



The Professional's Choice
for Quality High Performance
UT Couplants
Q1 — 2008

The Ultrasonic Couplant Experts

Sonotech manufactures a broad selection of ultrasonic couplants with over 45 products. Sonotech UT couplants deliver dependable high performance over a wide range of test conditions and procedures.

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**NDT Newsletter: Featuring Halogen Testing of UT Couplants,
Benefits of UT couplants, and much more!**



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WHY DOES SONOTECH TEST FOR HALOGENS?

The chemical family known as halogens includes chlorine, fluorine, bromine and iodine. With the advent of the nuclear power generating industry and the F-100 Super Sabre fighter/bomber in the mid 1950's, halogens became a concern with austenitic stainless steels and titanium alloys because of the propensity of halogens to cause stress corrosion cracking and catastrophic failure of the part.

In the 1950's and well into the 1960's, petroleum based oils and their distillates were the predominant ultrasonic couplants and the base chemicals in penetrants used for ultrasonic nondestructive testing. As NDT became widely used for nuclear power components and jet aircraft engines, specifications for halogens in couplants and penetrants became a concern.

Testing for Halogens

Beginning in the early 1960's, an existing chlorine test, ASTM D808 which was originally approved in 1944 for the determination of chlorine in lubricating oils and greases, was applied to ultrasonic couplants and penetrants. ASTM D808, as written, uses a small sample of material combusted in a bomb containing oxygen under pressure with the residue analyzed gravimetrically for chlorine. The lower limit of reliable applicability of the test is specified as 0.1% (1000 parts per million or ppm).

Problems inherent to applying ASTM D808 to a broader range of chemicals than was originally intended include the assumption that chlorine was the only halogen of concern and that the lower level of detection of 1000 ppm was adequate.

In March of 1969, the U.S. Atomic Energy Commissions Division of Reactor Development issued specification RDT F3-61 which required for nuclear reactors that "The materials shall contain no more than 50 ppm each of sulphur and of halogens;" however, no standards were available for halogen and sulfur determinations at that low level.

Over the years ASTM D808 as a test specification has evolved to a sample preparation method including dehydrating a sample of ultrasonic couplant to the point where it will combust, combusting the sample in a bomb and analyzing the halogens in the residue using instrumentation capable of detection to levels far lower than 1000 ppm.

The ASTM D808 test method precipitates Cl, Br and I; however, FI is water soluble in the test and is usually lost in the sample preparation. FI is usually analyzed and reported separately and Cl, Br and I are often reported together as "halogens as chlorides" since the ASTM D808 specification is specific to chlorine. Sonotech provides a Certificate of Analysis which lists S in ppm, (Cl, I and Br) in ppm, FI in ppm and total halogens as the sum of [(Cl, I and Br) plus FI], in ppm.

Laboratory testing for halogens to ASTM D808 is a combination of art and science and requires that the laboratory be experienced in sample preparation and dilutions, have dedicated glassware and oxygen bombs which are maintained with a high standard of cleanliness, and that the laboratory be certified by appropriate organizations for testing to ASTM D808. Perhaps the most important qualifications of a laboratory are that it routinely performs ASTM D808 for a broad range of customers including nuclear and aerospace, participates in "Round Robin" testing of samples with other well qualified labo-

ratories and has a clearly established minimum level of detection for each halogen.

Sonotech has been using independent laboratories for testing halogens in ultrasonic couplants for decades. During the last 10 years, we have selected two laboratories to routinely perform halogen analysis on each chemical batch of Sonotech couplant where a halogen claim is made. We use Laboratory Testing in Hatfield, PA and Applied Technical Services in Marietta, Georgia. These laboratories are, in our opinion, well qualified; they are certified to perform halogen testing to ASTM D808 to the single digit ppm threshold of accuracy. To satisfy Sonotech's internal Quality Standards, we routinely send samples of the same couplant batch to both laboratories and obtain results that are comparable.

Caution Advised In Reading Laboratory Halogen Reports

If halogens are critical to your testing requirements, we have the following suggestions:

- ▶ Beware of broad promotional statements which are difficult to interpret, such as "extremely low halogens", halogens below the "detectable limit", or "ND" (none detected). These phrases can be very misleading in that with some laboratories testing to ASTM D808 as it is written, "ND" can mean only that the halogen level was below 1000 ppm. The term "very low halogens" can mean different levels for each industry. For highly stressed titanium parts, (such as testing after welding before heat treating), very low halogens can mean a requirement for less than 10 ppm (0.001 %). On the other end of the spectrum, for some applications very low halogens can mean less than 10,000 ppm (1.00%).
- ▶ Check the testing laboratory's industry approvals and certifications specific to testing halogens to ASTM D808 to single digit threshold of detection. Laboratories which routinely perform this service can establish their qualifications through referencing their qualifying organizations, customers and routine testing of halogens for NDT penetrant manufacturers, nuclear power facilities, etc.

