Standard for Cleaning and Degreasing Agents (GS-34)

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Edition 2.3

Green Seal, Inc. | **greenseal.org**

Green Seal

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Foreword

General. The final issued standard was developed in an open and transparent process with stakeholder input that included producers, users, and general interests. Edition 2.3 was issued on March 11, 2025. It replaces Edition 2.2 from September 8, 2017. Corrections and/or clarifications were last made on August 23, 2024. Information on changes made to this standard can be found on Green Seal's website.[1]

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.

[1] Library of Standards Documents, www.greenseal.org/green-seal-standards/library#section9

List of 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
GHS. Globally Harmonized System of Classification and Labelling of Chemicals
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; hand wiping 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 Safer Chemicals

2.1 Safer Ingredients

2.1.1 Aquatic Biodegradability. Each of the organic *ingredients* in the *product as used* shall exhibit ready biodegradability in accordance with the OECD definition, except for polymers. Biodegradability shall be measured according to any of the following methods: ISO 7827, 9439, 10707, 10708, 9408, or 14593, OECD Methods 301A–F, OECD 310.

Specifically, within a 28-day test, the *organic ingredient* shall meet one of the following criteria within 10 days of the time when biodegradation first reaches 10%:

- Removal of Dissolved Organic Carbon (DOC) > 70%
- Biochemical Oxygen Demand (BOD) > 60%
- BOD, as % of Theoretical Oxygen Demand (ThOD) > 60%
- CO 2 evolution, as % of theoretical CO_2 > 60%

Per OECD guidance the 10-day window requirement does not apply to structurally related surfactant homologues.

Alternative Evaluation Options: Substances that Do Not Exhibit Ready Biodegradability.
For organic *ingredients* at 0.01% in the *product as used* that do not exhibit ready biodegradability, one of the following options may be acceptable:

1. The manufacturer may demonstrate biodegradability in sewage treatment plants using the Coupled Units Test found in OECD 303A by demonstrating DOC removal > 90%.
2. The manufacturer may demonstrate that the compound has low aquatic toxicity (acute $LC_{50} \geq$ 100 mg/L for algae, daphnia, or fish) and exhibits inherent ultimate biodegradability with biodegradation rates above 70% (measured as BOD, DOC, or COD), per ISO test methods 9887 or 9888 or OECD 302A-C.

Note: Testing is not required for any *ingredient* for which sufficient information exists concerning its biodegradability, either in peer-reviewed literature or databases. In the absence of experimental data, Quantitative Structure-Activity Relationship data from EPA's BioWin (EpiSuite) models may be considered.

2.1.2 Carcinogens and Reproductive Toxins. The *product as used* shall not contain any *ingredients* that are *carcinogens* or *reproductive toxins*. 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.

2.1.3 Flammability and Ignitability. The *undiluted 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).

2.1.4 Ozone Depletion. The *product as used* shall not contain any *ingredients* that are *ozone-depleting substances*.

2.1.5 Per- and Polyfluoroalkyl Substances (PFAS). The undiluted product shall not contain any *ingredients* or *components* that are Per- and Polyfluoroalkyl Substances (PFAS*).*

2.1.6 Skin and Eye Damage. The *undiluted product* shall not cause *skin corrosion* or cause *serious eye damage*. For purposes of demonstrating compliance with this requirement, data may be evaluated for each of the product's *ingredients*. If the *ingredients* at their concentrations in the *undiluted product* are not shown to cause *skin corrosion* or *serious eye damage,* then the product will not be considered to cause *skin corrosion* or *serious eye damage*. Results from peer-reviewed studies or standard in vitro or in vivo test methods may also be accepted. Testing is not required for any *ingredient* for which sufficient information exists.

Further, a product is considered to cause *skin corrosion* or to cause *serious eye damage* if it has a pH less than or equal to 2.5 or greater than or equal to 11.0, unless data prove otherwise.

2.2 Safer Products

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

Oral LD_{50}	$\leq$ 5,000 mg/kg
Inhalation LC_{50} (mist, dust, or fumes)	$\leq$ 20,000 ppm of vapor or gas or 500 mg/L

Dermal LD_{50}	$\leq$ 2,000 mg/kg

For purposes of demonstrating compliance with this requirement, existing acute toxicity data for each of the product's *ingredients* may be used. These data are used to calculate a weighted average that assumes that the toxicity of the individual *ingredients* is additive. The toxicity values are adjusted by the weight of the *ingredient* in the product and summed using the following formula:

$$TP = \left(\sum_{i=1}^{n} \frac{wt_i}{TV_i} \right)^{-1}$$

Where,
TP = toxicity of the product
wt_i = the weight fraction of the *ingredient*
TV_i = the toxicity value for each *ingredient* (LD_{50})
n = number of *ingredients*

Inhalation toxicity shall be determined from all *ingredients* in the *product as used* when the *ingredient* has a vapor pressure greater than 1 mm Hg at 1 atm pressure and 20° C.

2.2.2 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.

2.2.3 Toxicity to Aquatic Life. The *product as used* shall not be toxic to aquatic life. A product is considered not toxic to aquatic life if the lowest available and most representative acute LC_{50} for fish, daphnia, or algae is greater than or equal to 100 mg/L.

For purposes of demonstrating compliance with this requirement, data for each of the product's *ingredients* may be used to calculate a weighted average (as in section 2.2.1).

The preferred sources of data come from the following appropriate protocols: ISO 7346 for fish, OEDC 203 for fish, OECD 202 for daphnia, or OECD 201 for algae.

2.2.4 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 20º 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 VOCs present in the product at 0.01% or more.
- According to the EPA Method 24, or equivalent.

