



GS-34
Green Seal™ Environmental Standard for
Cleaning and Degreasing Agents

First Edition

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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

Green Seal, Inc. • 1001 Connecticut Ave., NW, Suite 827 • Washington, DC 20036-5525 •
(202) 872-6400 • Fax (202) 872-4324 www.greenseal.org

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GREEN SEAL™

Green Seal is a non-profit organization devoted to environmental standard setting, product certification, and public education. Green Seal's mission is to work towards environmental sustainability by identifying and promoting environmentally responsible products, purchasing, and production. Through its standard setting, certification and education programs, Green Seal:

- identifies products that are designed and manufactured in an environmentally responsible manner;
- offers scientific analyses to help consumers make educated purchasing decisions regarding environmental impacts;
- ensures consumers that any product bearing the Green Seal Certification Mark has earned the right to use it; and
- encourages manufacturers to develop new products that are significantly less damaging to the environment than their predecessors.

The intent of Green Seal's environmental requirements is to reduce, to the extent technologically and economically feasible, the environmental impacts associated with the manufacture, use and disposal of products. Set on a category-by-category basis, Environmental Standards focus on significant opportunities to reduce a product's environmental impact.

Green Seal offers certification to all products covered by its Standards. Manufacturers may submit their products for evaluation by Green Seal. Those which comply with Green Seal's requirements may be authorized to use the Green Seal Certification Mark on products and in product advertising. Manufacturers authorized to use the Green Seal Certification Mark on their product are subject to an ongoing program of testing, inspection, and enforcement.

For additional information on Green Seal or any of its programs, contact:

Green Seal
1001 Connecticut Avenue, NW, Suite 827
Washington, DC 20036-5525
(202) 872-6400
www.greenseal.org

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FOREWORD

A. Certification. This Environmental Standard contains the basic requirements for cleaner/degreasers (as defined in the Scope section) to be certified by Green Seal™ and for their manufacturers to receive authorization to use the Green Seal Certification Mark on products, on their packaging and in product advertising and promotion. The requirements are based on an assessment of the environmental impacts of product manufacture and use, and were developed with the guidance and input of a stakeholder committee consisting of solvent manufacturers, solvent users, government officials, academic and consulting experts, and environmentalists. The standard was reviewed and approved by consensus of the stakeholder committee, as defined by the International Organization for Standardization (ISO) and the Federal Government (Office of Management and Budget Circular A-119). It is therefore a consensus standard. This standard is subject to revision as further experience and investigation may show it is necessary or desirable. Green Seal solicits information and advice on issues associated with this standard.

B. Compliance with the Standard. Compliance with this Standard is one of the conditions of certification of a product by Green Seal.

C. Compliance with Government Rules. In order to be authorized to use the Green Seal Certification Mark, the manufacturer of the certified product must disclose all governmental allegations or determinations of violation of federal, state, or local environmental laws or regulations with respect to facilities in which the product is manufactured. Certification will be denied any product manufactured in violation of environmental laws or regulations if, in Green Seal's judgment, such violations indicate that the environmental impacts of the product significantly exceed those contemplated in the setting of the standard.

D. Limitations on Purpose of Standard. Green Seal's Standards provide basic criteria to promote environmental quality. Provisions for product safety have not been included in this Standard because government agencies and other national standard-setting organizations establish and enforce safety requirements.

E. Substantially Equivalent Products. Products that are substantially similar to those covered by this Standard in terms of function and environmental impact may be evaluated and certified by Green Seal against the intent of the requirements of this standard.

F. Unanticipated Environmental Impacts. A product which complies with this Standard will not necessarily be certified by Green Seal if, when examined and tested, it is found to have other features which significantly increase its impact on the environment. In such a situation, Green Seal will ordinarily amend its standards or criteria to account for the unanticipated environmental impacts.

G. Certification Agreement and Green Seal™ Rules. In order to be authorized to apply the Green Seal to a product or its packaging, or to use the Green Seal in product advertising or promotion, the manufacturer of the product must (1) sign a Green Seal Certification Agreement that, among other things, defines how and where the Green Seal may be used, (2) pay fees to cover the costs of evaluation and monitoring, (3) undergo an evaluation to determine that the product complies with Green Seal's requirements, (4) agree to an ongoing program of factory inspections and product testing, and (5) comply with the requirements found in the most recent version of "Rules Governing the Use of the Green Seal Certification Mark."

