



GS-34

**GREEN SEAL™ STANDARD FOR
CLEANING AND DEGREASING AGENTS**

**EDITION 2.1
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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

GREEN SEAL

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FOREWORD

Edition. This version is Edition 2.1 from July 12, 2013 and replaces the Second Edition from September 1, 2011. This version includes substantive changes.

General. The final issued standard was developed in an open and transparent process with stakeholder input that included producers, users, and general interests.

The requirements in the standard are based on an assessment of the environmental, health, or social impacts associated with the products, services, or organizations covered in the scope of the standard. These requirements are subject to revision, and generally cover aspects above and beyond regulatory compliance. This standard neither modifies nor supersedes laws and regulations. Any conformity assessment to this standard requires compliance with all applicable laws and regulations for the manufacturing and marketing of the products.

Provisions for safety have not been included in this standard, since they are supervised by regulatory agencies. Adequate safeguards for personnel and property should be employed for all stages of production, and for all tests that involve safety considerations.

Products, services, or organizations that are substantially similar to those covered by this standard in terms of function and life cycle considerations may be evaluated against the intent of the requirements of this standard, accounting for relevant differences between the intended scope of the Standard and the actual product, service, or organization to be evaluated.

This standard may not anticipate a feature of the product that may significantly, and undesirably, increase its impact on the environment, health, or society. In such a situation, Green Seal will ordinarily amend a standard to account for the unanticipated environmental, health, or societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference. Test methods may be required for product evaluation. Unless explicitly stated that a specified method is the only acceptable one, the intent of the standard is that an equivalent test method may be accepted at Green Seal's sole discretion.

Certification to this standard shall be awarded only by Green Seal, or, with Green Seal's explicit written permission, by a third-party certification program conducting on-site audits.

Disclaimer of Liability. Green Seal, as the developer of this standard, shall not incur any obligations or liability for any loss or damages, including, without limitation, indirect, consequential, special, or incidental damages, arising out of or in connection with the interpretation or adoption of, reliance upon, or any other use of this Standard by any party. Green Seal makes no express or implied warranty of merchantability or fitness for a particular purpose, nor any other express or implied warranty with respect to this Standard.

ACRONYMS AND ABBREVIATIONS

ASTM. American Society for Testing and Materials

CARB. Air Resources Board for the State of California

CFR. Code of Federal Regulations

EPA. United States Environmental Protection Agency

HSDB. Hazardous Substances Data Bank

ISO. International Organization for Standardization

OECD. Organization for Economic Cooperation and Development

RTECS. Registry of Toxic Effects of Chemical Substances

VOC. Volatile Organic Compound

GREEN SEAL STANDARD FOR CLEANING AND DEGREASING AGENTS, GS-34

1.0 SCOPE

This standard establishes 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. See Appendix 1 for an example list of products included in this standard.

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 manufacturer's 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 U.S. Army Center for Health Promotion & Preventive Medicine.

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

Words and phrases described in the standard that appear in *italics* have a corresponding definition located in the definition section of the standard, Annex A.

2.0 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 Annex B 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 Annex C.

3.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS

3.1 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 LD50	≤ 5,000 mg/kg
Inhalation LC50 (mist, dust, or fumes)	≤ 20,000 ppm of vapor or gas or 500 mg/L
Dermal LD50	≤ 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.

3.2 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 as Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), or Group 2B (possibly carcinogenic to humans) agents. 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 Code of Federal Regulations (CFR) Part 141.

3.3 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, U.S. Environmental Protection Agency (EPA) Publication, SW-846.

3.4 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

3.5 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 ASTM International (ASTM) Cleveland Open Cup Tester (ASTM D92-97), or a Tag Closed Tester (ASTM D56-97).

3.6 Volatile Organic Compound (VOC) Content. VOCs include all organic compounds that have a vapor pressure of greater than 0.1 mm mercury at 1 atm pressure and 20° C. "VOC content" means the total weight of VOCs in a product expressed as a percentage of the product weight.

The VOC content of the product as used shall not exceed the lower of the following options:

- 5% by weight.
- The current regulatory limits of the Air Resources Board for the State of California (CARB) for its product category.

The VOC content shall be determined in one of the following ways:

- By summing the percent by weight contribution from all volatile organic components present in the product at 0.01% or more.
- According to the EPA Method 24, or equivalent.

3.7 Ozone Depletion. The product shall not contain any *ozone-depleting substances*.

3.8 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 LC50 daphnia or fish	≥ 100 mg/L
Acute LC50 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.

3.9 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, 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.

3.10 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.

3.11 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.

3.12 Animal Testing. To avoid new animal testing, previous test results will be accepted as evidence of meeting a criterion. When existing data are not available, the preferred methods for new testing include methods that replace, reduce, or refine animal use, particularly those recommended by the Interagency Coordinating Committee on the Validation of Alternative Methods or the European Centre for the Validation of Alternative Methods, unless indicated otherwise. In addition, other non-animal (in-vitro) test results, modeling data, data from structural analogs, and other lines of evidence may be accepted, provided that the methods are peer-reviewed and applicable. Specific in vitro or modeling methods may be noted in the standard, but additional options may be accepted by the certification program.

Further, a mixture need not be tested if existing information demonstrates that each of the applicable components complies with the criterion.

