LEAK TESTING IN WELDING APPLICATIONS USING CANTESCO® LEAK DETECTION COMPOUNDS

A SAFETY AUDIT

FOR INSPECTION OF

WELDING AND CUTTING EQUIPMENT

CANTESCO CORPORATION
WELDING PRODUCTS DIVISION
MISSISSAUGA, ONTARIO • BUFFALO, NEW YORK • ANTWERP, BELGIUM
(716) 693-8206 (UNITED STATES) • (905) 624-5463 (CANADA)
WWW.CANTESCO.COM
E-MAIL SALES@CANTESCO.COM

LAST REVISED 01/01/2003 ITEM NUMBER 529-661

WHY INSTITUE AN AUDIT PROGRAM

The purpose in conducting a weld safety audit program using CANTESCO® leak detection compounds is to ensure that welding and cutting equipment is inspected on a timely basis and that it is in good working condition. As described in section 3.1.1 of ANSI/ASC Z49.1-88 Safety in Welding and Cutting, section 10.5.2.1 Leak Testing Connections:

> **Connections shall be checked for tightness after assembly and before lighting torch. Flames shall not be used. In addition, when using pressure-reducing regulators, the union nuts and connections on regulators shall be inspected before use.**

Section E10.5.2.1 goes on to state that "Leak test solutions for use on oxygen connections are commercially available and are recommended."

WHAT TO LOOK FOR IN A LEAK DETECTOR

The need for purchasing a leak detection compound versus using a "mild" soap solution to leak test welding equipment arises from time to time. Some question the requirement to use a product specifically formulated to detect leaks, choosing instead to leak test using a "mild" soap such as Ivory. In the case of welding using oxyfuel gas (OFW) and cutting (OFC) the answers to this question are critical.

One of the dangers in working with an oxyfuel process is the potential for oxygen and hydrocarbon (oil and grease) reactions. Although oxygen itself is non-flammable it does support the combustion of flammable materials.

The concern here is the spontaneous combustion and fuel fire that may result from the presence of oil, grease or combustible dust around cylinders, valves, fuse plugs and safety devices.

> **"Oil or grease in the presence of oxygen may ignite spontaneously and burn violently.**
>
> **Oxygen cylinders, cylinder valves, couplings, regulators, hoses, and apparatus shall be free from oil, grease and other flammable or explosive substances."**

SPECIFICATION MIL-PFR-25567E

The purpose of MIL-PRF-25567E is to establish the basic criteria necessary to ensure that a leak detection compound used in oxygen service is safe. The specification addresses this concern in two ways: by specifically prohibiting certain materials that can be used in the formulation of oxygen compatible leak detectors (potential combustible materials); and by having these leak detection compounds pass nine performance tests (ten for low temp type II leak detectors).

Section 3.1 Composition of MIL-PRF-25567E prohibits certain materials, stating that the compound shall not contain:

a. Mineral oil, vegetable oil, animal oil or fats.

b. Any material that will ignite or explode when in contact with liquid or gaseous oxygen.

c. Materials that will act as primary skin irritants, skin sensitizers, or produce any other dermatosis.

d. Ketones, aldehydes and alcohols as components in the formulation.

TABLE I below lists the performance tests required to be carried out on an oxygen compatible leak detection compound in order to meet MIL-PRF-25567E.

TABLE I - MIL-PRF-25567E PERFORMANCE TESTS

SECTION	TEST	REQUIREMENT
3.2.1 Composition	Various	Must satisfy performance requirements
3.2.2 Odor	ASTM D1292	no objectionable odor
3.2.3 pH Value	4.4.3	between 6.0 and 7.5
3.2.4 Nonflammability	ASTM D92	> 100^0C
3.2.5 Leak Detection	4.4.4	must pass test
3.2.6 Foaming Ability	ASTM D1173	> 145 mm initial
		> 130 mm after five min
3.2.7 Freeze Point (type II)	ASTM D1177	-60^0C or below
3.2.8 Residue	4.4.7	less than 0.50%
3.2.9 Corrosiveness	4.4.8	must pass test
3.2.10 Compatibility with Oxygen	4.4.9	must pass test
3.2.11 Mold Growth	4.4.10	must pass test