H. Disclaimer of Liability. Green Seal, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. Green Seal shall not incur any obligations or liability for damages, including consequential damages, arising out of or in connection with the interpretation of, reliance upon, or any other use of this Standard.

I. Care in Testing. Many tests required by Green Seal's Standards involve safety considerations. Adequate safeguards for personnel and property should be employed in conducting such tests.

J. Referenced Standards. Standards referenced in this document may have been superseded by a later edition, and it is intended that the most recent edition of all referenced standards be used in determining compliance of a product with this Standard.

K. Labeling Requirements. This Standard neither modifies nor supersedes government labeling requirements. Labeling language which varies in form from the requirements of this section may be used with the written approval of Green Seal.

GREEN SEAL ENVIRONMENTAL STANDARD FOR CLEANING/DEGREASING AGENTS

1.0 Scope

This standard establishes environmental requirements for cleaning/degreasing agents.

For purposes of this standard, cleaning/degreasing agents are defined as cleaners/degreasers marketed as suitable for cleaning soils in production and maintenance applications. Suitable agents do not include those for specialized cleaning/degreasing operations such as the removal of paints, sealants, rust, and adhesives; handwiping parts; preparation of surfaces for electroplating, organic coatings, and parts testing; or the cleaning of hydraulic components, medical supplies, electronics, and optics.

Due to the large number of possible cleaning products, processes, soil types, and cleaning requirements, compatibility of cleaning/degreasing agents with surface materials is not specifically addressed in this standard. Product users shall follow the manufacturers instructions on compatibility.

Military users of this standard are reminded that it only covers the environment and that the selection of a specific degreaser may require clearance from necessary channels such as the appropriate commodity managers and USACHHPM.

All criteria, unless otherwise specified, are based on the stated final degreasing agent concentration.

2.0 Definitions

ASTM. American Society for Testing and Materials

CPSC. Consumer Product Safety Commission

HSDB. Hazardous Substances Data Bank

Ingredient. any constituent of a product, whether intentionally added or not, including any impurities

ISO. International Organization for Standardization

OECD. Organization for Economic Cooperation and Development

Ozone-Depleting Substance. An ozone-depleting substance is any compound with an ozone depletion potential greater than 0.01 (CFC-11 = 1).

RTECS. Registry of Toxic Effects of Chemical Substances

3.0 Product-Specific Performance Requirements

The cleaning/degreasing agent shall clean a steel coupon to a level of 2,000 mg/m² by the test method presented in Appendix A for both types of soil specified in the test method. The 2,000 mg/m² level of cleanliness is intended to be a minimum level of performance. Degreaser users may need to conduct their own performance testing to determine if a degreasing agent meets specific cleaning requirements. Aqueous degreasers shall also meet the 95% separation level set out in Appendix B.

4.0 Product-Specific Health and Environmental Requirements

4.1 Toxic Compounds

The product shall not be toxic to humans. A product is considered toxic if any of the following lethal dose (LD) criteria apply:

Oral LD ₅₀	≤ 5,000 mg/kg
Inhalation LC ₅₀	≤ 20,000 ppm of vapor or gas or 500 mg/L of mist, dust, or fumes
Dermal LD ₅₀	≤ 2,000 mg/kg

The toxicity testing procedures shall follow the protocols put forth in the Organization for Economic Cooperation and Development (OECD) *Guidelines for the Testing of Chemicals*. These protocols include: *Acute Oral Toxicity Test* (TG 401), *Acute Inhalation Toxicity Test* (TG 403), and *Acute Dermal Toxicity Test* (TG 402). To demonstrate compliance with this requirement, a mixture need not be tested if existing toxicological information demonstrates that each of the ingredients complies. It is assumed that the toxicity of the individual component compounds is additive. Data from the *Registry of Toxic Effects of Chemical Substances* (RTECS) and from the *Hazardous Substances Data Bank* (HSDB) will be accepted as well as peer-reviewed primary data.

4.2 Carcinogens and Reproductive Toxins

The product shall not contain any chemicals that are carcinogens or that are known to cause reproductive toxicity. Carcinogens are defined as those chemicals classified by the International Agency for Research on Cancer (IARC) as Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), or Group 2B (possibly carcinogenic to humans) agents.

