – some cleaners are formulated to counteract hard water effects.

Aerospace Compliant

YES | NO ↑

See list for specification compliance

SARA Reportables

YES | NO ↑

Typical Properties:

	100% Concentrate	10% in DI Water	0.25% in DI Water
Appearance	Colorless to slightly yellow with light haze		
Odor	Bland		
Free Alkaline Equivalent (to pH 8.3)	N/A		
Total Alkaline Equivalent (to pH 4.0)	0.34 – 0.44		
Cloud Point, °F (°C)		94 (34)	
pH	7.5	6.9	
Conductivity, µS	16.4		
Refractive Index, °Brix	13.5		
Specific Gravity	1.025		
Density, Lb/US Gal	8.5		
Surface Tension, dynes/cm		29	
Vapor Pressure, mmHg @ 20°C	19		
VOC, EPA Method 24	59.9 g/L 0.5 Lb/US Gal	6.0 g/L < 0.1 Lb/US Gal	
Total Fats, Oils & Grease (FOG)			5 ppm
Petroleum Hydrocarbons			1 ppm
Biochemical Oxygen Demand (5-day BOD)			200 ppm
Chemical Oxygen Demand (COD)			620 ppm
Typical elemental concentrations:			
Chloride		26 ppm	
Phosphorous		7 ppm	
Sodium		530 ppm	
Potassium		5 ppm	
Silicon		6 ppm	
Sulfur		1 ppm	
Boron		< 1 ppm	

A randomly selected drum sample was analyzed and found to have the above chemical properties. The product is not manufactured to these specifications, therefore slight variations may be expected from batch to batch.

Application Data:

DARACLEAN® 236 is suitable for the removal of light to heavy soils from Aluminum, Brass, Bronze, Carbon Steel, Cast Iron, Copper, Hastelloy, Inconel, Stainless Steel, Titanium, and Zinc alloys. Independent laboratory tests have demonstrated excellent corrosion inhibition in sandwich testing and stock-loss testing.

DARACLEAN® 236 can be pretreated via skimming and/or filtering prior to disposal. Final sewerability is determined by the municipal sewer district covering the plant location and local regulations.

It is recommended that DARACLEAN® 236 be stored in well-ventilated areas at temperatures between 40 and 100 °F (4 and 38 °C). The recommended shelf life of this product is one year.

Material Performance:

Test	Concentrate	25% Solution	10% Solution
ASTM F-483 Immersion Corrosion	Conforms	Conforms	Conforms
ASTM F-484 Stress Crazing on Acrylic Plastics	Conforms	Conforms	Conforms
ASTM F-485 Effects on Unpainted Aircraft Surfaces	Conforms	Conforms	Conforms
ASTM F-502 Effects on Painted Aircraft Surfaces	Conforms	Conforms	Conforms
ASTM F-945 Titanium Stress Corrosion	Conforms	Conforms	Conforms
ASTM F-1110 Sandwich Corrosion	Conforms	Conforms	Conforms

Film Residue — Free Rinsing – No Film Residue

Foam Levels — 5% Solution at 72°F (22°C), Blender Method
180 mL Foam initially, (10 mL after 5 minutes)

5% Solution at 72°F (22°C), Graduate Method
Flat, no foam

Typical Applications:

	Aluminum	Anodized Surfaces	Brass & Bronze	Carbon Steel & Cast Iron	Copper	Magnesium	Nickel & Superalloys	Plating (Cd, Cr, Ir, Pt)	Stainless Steel	Titanium	Zinc
Water-Soluble Oils	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Machining Fluids	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Synthetic Coolants	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Medium Weight Oils	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Lube Oils	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Buffing Compounds	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Motor Oils	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦♦♦			♦♦♦		♦♦♦♦		
Heavy Petroleum Oils	♦♦	♦♦	♦	♦♦			♦		♦♦		
Carbonized Soils	♦	♦		♦					♦		
Railroad & Axle Grease	♦♦♦	♦♦♦	♦♦	♦♦♦			♦♦		♦♦♦		
Glues	♦♦	♦♦	♦	♦♦			♦		♦♦		
Spray Adhesives											

Excellent	♦♦♦♦
Good	♦♦♦
Fair	♦♦
Poor	♦
Not Recommended	

Typical Usage:

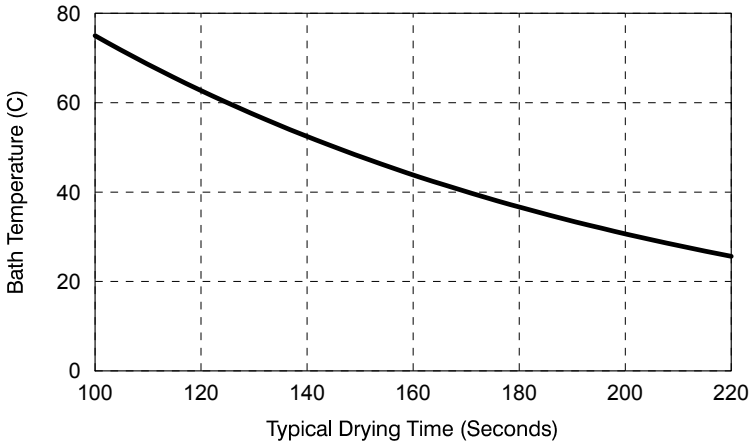
Cleaning Method	Concentration	Temperature	Typical Duration
Immersion, Agitation	5 – 30 %	80 – 180 °F 27 – 82 °C	2 – 30 minutes
Ultrasonic	5 – 30 %	80 – 180 °F 27 – 82 °C	2 – 30 minutes
Spray	2 – 30 %	130 – 180 °F 54 – 82 °C	0.25 – 3 minutes
Steam	1 – 12 %	150 – 200 °F 66 – 93 °C	1 – 5 minutes
Hand Wipe	1 – 100%	Ambient	As required
Corrosion Inhibitor	1 – 3 %	80 – 180 °F 27 – 82 °C	0.25 – 5 minutes

For each application, the concentration, temperature, and duration should be adjusted for optimum performance

- Drying time is significantly reduced at higher bath temperatures

Temperature vs. Drying Time

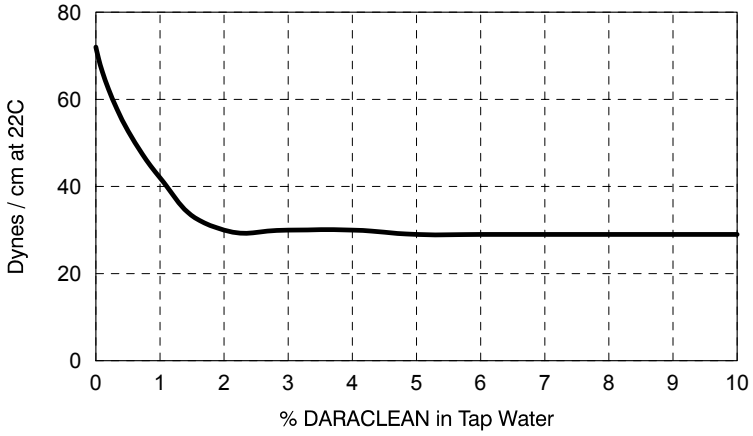
DARACLEAN 236



- Surface tension is dramatically reduced, increasing surface-wetting and minimizing drag-out.

Surface Tension (Tensiometric Method)

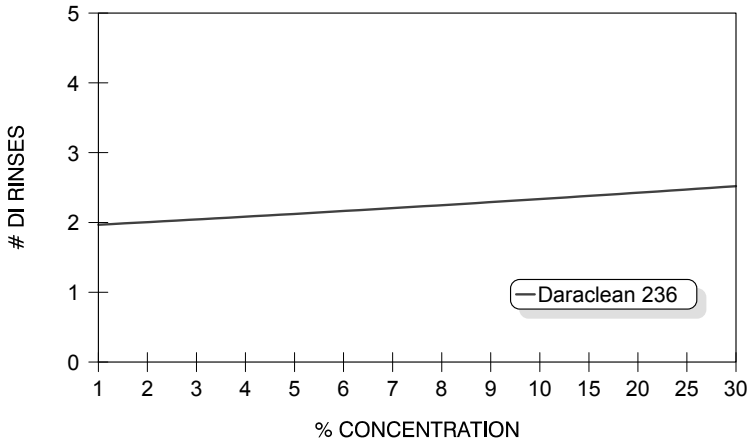
DARACLEAN 236



- Complete rinsing of clean surfaces is normally accomplished in two rinse stages.

RINSABILITY

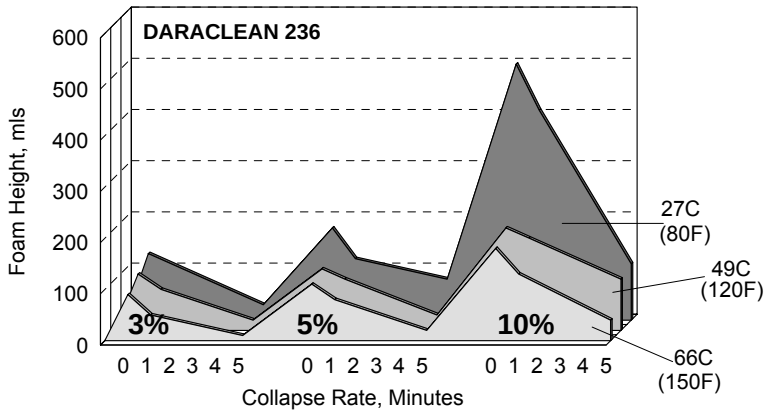
Rinses to Zero Conductivity



Foaming Properties

Blender Method

- Foam levels are significantly reduced at higher temperatures, and very low foam persistence observed.