Couplant Manufacturers' Specifications for Halogens

As a technology and engineering based company, Sonotech strives for a margin of safety in our product claims. With halogen claims, we select a maximum level number which we believe will include a decade's variation in raw materials and final product, and will cover the results from any well qualified laboratory. For example, while we specify 50 ppm maximum halogens for Ultrigel II, some batches will have total halogens below 5 ppm.

A Parting Thought:

The basic premise of NDT is, as in medicine, *first do no harm*. Understanding the metallurgical requirement of the ultrasonic couplant is critical to insure the test is truly nondestructive. In recent Sono NEWS publications we have covered Hydrogen Embrittlement testing of Ultrasonic Couplants and Titanium Stress Corrosion of Ultrasonic Couplants. Past newsletters can be downloaded at our website: www.sonotech-inc.com.

BENEFITS OF UT-X AND UT-X FE POWDERED UT COUPLANTS:

UT-X and UT-X FE are salt tolerant/resistant products. Salts can form as the by-product of the corrosion process, (such as Ferrous Sulphate), they can precipitate from contaminated feedwater and Calcium or Sodium Chlorides are used directly to melt ice and snow. Therefore, salts can be present on boilers, boiler tubing, bridges and ships. *UT-X and UT-X FE will not break down in the presence of salts.*

UT-X and UT-X FE form a continuous film. UT-X and UT-X FE resist "snow plowing" with the transducer leading edge, which can cause the surface under the transducer to be almost dry. Dry spots cause loss of coupling. *UT-X and UT-X FE form a thin, continuous film for consistent imaging.*

UT-X and UT-X FE mix uniformly. Due to the two part polymer system Sonotech has formulated, and the instructions to de-air the water prior to mixing, UT-X and UT-X FE form a uniform gel without clumps, while minimizing air bubbles. *Sonotech's two packet system enables this advantage.*

UT-X and UT-X FE offer ferrous corrosion inhibition. Although UT-X and UT-X FE are only rated at 10 and 40 respectively on the Sonotech Corrosion Inhibition Chart, they offer far superior ferrous corrosion inhibition over other powder couplants we have tested.

UT-X and UT-X FE have a proven history. Introduced in 1995 and 1997 respectively, UT-X and UT-X FE have been used in tens of thousands of inspections over the past decade.

NEW COUPLANT TESTING APPROVALS:

Gel 3000® and Echogel XP® have been tested and approved to Hydrogen Embrittlement Testing of high strength low alloy steel, ASTM F519-05 by Scientific Materials International.

Gel 3000 is a water-soluble, broad temperature range couplant containing a fluorescent tracer that enables the inspector to monitor transducer overlap and ensure complete coverage and removal by illuminating couplant or residue with ultraviolet light. New applications for Gel 3000 include overhead inspections (eliminates drips), vertical inspections and hot welds. If you are looking for a broad temperature range (0 to 325°F) couplant, but don't need a fluorescent tracer, Thermasonic is the same formula as Gel 3000 without the fluorescent tracer.

Echogel XP is an economical, salt-stable couplant which provides an extended operating range (5 to 190°F) and an extended drying time to facilitate longer inspections.

The ferrous corrosion inhibition of Echogel XP is rated at 80 (60 days minimum on steel) and the ferrous corrosion inhibition of Gel 3000 is rated at 85 (better than 60 days but not long term protection on steel) using Sonotech's Ferrous Corrosion Inhibition rating system. Gel 3000 has recently been tested on magnesium alloys and evidenced no visible corrosion with minimal staining after 60 days.

For a complete listing of Testing Specifications and Sonotech couplant approvals, please visit www.sonotech-inc.com or call (800) 458-4254.

Sono 1200+

Sonotech is developing a new ultra high temperature ultrasonic couplant for applications over 1200°F. (650° C). With atmosphere control, this product has applications beyond 1500°F (815°C). Sono 1200+ is in the advanced prototype stage and samples are available at no charge for investigation in ultra high temperature flaw and thickness ultrasonic testing. Contact Marian Larson at Sonotech with the specifics of your application ([HYPERLINK "mailto:mlarson@sonotech-inc.com"](mailto:mlarson@sonotech-inc.com) mlarson@sonotech-inc.com or 360-671-9121 x 116).

GIVE US YOUR FEEDBACK:

Do you have a need for an economical ultrasonic couplant with a visible light or ultraviolet tracer? If so, for what applications? E-mail your thoughts to mlarson@sonotech-inc.com.

CUSTOMER SERVICE

Sonotech is committed to assisting you in selecting the right ultrasonic couplant for your application. To request free samples for evaluation, receive a couplant selection training CD or for technical assistance, please call customer service (800) 458-4254 or visit our website www.sonotech-inc.com.

Next Newsletter: Our next technical newsletter will cover ferrous corrosion properties and testing of ultrasonic couplants, and the difference between surface corrosion testing and crevice corrosion.