4.2 Carcinogens and Reproductive Toxins (continued)

Chemicals known to cause reproductive toxicity are defined as those listed by the State of California under the *Safe Drinking Water and Toxic Enforcement Act of 1986* (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, *et seq.*).

For purposes of this standard, naturally occurring elements and chlorinated organics that may be present as a result of chlorination of the water supply and that are listed as carcinogens or reproductive toxins may be present as impurities if the concentrations are below the applicable maximum contaminant levels in the *National Primary Drinking Water Standards* found in 40 CFR Part 141.

4.3 Corrosivity and Causticity

The pH of the degreasing agent concentrate shall be less than 11.0 but greater than 2.5. The pH is measured using a pH meter and Method 9040 in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication, SW-846.

4.4 Skin and Eye Irritation

The degreasing product concentrate shall not be a skin or eye irritant. A product is considered a skin irritant if it has a mean score of 2 or more for either erythema and eschar formation or edema formation, based on the OECD dermal scoring system (OECD, TG 404). A product is classified as an eye irritant if it causes significant ocular lesions in any type of ocular tissue (i.e., cornea, iris, or conjunctivae) within 72 hours after exposure that persist for at least 24 hours. The product concentrate shall meet all of the following criteria (OECD, 1993):

- Mean score for cornea opacity of less than 2
- Mean score for iris lesions of less than 1
- Mean score for redness of the conjunctivae of less than 2.5
- Mean score for edema of the conjunctivae (chemosis) of less than 2

4.5 Flammability and Ignitability

The concentrated product shall not be ignitable (i.e., the flashpoint for the compound is above 140° F). In addition, the flash point of the final concentration of the degreasing product shall not be less than 40° F above the manufacturer's recommended usage temperature. The flash point of the degreasing agent shall be determined using either the Cleveland Open Cup Tester (ASTM D92-97), or a Tag Closed Tester (ASTM D56-97).

4.6 Photochemical Smog and Oxidant Production

The compound shall not contain substances that can contribute significantly to the production of photochemical smog and tropospheric ozone. Therefore, the volatile organic content of the product, as used, shall not exceed 50 g/L, as determined by EPA method 24 (40 C.F.R. Part 60).

4.7 Ozone Depletion

The product shall not contain any ozone-depleting substances.

4.8 Toxicity to Aquatic Life

The product shall not be toxic to aquatic life. A compound is considered not toxic to aquatic life if it meets one of the following criteria:

Acute LC ₅₀ daphnia or fish	≥ 100 mg/L
Acute LC ₅₀ algae	≥ 100 mg/L

For purposes of demonstrating compliance with this requirement, the product shall be tested. However, aquatic toxicity testing is not required if sufficient aquatic toxicity data exists for each of the ingredients of the product to demonstrate that the product mixture complies. Data from the RTECS and from the HSDB will be accepted, as well as peer-reviewed primary data. For the purposes of estimating the potential toxicity of the chemical mixture, it is assumed that the toxicity of the individual component compounds is additive.

Acute toxicity tests for the product shall follow the appropriate protocols put forth in the International Organization for Standardization (ISO) *Determination of the Acute Lethal Toxicity of Substances to Freshwater Fish - Part 2* (ISO 7346-2); *Determination of the Inhibition of the Mobility of Daphnia magna Straus - Acute Toxicity Test* (ISO 6341); and/or *Fresh Water Algal Growth Inhibition Test with Scenedesmus subsicatus and Selenastrum capricarnutum* (ISO 8692; 1989).

Exception to this criterion can be made for products that have LC₅₀ and EC₅₀ values that are greater than the solubility of the product in water.

4.9 Aquatic Biodegradability

The biodegradability of the finished product shall be determined using the protocols given in *ISO Water-Quality Evaluation in an Aqueous Medium of the "Ultimate" Aerobic Biodegradability of Organic Compounds* (ISO 7827: 1994 or ISO 9439: 1990). The compound shall meet the minimum requirement of 80% biodegradation based on dissolved organic content concentration,

4.9 Aquatic Biodegradability (continued)

or 70% of theoretical maximum CO₂ production within 28 days. Exception to this criterion can be made for products that are practically insoluble, i.e., solubility less than 10 mg/L.

4.10 Eutrophication

Phosphates and phosphonates, including sodium salts and potassium salts, shall not be present in the product as used in quantities above 0.5% by weight of total phosphorus.

