

FREQUENTLY ASKED QUESTIONS

General

- 1. Why is the coating called Gentoo?** It is named after an Antarctic species of penguin that repels water and oil off its feathered coat. It is NOT short for “generation two”, as some have guessed.
- 2. What is the best way to determine if Gentoo is right for my application?** After learning to apply Gentoo to standard surfaces, we recommend that Gentoo is applied to a small area(s) of the test surface for initial application-specific testing. Depending on the substrate, different surface preparation and curing methods could be tried, to see if they make a difference in the application-specific performance of Gentoo. See application instructions for more information.
- 3. How is Gentoo cured?** Gentoo can be cured in an oven at 194°F (90 °C) for 1 hour. Alternatively, Gentoo can cure in ambient conditions for 24-48 hours. After application Gentoo is dry to the touch within 10-15 minutes (for Gentoo applied to smooth surfaces). Gentoo coated items should not be oven cured until they have dried to the touch. After 24 hours of curing at ambient conditions, if it is found to meet the needs of the customer, it may be put into service. Performance may improve after multiple days of curing at ambient conditions.
- 4. How can Gentoo be removed?** Gentoo hydrophobic coating is very durable, so removing it can be difficult. In some cases, Gentoo can be removed using abrasive materials such as heavy-duty Scotch Brite™ (which contains aluminum oxide) or sandpaper. Pressure washing may also remove Gentoo, under certain circumstances. The only definitive way to remove Gentoo would be the use of a high pH / solvent mixture, as described below. For small items, including glassware and lab tools, a chemical solution of 100% pure potassium hydroxide with 99% isopropyl alcohol may also be used. A recommended ratio is 1 lb (0.45 kg) of potassium hydroxide to 2-3 gallons (7.5-11 liters) of isopropyl alcohol. Items can be soaked in this highly reactive solution for several days in order to begin to remove the coating. A final wash with soap and water, and then water, is advised. Note: These removal methods may damage the substrate and/or coating beneath the Gentoo coating. Appropriate safety precautions, including the use of proper personal protective equipment, must be taken when removing Gentoo from a surface.
- 5. Are there any regulatory concerns with the materials used in Gentoo hydrophobic coating?** The VOC content of Gentoo is relatively high, so appropriate engineering controls and PPE are necessary during application.
- 6. If I didn't apply an inert gas blanket to Part A right away, how can I tell if it has been rendered unusable?** There is not an easy way or direct indicator to tell if Part A has been



rendered unusable. The Part A in question should be mixed with Part B according to the application instructions and applied to a test piece and testing should be performed. Testing procedures can be found at <http://tinyurl.com/gentoofaq1>. If the test piece fails any of the tests, this may indicate that Part A has been rendered unusable.

7. **If Gentoo is used for anti-graffiti purposes, how can the paint be removed?** This is still being tested. One method that has been found effective for the removal of some spray paints that have been sprayed onto the Gentoo is to use a soft sponge and xylene, followed by a clean rag and more xylene. Other organic solvents may work in place of xylene. Proper safety precautions must be taken when working with any organic solvents. In some cases, the paint has simply been peeled off of smooth surfaces. Pressure washing or physically rougher (or abrasive) cleaning materials may remove the Gentoo.
8. **What is the working temperature range for Gentoo?** Gentoo has been tested between -50 °C (-58 °F) and 200 °C (392 °F). Because extensive testing has not been performed at these temperatures, application specific testing will be needed if Gentoo is exposed to specific high or low temperature environments within this range.
9. **Can the Outdoor / UV life of Gentoo be improved?** For the longest lasting outdoor performance, apply Gentoo over surfaces that contain a UV inhibitor.
10. **What is the coverage of Gentoo?** In the following statements, “Gentoo” alone refers to Gentoo Part A combined with Gentoo Part B (in equal parts by weight, per the instructions and technical data sheet). Gentoo Part A and Gentoo Part B are filled by weight, not by volume.

The following coverage estimates assume no waste: one gallon (3.8 L) of Gentoo covers approximately 665 ft² (61.8 m²). A complete “quart kit” contains 61 fl oz (1.8 L): this covers 316 ft² (29.4 m²). A complete “5-gal set” contains 9.5 gal (36 L): this covers 6,330 ft² (588 m²).