4.0 CERTIFICATION AND LABELING REQUIREMENTS

4.1 Instructions for Dilution. 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.

4.2 Instructions for Use. 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.

4.3 Instructions for End of Use. A label must give specific instructions for recycling or disposal.

4.4 Certification Mark. The Green Seal® Certification Mark may appear on the product, packaging, secondary documents, and promotional materials, only in conjunction with the certified product. Use of the Mark must be in accordance with *Rules Governing the Use of the Green Seal Certification Mark*¹.

The Green Seal Certification Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

Green Seal must review all uses of the Certification Mark prior to printing or publishing.

4.5 Use With Other Claims. The Green Seal Certification Mark shall not appear in conjunction with any human health or environmental claims, unless verified and approved in writing by Green Seal.

4.6 Statement of Basis for Certification. Wherever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable.

The description shall read as follows, unless an alternate version is approved in writing by Green Seal:

This product meets Green Seal™ Standard GS-34 based on effective performance and protective limits on: VOCs, ozone depleting chemicals, and human & environmental toxicity. GreenSeal.org.

¹ www.greenseal.org/TrademarkGuidelines

ANNEX A – DEFINITIONS (Normative)

Note that the defined terms are italicized throughout the standard.

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

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

ANNEX B – TEST METHOD FOR CLEANING EFFECTIVENESS (Normative)

Test Method for Evaluating the Cleaning Effectiveness of Degreasing Agents

B.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.

B.2 Materials and Equipment Needed

B.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.

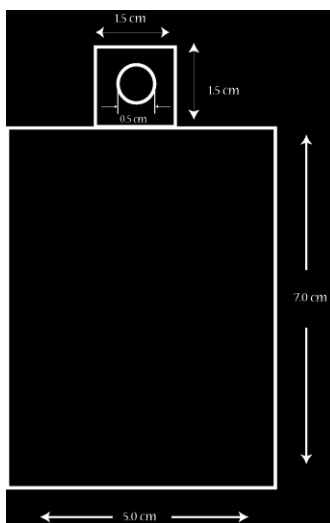


Figure A.1

B.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 kHz²;

² Industrial ultrasonic cleaning is commonly conducted at 40 kHz [MFASC (1997)].

- 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

B.2.3 Safety Items

- Hearing protection to be worn during operation of ultrasonic bath.

B.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.

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.

B.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.

B.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.

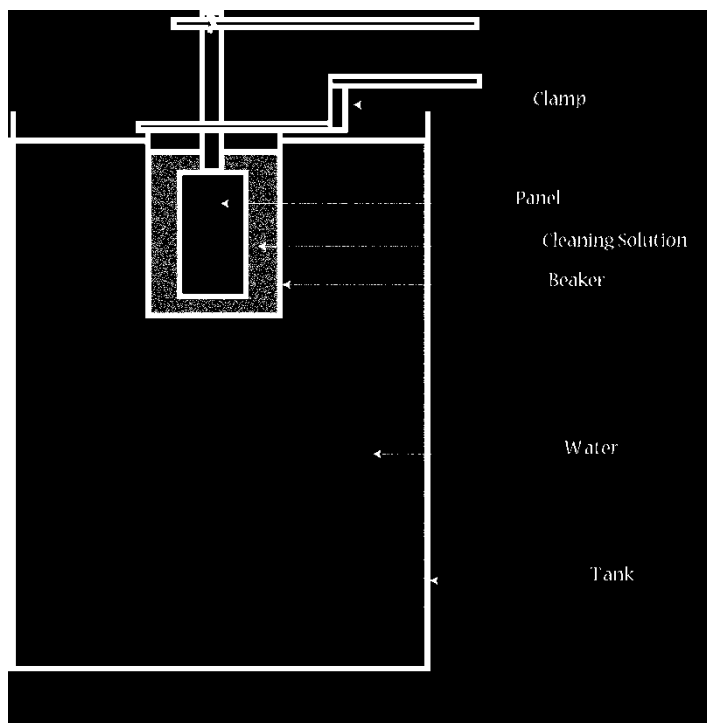


Figure A.2

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.³ 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).

B.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

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

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.

B.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 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.⁴ Allow the coupons to cool to room temperature and weigh the coupons (mass of the coupon after cleaning = C).

⁴ **Warning.** Do not place coupons directly in the oven if residual material is present.

B.8 Cleanliness Evaluation

B.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.

B.8.2 Cleaning Effectiveness

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

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

Where:

RS = amount of residual soil (mg/m^2)

C = mass of the coupon after cleaning

A = initial coupon mass

Ar = surface area = 0.0035 m^2

B.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

ANNEX C – TEST METHOD FOR OIL SEPARATION ABILITY (Normative)

Test Method for Evaluating the Oil Separation Ability of Aqueous Degreasers

C.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.

C.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.

C.2 Materials and Equipment

C.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

C.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

C.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).

C.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 1 – SCOPE (Informative)

Examples of products included in or excluded from the scope of GS-34:

Products Included in GS-34

- Cleaning agents marketed as suitable for cleaning soils in production and maintenance applications
- Degreasing agents marketed as suitable for cleaning soils in production and maintenance applications

Products Excluded from GS-34

- Floor finish and finish strippers (included in GS-40)
- General-purpose, restroom, glass and carpet cleaners for household use (included in GS-8) and industrial and institutional use (included in GS-37)
- General-purpose, bathroom, glass, and carpet cleaner products marketed specifically for household use (included in GS-8)
- Hand cleaning products for industrial and institutional use (included in GS-41) or household use (included in GS-44)
- Medical supply cleaning products
- Laundry care products
- Paint thinners or removers
- Specialty cleaning products for household use (included in GS-52) and industrial and institutional use (included in GS-53)