4.11 Disposal

The manufacturer shall either take back unused or spent products for recycling or disposal or provide the user with specific recycling and disposal instructions.

Appendix A: Test Method for Evaluating the Cleaning Effectiveness of Degreasing Agents

A.1 Scope

This test method is a procedure for evaluating the ability of a degreaser to remove soil. This method is based on ASTM G-122, (1996), MIL-PRF-87937C (DOD, 1997) and MIL-C-29602 (DOD, 1995). It is intended to provide information about the relative cleaning ability of a degreaser. Because cleaning effectiveness depends on a variety of cleaning conditions (e.g., temperature, agitation, and rinse conditions), as well as on the characteristics of parts (e.g., size and shape), the final evaluation of a cleaning agent should include testing under actual cleaning conditions.

This procedure can be used to test aqueous-, semiaqueous-, and solvent-based degreasers. A minimum of four tests must be completed for each degreaser/soil combination. For the two soil types recommended in this method, eight 304 stainless coupons are used to test each degreaser.

This method does not address compatibility of degreasers with various surfaces. It is the responsibility of the manufacturer of the degreaser to provide the user with this type of information. In addition, this method does not address all safety issues. The testing laboratory is responsible for establishing the appropriate health and safety practices as well as the applicability of regulatory limitations.

Note that certain precautions may be required when working with low flash point degreasers. For example, an inert-gas blanket may be required, or heating and agitation may not be possible. The tester must consult the manufacturer's operating and safety instructions concerning specific precautions before conducting this test.

A.2 Materials and Equipment Needed

A.2.1 Materials

- 100 mL WD-40
- 100 mL Marvel Lubricating Oil
- 100 mL AW32 Hydraulic Oil
- 100 mL Hypoid SAE 140 Gear Oil

- 100 mL MAR-TEMP 355 Quench Oil
- 100 mL Honing and Cutting Oil
- 10 grams of carbon black
- 10 grams iron oxide (98% purity)
- 4 L reagent-grade 2-propanol
- Distilled/deionized water (ASTM D1193, Specification for Reagent Water)
- Degreasing agent. If the manufacturer recommends dilution, the product must be diluted to comply with these instructions using distilled/deionized water
- Eight 304 stainless steel coupons. The coupons should measure 0.3175 cm thick with a surface area of 7.0 cm by 5.0 cm. Tests also require either a 0.5 cm diameter hole in the coupons or tabs measuring 1.5 cm by 1.5 cm with a hole measuring 0.5 cm in diameter in the middle of the tab (Figure B.1). The tabs, centered on top of the coupons, enable them to be suspended in liquid without touching the sides of the beaker. The coupons should be made of 304 stainless steel according to metal characterization guidelines set forth by the American Society for Metals (ASM). The coupons should be free of soils, stains, or surface imperfections. Furthermore, all coupons should have similar surface characteristics. Sources for test coupons can be found in Table A-2.

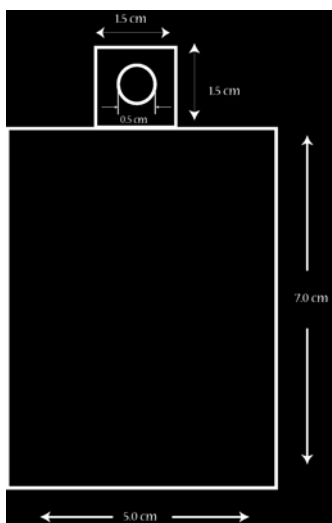


Figure A.1

A.2.2 *Equipment*

- One five-gallon tank equipped with both a heating device capable of heating to 85° C, and an ultrasonic generator capable of emitting ultrasonic energy at 40 kHz¹;
- Two magnetic stirrers
- One oven capable of heating to 105° C
- Two 750 mL glass beakers
- Eight identical glass beakers capable of holding a 5.0 cm by 7.0 cm by 0.3175 cm piece of metal completely submerged in liquid
- Four beaker holders. Beaker holders support beakers in the 5-gallon ultrasonic tank so that the beakers do not contact the bottom or sides of the tank
- Ring stand and clamp assembly
- Mass balance, capable of measuring to 0.1 mg
- Paint brush
- Timer

A.2.3 *Safety Items*

Hearing protection to be worn during operation of ultrasonic bath.

A.3 **Soil**

Two types of soils need to be prepared individually.