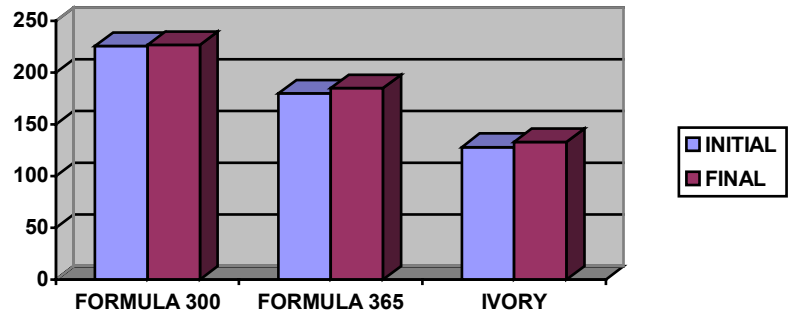
To demonstrate whether a "mild" soap solution would be suitable for use as an oxygen compatible leak detector, samples of CANTESCO® LEAK DETECTION COMPOUND FORMULA 300, FORMULA 365 and IVORY soap (diluted 50% with regular tap water) were subjected to the above foaming ability and residue tests by an outside independent lab facility.

Figure 1 on the next page provides the test results for foaming ability, Figure 2 indicates residue results.

FOAM HEIGHT TEST RESULTS

As indicated in TABLE I an oxygen compatible leak detector must reach an initial minimum foam of 145 mm or greater and have a minimum foam height of 130 mm or greater after five minutes. Figure 1 shows that both CANTESCO® FORMULA 300 AND 365 exceed this requirement, providing a stable leak detector over an extended time period.

FIGURE 1

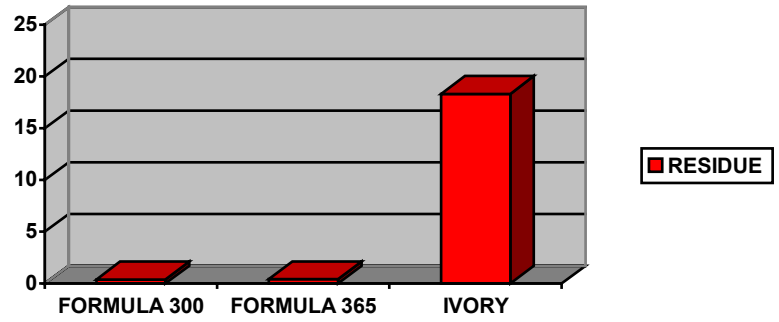


The Ivory soap solution did not reach the minimum foam height levels (initial foam of 126 mm, final foam 133 mm) as set out in the mil spec. (A 100% undiluted sample of Ivory was tested at the same time, providing test results of 82 mm initial and 88 mm final).

RESIDUE TEST RESULTS

In Figure 2 the results of the residue test as per the mil spec show that at 18.32% by weight the Ivory solution exceeds that maximum of less than 0.5% by weight. Both CANTESCO® FORMULA 300 AND 365 are below the 0.5% limit and meet this requirement.

FIGURE 2



As these two performance tests indicate, the use of a "mild" soap solution (and in particular for use on oxygen systems) is not a recommended practise.

ASME SECTION V NONDESTRUCTIVE EXAMINATION

Often referred to as Nuclear Industry Standards ASME SECTION V ARTICLE 6 covers LIQUID PENETRANT EXAMINATION (see also ASME SE-165). ARTICLE 6 specifies a requirement for CONTROL OF CONTAMINANTS which states that "The user of this Article shall obtain certification of contaminant content for all liquid penetrant materials used on nickel base alloys, austenitic stainless steels, and titanium." Cantesco Corporation completes testing to these requirements as detailed in certificates of compliance.

CERTIFICATES OF COMPLIANCE

CANTESCO® leak detection compounds are lot numbered for traceability and certificates of compliance for halogen and chloride content can be provided. To receive a copy contact customer service stating item and lot number. For a copy of ASTM test methods for halogen and chloride content (sulphur, fluoride and chloride) contact the ASTM at www.astm.org.

AREAS THAT CAN BE INSPECTED WITH CANTESCO® LEAK DETECTION COMPOUNDS

The following areas should be checked at installation and on a periodic basis, as recommended by the manufacturer of each item:

- **regulators**
- **cylinder valves**
- **fuse plugs**
- **safety devices**
- **valve packing**
- **hoses**

CANTESCO® LEAK DETECTION COMPOUNDS are available in sizes from 4 oz through to 8 oz with special applicators including daubers and 12" pull out extension tubes. Bulk gallon, pail and drum containers for economical refill are also available.