2.2.5 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.

3.0 Verified Performance and Claims

3.2 Product Performance. 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.

3.2 Product Label

3.2.1 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.

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

3.2.3 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.

3.3 Product Design

3.3.1 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.

4.0 Trademark Use Requirements

4.1 Trademark Use. Any use of the Green Seal® Certification Mark or the Green Seal name, e.g., on the product, product label, packaging, secondary documents, or promotional materials, must be in accordance with Green Seal's Trademark Use Guidelines.[2]

4.2 Misleading Claims. Green Seal trademarks 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.

[2] www.greenseal.org/trademark-use-guidelines

Annex A – Definitions (Normative)

Note that the defined terms are italicized throughout the standard.

Carcinogen. A substance listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer (IARC Groups 1, 2A, and 2B).

Component. A constituent that is deliberately added at any level for its continued presence in the final product to provide a specific characteristic, appearance, or quality.[3]

Ingredient. Any constituent of a product that is intentionally added or known to be a contaminant that comprises at least 0.01% by weight of the product.

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

Per- and Polyfluoroalkyl Substances (PFAS). A class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.

Product As Used. The most concentrated form of the product that the manufacturer recommends for a product's intended use. For example, if a manufacturer recommends a product be diluted 1:4 or 1:8 for use, the product shall meet the health and environmental requirements at a dilution of 1:4.

Reproductive Toxin. A substance listed as a reproductive toxin (including developmental, female, and male toxins) 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., also known as Proposition 65).

Serious Eye Damage. The production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application. Substances classified as Category 1 for Serious Eye Damage/Eye Irritation (H318) under the GHS are also considered to cause serious eye damage.

Skin Corrosion. The production of irreversible damage to the skin, namely visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to 4 hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia, and scars. Substances classified as Category 1A, 1B or 1C for Skin Corrosion/Irritation (H314) under the GHS are also considered to cause skin corrosion.

Undiluted Product. The most concentrated form of the product produced by the manufacturer for transport outside its facility.

3 Naturally occurring elements and chlorinated organics that may be present as a result of chlorination of the water supply, are not considered intentional components if the concentrations are below the applicable maximum contaminant levels in the National Primary Drinking Water Standards found in 40 CFR Part 141.

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.

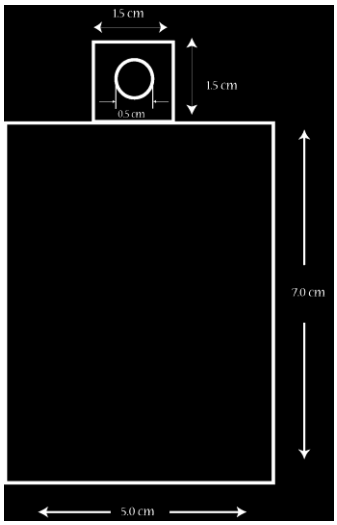
B.2 Materials and Equipment Needed

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 B.2.

Figure B.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 kHz;[4]
- 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.

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

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.

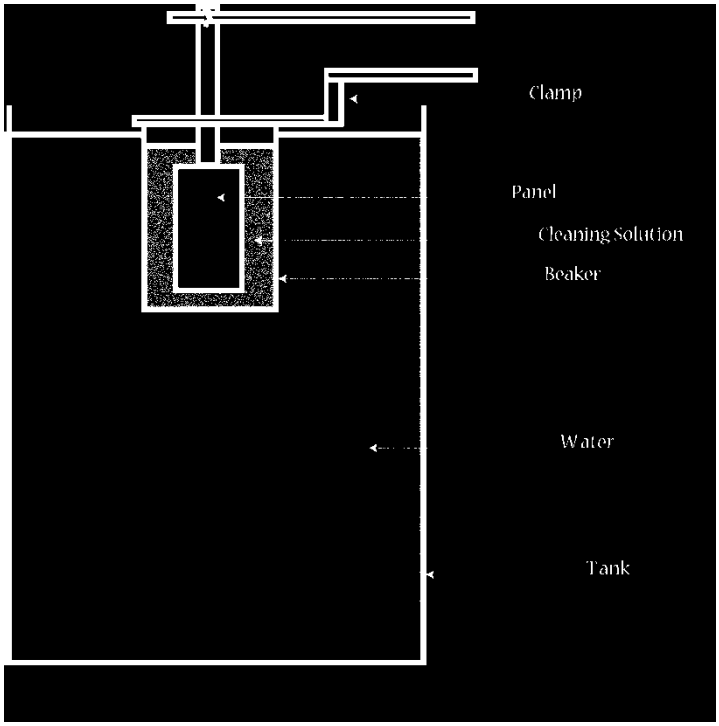
B.4 Soil/Degreaser Combinations

The steps presented in Sections B.6 to B.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 B.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 halfway 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 B.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.[5] 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 production soil, all three coupons should be baked in an oven for thirty minutes at 105□ C.[4] Allow the coupons to cool to room temperature and weigh them (soiled mass = B).

Only coupons with between 85 mg and 115 mg (100 $\pm$ 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 B.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 B.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 B.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 B.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.

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

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.[6] Allow the coupons to cool to room temperature and weigh the coupons (mass of the coupon after cleaning = C).

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 B.1. If the average residual maintenance soil loading, and the average residual performance soil loading are each less than 2,000 mg/m^2, the degreaser meets the cleaning performance criteria.

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

Table B.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 B-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	15-674-4300
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 Metal Samples Company Q-Panel Company	San Antonio, TX Munford, AL Cleveland, OH	210-923-5999 256-358-4202 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 C.2 to C.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)
- 20 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)