Label one 750 mL beaker with “maintenance soil.” Place in it 10 grams of carbon black, 10 grams iron oxide, 100 mL WD-40, 100 mL AW32 Hydraulic Oil, and 100 mL Hypoid SAE 140 Gear Oil. Stir the mixture for 20 minutes at room temperature using a magnetic stirrer.

¹ Industrial ultrasonic cleaning is commonly conducted at 40 kHz [MFASC (1997)].

Label another 750 mL glass beaker “production soil.” Place in it 200 mL MAR-TEMP 355 Quench Oil and 200 mL Honing and Cutting Oil. Stir the mixture for 20 minutes at room temperature using a magnetic stirrer.

A.4 Soil/Degreaser Combinations

The steps presented in Sections A.6 to A.9 must be repeated for each soil type. In other words, the steps must be completed once for the maintenance soil, and once for the production soil.

A.5 Preparation of the Ultrasonic Tank

The 5-gallon ultrasonic tank should be filled with water up to about 5 cm from the top when four 400 mL beakers are suspended in the water (Figure A.2). To do this, fill the tank halfway with water, place the beakers in holders over the water, and then adjust the water level (5 cm below the top of the tank and so that the water from the ultrasonic tank does not enter the beaker). Fill the four beakers half way with reagent-grade 2-propanol. Suspend each coupon in a beaker so that it does not come into contact with the beaker. Adjust the level of the 2-propanol to make certain it covers the entire coupon.

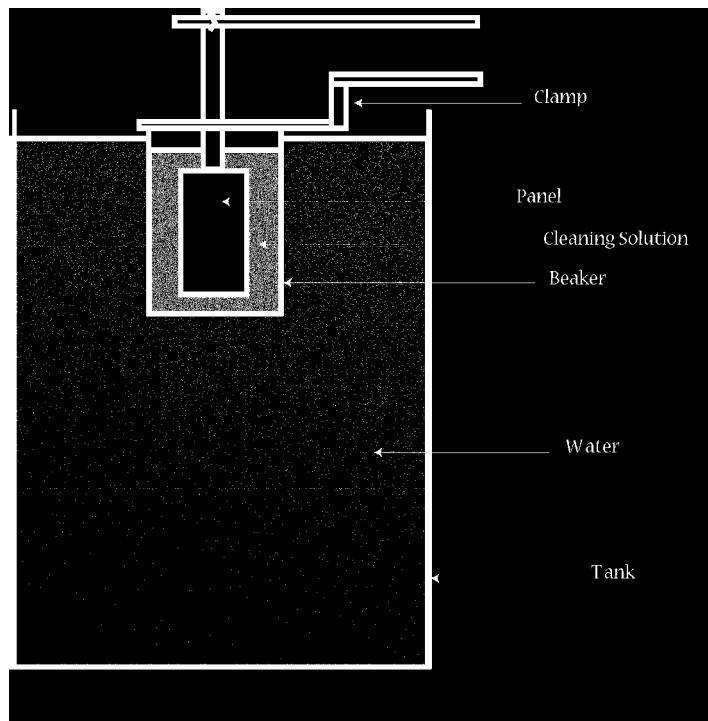


Figure A.2

Put on hearing protection. Turn the ultrasonic generator on and allow it to emit ultrasonic energy for 30 minutes at room temperature to degas the tank. After degassing the tank, clean the panels in the 2-propanol for five minutes. The coupons should be air dried for 30 minutes, and then dried in an oven for 30 minutes at a temperature of 105° C.² Allow the coupons to cool to room temperature. A minimum of four coupons should be prepared for each degreaser/soil combination.

Label each coupon. Coupons that will be soiled with maintenance soil should be labeled M1, M2, M3, and MC. Coupons that will be soiled with production soil should be labeled P1, P2, P3, and PC. One common method for labeling coupons is to etch the label into the back face of the coupon. Weigh each coupon with a balance, and record this weight (initial mass = A).

A.6 Soiling of Test Coupons

Apply approximately 100 mg of soil onto one side only of each of three precleaned coupons with a brush. Do not apply any soil to the control coupons. The maintenance soils for all three coupons should be baked in an oven for 30 minutes at a temperature of 40° C. For the production soil, all three coupons should be baked in an oven for thirty minutes at 105° C.² Allow the coupons to cool to room temperature and weigh them (soiled mass = B).