Bath Maintenance Tests:

Concentration Measurement by Titration Kit Method:

Sample Size:	10 mL		10 mL
Indicator:	Bromophenol Blue	OR	Bromophenol Blue
Titrant:	0.5N Acid (HCl)		1.0N Acid (HCl)
Concentration (%):	0.5 × drops titrant		1.0 × drops titrant

PROCEDURE:

1. Using a cup, take about 500 mL cleaning solution from a thoroughly agitated bath.
2. Using a graduated cylinder, pipette or syringe, transfer 10 mL (cc) sample to an Erlenmeyer flask.
3. Dilute as desired to approximately 50 mL with DI water. (Increased volume will help see the endpoint; the volume is not critical.)
4. Add approximately 5 drops indicator; solution will turn blue.
5. While swirling, hold the acid titrant bottle exactly vertical and add dropwise to a bright yellow-green endpoint. (If using a pH meter, titrate to pH 3.0.)
6. Record the number of drops titrant.
7. Calculate: drops acid x factor (depending on the normality of acid titrant used) = % DARACLEAN® 236

Concentration Measurement by Refractometer Method:

% DARACLEAN® 236 = Refractometer reading (°Brix) × 6.5 (Solution in DI Water)

Oil Load Measurement:

PROCEDURE:

1. Take approximately 500 mL sample from a well agitated tank.
2. Transfer 100 ml to a 100 mL graduated cylinder.
3. Allow to set 30-60 minutes.
4. Record mL oil floating on the top.
   - 3 mL or less = no action required
   - Over 3 mL = skim excess oil from bath

Particulate Load Measurement:

PROCEDURE:

1. Using the same sample as for oil load, record mls sediment on the bottom of the cylinder.
   - 2 mL sediment = no action required
   - Over 2 mL = filter sediment from bath

Cleaning Strength by Alkalinity Ratio:

EQUIPMENT:

10 mL pipette
125 mL Erlenmeyer flask or beaker
25 or 50 mL burette (0.1 mL graduations)
Magnetic stirrer with Teflon magnet
pH meter

REAGENTS:

DI water
0.1 N Acid (HCL)
Bromophenol Blue Indicator (if pH meter is not available)
Bromothymol Blue Indicator (if pH meter is not available)

PROCEDURE

1. Take a 500 mL sample from a well agitated cleaning bath
2. Transfer 10 mL sample into a flask or beaker.
3. Add deionized water to approximately 50 mL (volume is not critical).
4. Titrate with 0.1 N Acid to pH 6.0 (or titrate using Bromothymol Blue indicator to a yellow endpoint if a pH meter is not available).
5. Transfer a second 10 mL sample into a fresh flask or beaker.
6. Add deionized water to approximately 50 mL.
7. Titrate with 0.1 N Acid to pH 3.0 (or titrate using Bromophenol Blue indicator to a yellow endpoint if a pH meter is not available).
8. Calculate: Alkalinity Ratio = mL titrant to pH 3.0 (#7 above) ÷ mL titrant to pH 6.0 (#4 above)
   - Theoretical Alkalinity Ratio for DARACLEAN® 236 is 2.0
   - If Alkalinity Ratio is 2.0 – 4.5, add DARACLEAN® 236 as required to maintain concentration.
   - If Alkalinity Ratio is greater than 4.5, evaluate the cleaning performance of the bath. If cleaning performance has fallen off, dump and recharge with fresh product

DARACLEAN® 236 Aerospace Specification Conformance:

ARP 1512 – Sandwich Corrosion
ARP 1755 – Stock Loss

ASTM F-483 – Immersion Corrosion
ASTM F-484 – Stress Craze Acrylics Plastics
ASTM F-485 – Unpainted Aircraft Surfaces
ASTM F-502 – Painted Aircraft Surfaces
ASTM F-945 – Titanium Stress
ASTM F-1110 – Sandwich Corrosion

Boeing D6-48809 – Sandwich Corrosion

Pratt & Whitney PMC 1438-1
Pratt & Whitney PWA 36604 – Hot Corrosion
Pratt & Whitney PWA 36604 – Non-Metallics
Pratt & Whitney PWA 36604 – PWA 407 Rubber

SCAQMD Clean Air Certification

Title 22 California Department of Health 96 Hour Acute Aquatic Toxicity Certification

DARACLEAN® 236 conforms to many other aerospace, automotive, and industrial cleaning specifications. For conformance to specifications not listed here, please contact us via our website at **www.qnde.ca**.