There are different ways to apply Gentoo. Depending on which method is chosen, your coverage and waste may vary. Collecting, re-using (and re-filtering) will help achieve maximum coverage and reduce waste.

11. **What is the storage temperature for Gentoo?** Gentoo should be stored between 40°F and 115°F (4°C and 40°C).
12. **What is the shelf life of Gentoo?** The shelf life of Gentoo is two years when stored at 75 °F (24 °C). Storage at higher temperatures will shorten the shelf life.



- 13. Can Gentoo be decanted or divided into smaller containers?** It is not recommended that Gentoo is divided into smaller containers. Gentoo is moisture sensitive, and must be repackaged using a carefully controlled process. The mixing process and container choice will also affect the quality of the Gentoo. It is recommended that the appropriate sized set of Gentoo is ordered for the specific application. The use of quart kits is recommended for initial testing.

Applying Gentoo

- 14. What do you recommend before a user applies Gentoo to their specific surface or in their specific application?** We recommend that a small amount of Gentoo is mixed and applied to glass or aluminum as a test, to verify that the user is performing the mixing and curing processes properly. Three performance tests can be performed to determine if the Gentoo is working as it should. Please see testing procedures at <http://tinyurl.com/gentoofaq1> and the video at <http://tinyurl.com/gentoofaq2>. UltraTech has typically used borosilicate glass or brushed aluminum as the standard test substrates.
- 15. What is the proper mixing ratio and how long does it need to mix?** Gentoo is a two-part mixture and is mixed in equal parts (1:1) of Part A and Part B by weight, not by volume. Equal sized containers are sold in equal weights for Part A and Part B. Gentoo will need to be mixed together for a minimum of 90 – 120 minutes, depending on temperature of surroundings, to hydrolyze the chemicals together and allow the proper reaction to occur. Please see instructions for more information.
- 16. What kind of pre-treatment do you recommend before applying Gentoo to a substrate?** For plastics and acrylics, we recommend preparing the surface by cleaning with IPA and then performing a corona treatment prior to applying Gentoo. Corona treatment is not a requirement, but is a recommendation that may help achieve the best bonding of the Gentoo coating to the substrate. Flame treatment of polyethylene plastic has also proven effective. Some plastics have not required any pre-treatment, so testing the need for pre-treatment on a specific plastic would be advised. Some plastics may also benefit from being scuffed (and then cleaned with IPA), if this is acceptable to the customer. Please contact us for more information.
- 17. Can Gentoo be mixed at temperatures lower than 65 °F (19 °C) or above 75 °F (24 °C)?** Ideally, Gentoo should be mixed above 65 °F (18 °C). Mix Gentoo for 120 minutes if between 65 °F and 75 °F (18 °C and 24 °C). Mixing at temperatures above 75 °F (24 °C) may shorten the required mixing time to potentially as low as 90 minutes. Mixing at temperatures below 65 °F (18 °C) may require mixing times of 3 hours or longer.
- 18. Can Gentoo be applied with commercial spray equipment?** Yes, Gentoo can be applied



with HVLP spray equipment. Gentoo applied with commercial spray equipment may result in a coating with visual defects, such as mottling and/or “orange peel”. The proper PPE should be used - see instructions for more information.

19. What supplies and equipment are needed to mix and apply a quart kit of Gentoo? Please see the following link for a list of recommended equipment: <http://tinyurl.com/gentoofaq3>

20. What equipment and supplies do you recommend for spraying Gentoo? Do not spray Gentoo without sufficient engineering ventilation controls or without making a minimum of supplied-air respirators available to all those exposed to Gentoo spray.

A list of supplies and equipment can be found at <http://tinyurl.com/gentoofaq4>. This list includes a supplied air respirator.

If engineering ventilation controls are not available or sufficient, wear a minimum of a hooded supplied-air respirator and nitrile gloves. A paint suit / Tyvek suit is recommended. Refer to Safety Data Sheets (SDSs) for both Part A and Part B before beginning to apply Gentoo.

21. How can you tell if Gentoo is hydrolyzed? Please see the video at <http://tinyurl.com/gentoofaq5>.

22. Can Gentoo be ‘refreshed’ or re-applied over an existing Gentoo application? We are looking at an option to be able to do this. If your current Gentoo coating has lost its repellency or other performance benefits, then you should be able to clean the surface and re-apply Gentoo. This has not been fully evaluated, and the performance may vary from the initial Gentoo application.