Only coupons with between 85 mg and 115 mg (100 ± 15 mg) of soil should be used for testing the cleaners (B-A). If the soil falls outside this range, the test coupon should be cleaned and soiled again.

A.7 Cleaning Procedure

Preheat the cleaning bath in the ultrasonic tank to the manufacturer's recommended operating temperature. Fill four 400 mL beakers with enough fresh degreaser solution to completely submerge the coupons in the degreasing solution without any overflow.

The four beakers should then be suspended in the ultrasonic tank (Figure A.2). Note that the size and configuration of the beakers in the ultrasonic tank must be consistent throughout the testing.

Allow the temperature in the cleaning bath and beakers to equilibrate. Put on hearing protection and degas the ultrasonic tank again. Each coupon should then be suspended in a beaker, allowing the entire 7.0 cm by 5.0 cm soiled face of the coupon to be submerged in the cleaning solution (Figure A.2). Adjust the amount of degreaser solution to cover the test coupon if necessary. The coupons should be washed for 20 minutes. If the degreaser manufacturer's

² **Warning.** Do not place coupons directly in the oven if residual material is present.

instructions permit, the solution should be agitated with ultrasonics at 40 kHz.

The initial washing step is followed by two rinse steps. The coupons should be drained for 30 seconds prior to each rinse step. This draining time will minimize carry-over into the next tank. For each rinse step repeat the following:

After the test coupons are removed from the beakers, pour distilled/deionized water into clean beakers and suspend them in the 5-gallon ultrasonic tank (Figure A.2). Make certain that the temperature of the water in the ultrasonic tank and the beakers is the same as it was in the original washing stage, unless different temperatures for rinsing are recommended by the cleaning agent supplier. In that case, the manufacturer's recommended rinse temperature shall be used. The wash and rinse temperatures shall be appended to the tabulation of test results (Table A.1). Then suspend the test coupons in the beakers. Adjust the level of distilled/deionized water so that the surface of the coupons is completely covered.

If ultrasonics were used in the washing step, turn the 40 kHz ultrasonic generator on for 20 minutes. Allow the coupons to drain for 30 seconds prior to transfer to the next step.

After the two rinse steps are completed, all coupons should be allowed to air dry for 30 minutes and then dried in an oven at 105° C for 30 minutes.³ Allow the coupons to cool to room temperature and weigh the coupons (mass of the coupon after cleaning = C).

A.8 Cleanliness Evaluation

A.8.1 Control Test

First examine the control coupon to determine if there are any visible signs of corrosion. Next, determine if the control coupon lost mass, which might occur if corrosion was in progress; or gained mass, which might occur if the degreaser had left a residue on the coupons. Apply the following equation.

$$|MC_C - MC_B| < 0.1 \text{ mg (which is the maximum balance error).}$$

Where:

MC_C = mass of the control coupon after washing and rinsing

MC_B = mass of the control coupon before washing and rinsing

If the control coupon's mass differs by more than 0.1 mg, conduct two more control tests. If the coupon's mass differs by more than 0.1 mg in two out of three tests, the degreaser does not meet the cleaning performance criteria.

A.8.2 Cleaning Effectiveness

³ **Warning.** Do not place coupons directly in the oven if residual material is present.

Calculate the amount of residual soil per surface area, using the following formula:

$$RS = (C-A) / Ar$$

Where:

RS = amount of residual soil (mg/m²)

C = mass of the coupon after cleaning

A = initial coupon mass

Ar = surface area = 0.0035 m²

A.9 Compiling Results

Enter all of the mass values collected during the testing in Table A.1. If the average residual maintenance soil loading, and the average residual performance soil loading are each less than 2,000 mg/m², the degreaser meets the cleaning performance criteria.

Table A.1

Coupon	Initial mass of coupon (A)	Mass of coupon after soiling (B)	Mass of coupon after cleaning (C)	Residual soil (mg/m ²)	Mass difference control
M1					-
M2					-
M3					-
MC				-	
Average					
P1					-
P2					-
P3					-
PC				-	
Average					

Summary of Test Conditions:

Test Step	Temp., °C	Time, min.	Ultrasonics used? (Y/N)	Remarks
Wash				
Drain Time				
Rinse #1				
Drain Time				
Rinse #2				
Drain Time				
Air Drying				
Oven Drying				