Ordering Information:

DARACLEAN® 236 is available in 5 gallon pails and 55 gallon drums:

P/N	Description	Weight
01-6040-40	DARACLEAN® 236, 5 US Gallons (18.9 liters)	43 Lb (19.5 kg)
01-6040-45	DARACLEAN® 236, 55 US Gallons (189.3 liters)	471 Lb (214 kg)

DARACLEAN® Brand Aqueous Cleaners are manufactured by MAGNAFLUX®, a division of Illinois Tool Works Inc. and distributed through local distributors around the world. For more information or to find a local distributor near you, please visit our website at www.qnde.ca.

How to Measure Daraclean Concentration by Burette Titration

1. Use the How to Determine Titration Factor instructions to determine the titration factor for your cleaning solution.
2. Thoroughly agitate in-use cleaning bath, then take about 100 mL of cleaning solution.
3. Use a graduated cylinder, pipette, or syringe to measure 10 mL of cleaning solution.
4. Transfer cleaning solution sample to an Erlenmeyer flask and add 40 mL DI water to make a 50 mL sample. (Increased volume will help see the endpoint; exact volume is not critical.)
5. Add 5 drops of phenolphthalein (or other indicator) to sample and swirl to mix. Solution will turn pink (or other color depending on the indicator used).
6. While swirling, slowly add 0.5N HCl (or other 0.5N titrant) drop-by-drop to the sample until the solution turns clear (or other end-point color depending on the indicator used). Record the mL of titrant to reach the end-point.
7. Calculate cleaning solution concentration by:
   mL of titrant to reach end-point × Titrant normality × Titration factor = % Cleaning solution

How to Determine Titration Factor

1. Prepare 100 mL of fresh 5% cleaning solution and 10% cleaning solution.
2. Use a graduated cylinder, pipette, or syringe to measure 10 mL of each prepared cleaning solution (5% and 10%).
3. Transfer each cleaning solution sample to an Erlenmeyer flask and add 40 mL DI water to each flask to make two 50 mL samples. (Increased volume will help see the endpoint.)
4. Add 5 drops of phenolphthalein (or other indicator) to each sample (5% and 10%) and swirl to mix. Solution will turn pink (or other color depending on the indicator used).
5. While swirling, slowly add 0.5N HCl (or other 0.5N titrant) drop-by-drop to the 5% sample until the solution turns clear (or other end-point color depending on the indicator used). Count and record the number of drops or mL of titrant added to reach the end-point. Repeat for 10% sample.
6. Calculate factor by:

$$\frac{\textbf{\% Cleaning solution}}{\textbf{Number of drops of titrant to reach end-point}} = \textbf{Titration factor}$$

Example: $\dfrac{\textbf{5\%}}{\textbf{8 drops}} = \textbf{0.625}$

if titrating with acid other than 0.5N:

$$\frac{\textbf{\% Cleaning solution}}{\textbf{mL of titrant to reach end-point} \times \textbf{Titrant normality}} = \textbf{Titration factor}$$

The titration factors for 5% and 10% samples should calculate out to be the same.

How to Measure Daraclean Concentration by HACH Alkalinity Titration Kit

1. Thoroughly agitate in-use cleaning bath, then take about 100 mL of cleaning solution.
2. Fill the kit's measuring tube to the top with cleaning solution.
3. Transfer cleaning solution sample into the mixing bottle.
4. Add one packet of Bromcresol Green-Methyl Red indicator powder to the mixing bottle and swirl to dissolve. Solution will turn blue-green.
5. While swirling, slowly add Sulfuric Acid titrant solution drop-by-drop to the sample until the solution turns pink. Count how many drops are added to turn the solution pink.
6. Calculate cleaning solution concentration by:

   Number of drops of titrant to reach end-point × Titration factor = % Cleaning solution

Product	Titration Kit Titration Factor*
Daraclean 121	6.3
Daraclean 200	1.15
Daraclean 212	0.7
Daraclean 232	1.8
Daraclean 235	2.15
Daraclean 236	2.5
Daraclean 238	0.8
Daraclean 257	1.0
Daraclean 259	0.65
Daraclean 282	1.7
Daraclean 282GF	1.43
Daraclean 283	1.66
LC5	0.08
Magnavu Dip	1.4
Magnavu Spray	1.4
615	0.71

** Titration factors in this table apply only to titrations performed with the HACH Alkalinity Titration Kit.*

Alkalinity Titration Kit Ordering Information

Description: Alkalinity Test Kit, Model AL-TA

Product #: 2314500

Manufacturer: Hach Company

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