23. How can I tell if Gentoo has been applied correctly? Three tests can be performed on Gentoo to verify if it is functioning correctly. Please see the testing procedures at <http://tinyurl.com/gentoofaq1> and video at <http://tinyurl.com/gentoofaq2>.

24. What are some of the challenges with spraying Gentoo? Dust, debris, gels, mottling and orange peel are defects that may affect the appearance of Gentoo when it is applied by an HVLP spray gun. Higher quality spray guns may reduce these defects. Please see the document at <http://tinyurl.com/gentoofaq6> for examples of defects that may be encountered when spraying Gentoo.



- 12. How long will Gentoo last after it has been hydrolyzed?** The pot life of filtered Gentoo is dependent on environmental conditions. At 85 °F (30 °C), the pot life may be under 4 hours. If it is at standard conditions (70 - 75 °F / 21 - 24 °C), the pot life will be close to 6 hours. If Gentoo is chilled (at 40 °F / 5 °C), pot life may be over 16 hours. The pot life is dependent on how quickly the solvents evaporate, which can be minimized by keeping it covered. As the solvents evaporate, the secondary condensation reaction begins, and the Gentoo begins to turn into its final form as a gel.

Characteristics

- 13. How durable and abrasion-resistant is the coating?** Gentoo is very durable and abrasion resistant. The ASTM D 3363 pencil hardness of Gentoo applied to hard surfaces is 9H. Taber Abrasion data is available on the website: www.gentoo coating.com
- 14. Is Gentoo transparent?** Yes, Gentoo is transparent and it retains its transparency even with mild abrasion.
- 15. Is Gentoo oleophobic and hydrophobic?** Yes. Gentoo maintains performance after being challenged with a wide range of solvents including mild soap, salt water, isopropyl alcohol (IPA), naphtha, some acids, heptane, jet fuel, deicing fluid, hydraulic fluid, lubricants, and others. Gentoo does not hold up well with long exposure to very low pH (acidic, less than pH of 3) or very high pH (alkaline, greater than pH of 11) fluids. It is advised to test Gentoo with your specific chemical application prior to adoption.
- 16. How long will Gentoo last?** Longevity of the Gentoo coating will vary based on environmental factors, abrasion, chemical contact, etc.

Gentoo is a new product, developed under a number of military SBIRs (developmental grants) and there has been quite a bit of testing done, but there is still much to learn.

The performance of Gentoo is dependent on the quality of the application of the Gentoo to the surface or substrate (particularly the quality of the adhesion of the Gentoo), the desired performance results (whether it is an easy-cleaning application or an anti-corrosion application), and, if outdoors, the presence of UV stabilizer in the substrate.

For indoor applications (whether it is for corrosion protection or easy-cleaning), Gentoo could last for years before reapplication.



For outdoor applications requiring corrosion protection, Gentoo should last for two or more years without reapplication. Longevity of outdoor easy-cleaning applications will depend on many factors. After outdoor exposure, it has been observed that the sliding angle of liquids will increase over time, but the coating can still be effective. If the substrate being coated with Gentoo contains a UV inhibitor, the Gentoo could last several years without reapplication, but if the substrate does not contain a UV inhibitor, the Gentoo may only last one or two months, depending on the UV intensity and the abrasion present in the environment of the coating. Testing Gentoo in your specific application is required to determine if it meets the requirements of the application.

The addition of UV inhibitor to the Gentoo formula is under development to extend its outdoor performance and longevity.