Table A-2

Materials	Company	Address	Phone Number
100 mL WD-40	WD-40 Company	1061 Cudahy Place San Diego, CA 92110	619-275-1400
100 mL Marvel Lubricating Oil	Marvel Oil Co., Inc.	Port Chester, NY 10573	914-937-4000
100 mL AW32 Hydraulic Oil	American Lubricating Company	Memphis, TN 38101	901-527-4707
100 mL Hypoid SAE 140 Gear Oil	Sta-Lube (a subsidiary of) CRC Industries	Warminster, PA 18974	215-674-4300
100 mL MAR-TEMP 355 Quench Oil	E. F. Houghton Co.	Valley Forge, PA 19482	610-666-4000
100 mL Honing and Cutting Oil	Sta-Lube	Rancho-Dominguez, CA 90224	215-674-4300
Test coupons	Metaspec	San Antonio, TX	210-923-5999
	Metal Samples Company	Munford, AL	256-358-4202
	Q-Panel Company	Cleveland, OH	440-835-8700

Appendix B: Test Method for Evaluating the Oil Separation Ability of Aqueous Degreasers

B.1 Scope

This method measures the ability of a mixture of soil and an aqueous degreaser to separate from water. This is an important characteristic for a degreaser because good separating ability enables the degreaser and water to be reused and recycled. Conduct each degreaser test described in Sections B.2 to B.4 three times to ensure repeatability.

B.1.1 Applicability

This test method is not applicable to semi-aqueous cleaning agents, semi-aqueous cleaning agent emulsions, or solvents, since these systems are designed to hold significant amounts of oils and/or greases in solution.

B.2 Materials and Equipment

B.2.1 Materials

- Distilled/deionized water (ASTM D1193, Specification for Reagent Water)
- 720 mL Degreasing agent (final concentration). This 720 mL includes the volume of water if the manufacturer recommends that the degreasing agent be diluted. The product must be diluted according to the manufacturer's instructions with distilled/deionized water
- 80 mL Hypoid SAE 140 Gear Oil

B.2.2 Equipment

- Volumetric cylinder. This cylinder should be 25 cm tall and have a diameter of 8 cm.
- Magnetic stirrers
- Ring stand and clamp assembly
- Timer

B.3 Mixing

This shall be performed at the temperature suggested by the degreaser supplier for best separation performance. Dilute the degreaser to the manufacturer's recommended dilution with distilled/deionized water. Pour 720 mL of the diluted aqueous degreaser solution into the volumetric cylinder, which has been previously clamped in place on the magnetic stirrer. Do not dilute the degreaser if the manufacture does not recommend it. To this add 80 mL of the Hypoid SAE 140 Gear Oil. Measure the initial total height of the liquids in the cylinder (A = initial height). It should be close to 16 cm. Stir the mixture for 30 minutes with a magnetic stirrer at the highest setting that does not result in any of the mixture spilling from the container.

Upon completion of the 30-minute stirring time, turn off the stirrer. Set a timer for 20 minutes, and allow the liquid mixture in the cylinder to sit for that period of time without stirring. As the mixture sits, three phases will form. The top phase will be the oil, the middle phase will be the dispersed phase, which consists of both the oil and the cleaning solution, and the bottom phase will consist only of the cleaning solution and water. After the 20 minutes has elapsed, measure the height of the dispersed, or middle, phase (B = final height).

B.4 Determining Separation Ability

The percent of separation can be determined by the following formula:

$$[(A-B)/A]100 = \text{percent separation.}$$

If the percent separation exceeds 95% in two out of three tests, the degreaser meets the performance standard for separation.

Appendix C: Labeling Requirements for Certification by Green Seal™

Unless otherwise approved in writing by Green Seal, the following requirements shall apply:

1. The Green Seal Certification Mark shall appear on the product.
2. Whenever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis of certification. This description shall be in a location, style, and typeface that are easily readable by the consumer. The description shall read as follows:

“This product meets Green Seal’s standard for cleaning/degreasing agents based on its reduced hazard to humans, reduced aquatic impacts, reduced smog production, and low ozone depletion potential.”
3. Where a product is intended to be diluted with water by the user prior to use, the manufacturer label must state clearly and prominently that dilution is recommended and must state the recommended level of dilution.
4. The label must include detailed instructions for proper use, particularly with regard to the temperature at which the degreasing agent may safely be used and to the use of personal protective equipment.
5. A label must give specific instructions for recycling or disposal.