- 17. What is the typical thickness of the Gentoo Coating?** The coating thickness is normally 4-6 microns, much thinner than a typical paint.
- 18. What is the contact angle and the watershed angle for Gentoo?** The initial coating exhibits a contact angle of approximately 110° - 115° for many liquids. The initial watershed angle is normally 5° - 10°.
- 19. How flexible is Gentoo?** We have test data showing Gentoo on metal being bent 180 degrees over a 1/8" diameter mandrel, without any cracking, even at -51 °C (-60 °F). The hybrid inorganic-polymer coating exhibits excellent flexibility.
- 20. Is corrosion resistance correlated directly to the thickness of the coating?** There has not been much testing done showing corrosion resistance versus thickness of Gentoo, as it is difficult to build the thickness of Gentoo (versus a paint that can be built up over itself to achieve a targeted thickness). However, even a thin coating 4-6 microns) of Gentoo will help to prevent corrosion, since it is hydrophobic, and it is insulating and acts as a barrier. Because it is hydrophobic, it will shed water and water-based substances more easily than other surfaces. Because it is insulating, it will inhibit the flow of electricity to the substrate, which slows the corrosion process. Because it acts as a barrier, many liquids that may remain on the surface will be physically separated from the substrate.
- 21. Is Gentoo slippery?** Gentoo is not slippery on its own. It is rubbery, and may cause a surface to have a higher coefficient of friction than it did before Gentoo was applied.
- 22. What type of finish does Gentoo have?** Gentoo has a glossy finish. Other less glossy finishes are in development. Please contact us for more information.



- 23. Is Gentoo electrically conductive?** No, Gentoo is not electrically conductive. It would be considered an electrical insulator.
- 24. How chemically resistant is Gentoo?** Gentoo maintains hydrophobicity after being challenged with a wide range of solvents including mild soap, salt water, isopropyl alcohol (IPA), naphtha, some acids, heptane, jet fuel, deicing fluid, hydraulic fluid, lubricants, and others.
- 25. How well does Gentoo stand up to acid/bases?** Gentoo does not hold up well with long exposure to very low pH (acidic, less than pH of 3) or very high pH (alkaline, greater than pH of 11) fluids.
- 26. Is Gentoo fingerprint or smudge resistant?** It has not been extensively tested, but its repellency does provide it some resistance. It is recommended you test this performance feature of Gentoo for your own specific application to determine its applicability.
- 27. How much weight does Gentoo add when applied?** The estimated weight of Gentoo is about 0.85 grams per square foot (after full hydrolysis and full curing) at 5-micron thickness. This equates to 0.00187 lbs/sq foot.

Uses and Applications

- 1. Can Gentoo be used on rubber or other elastic substrates?** No testing has been performed on ultimate elongation, but Gentoo is flexible. Elasticity has not been tested. Elongation beyond 100% would not be elastic. A rubber primer/surface treatment may help adhesion.
- 2. Is Gentoo capable of preventing corrosion?** Gentoo is an excellent anti-corrosion coating. Gentoo's dense structure provides a high physical barrier to electrolytes that cause corrosion and an insulating electronic barrier for galvanic corrosion. For best results, a paint or another protective coating should be applied to the substrate, and then Gentoo should be applied when the paint or other coating is still "green" (tack-free but still has reactive groups available to help bonding). Gentoo hydrophobic coating can also be applied to a paint or other coating after it has dried, but surface roughening (if acceptable) is recommended to promote adhesion. Gentoo can also be applied directly to a substrate. In this case, surface roughening (if acceptable) and/or other surface preparation methods are recommended to promote adhesion.
- 3. What substrates have been successfully coated with Gentoo hydrophobic coating?** Stretched acrylic, glass, aluminum, stainless steel, brushed steel, polycarbonate panels, wood, rubber, leather, polyethylene, PVC, painted surfaces, marble, granite, and quartzite. Each substrate may have unique challenges including but not limited to: surface preparation, overcoming substrate porosity, shrinkage, and/or stiffening.



4. **Does Gentoo repel or allow for easier clean-up of cement and concrete?** Initial testing has shown that ready-mix concrete is easily removed from a Gentoo-treated concrete chute when water is used to clean it. If the concrete is allowed to dry on the chute, the removal of the dry concrete may remove the Gentoo coating. Because of limited testing, these results are preliminary, we recommend that real-world testing is performed on the specific surfaces and the specific concrete in your application.

5. **Can Gentoo be used primarily as a top-coat?** Gentoo makes a great top coat – it has been coated on bare metal (aluminum, steel, stainless steel, etc.), on plating (Cd, Zn-Ni), and on top of current primer/top coats. The coating thickness is normally 4-6 microns, much thinner than a typical paint.

6. **Can Gentoo be applied to electronics to protect them from moisture, liquids and corrosion?** Yes, Gentoo can be successful in these types of applications. Testing prior to adoption is recommended.