CANTESCO CORPORATION CAN HELP

- **We provide copies of mil spec MIL-PRF-265567E free of charge. To receive a copy call, fax or e-mail us.**
- **We can help you prepare standards for leak testing.**
- **Certificates of compliance to mil specs are available for each batch of product produced. CANTESCO® products are lot numbered for traceability.**
- **MSDS sheets are available for all of Cantesco's products, whether they are regulated or not.**

PUMP & HANDLING MATERIALS NOT RECCOMENDED FOR CONTACT WITH CANTESCO LEAK DETECTORS

Avoid using pumps and handling materials which contain brass, mild steel and galvanized steel parts and fittings. For additional information on incompatiblities see the individual product material safety data sheet.

RECCOMENDED MATERIALS FOR PUMPING, DISPSENSING & STORING CANTESCO LEAK DETECTORS

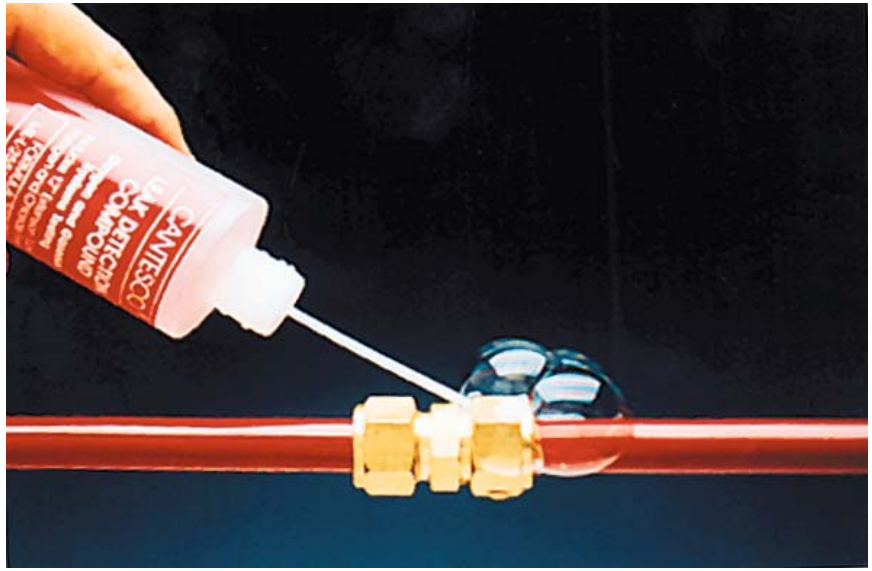
We recommend using stainless steel, aluminum and plastic materials when pumping & dispensing CANTESCO® LEAK DETECTION COMPOUNDS. As glycol based formulas may see slight discoloration due to iron contamination when using ordinary steel materials their use should be avoided.

SHELF LIFE

The shelf life for CANTESCO® leak detection compounds is a minimum of 36 months when kept in sealed containers and used as directed.

ADDITIONAL INFORMATION

For additional information on each specific product request the TECHNICAL INFORMATION - TYPICAL ANALYSIS form for each material(s) you are considering using. For health and safety information request the specific material safety data sheet for each product(s) you are considering using by emailing us at msds@cantesco.com.



WELDING PRODUCTS SELECTION GUIDE

LEAK DETECTION COMPOUND - OXYGEN COMPATIBLE – APPROVED FOR OXYGEN USE - REG TEMP TYPE I

FORMULA	DESCRIPTION	TEMP RANGE
300	Regular temperature oxygen compatible solution	+27° F / -3° C

LEAK DETECTION COMPOUND - OXYGEN COMPATIBLE – APPROVED FOR OXYGEN USE - LOW TEMP TYPE II

FORMULA	DESCRIPTION	TEMP RANGE
365	Low temperature oxygen compatible solution	-65° F / -54° C

LEAK DETECTION COMPOUND – REGULAR TEMPERATURE

FORMULA	DESCRIPTION	TEMP RANGE
100	Regular temperature compressed air and gas systems leak detector (not certified for use on oxygen systems).	+27° F / -3° C

LEAK DETECTION COMPOUND – MID TEMPERATURE

FORMULA	DESCRIPTION	TEMP RANGE
135	Mid temperature compressed air and gas systems leak detector (not certified for use on oxygen systems).	-35° F / - 37° C

LEAK DETECTION COMPOUND – LOW TEMP RED

FORMULA	DESCRIPTION	TEMP RANGE
LTR1	Mid temperature solution for detection of leaks in propane, butane, LPG and compressed air and gas systems.	-10° F / -23° C

LEAK DETECTION COMPOUNDS • GAS LEAK DETECTORS • ZINC RICH SPRAY GALVS
DYE PENETRANT INSPECTION • ANTI-SPATTERS • NOZZLE TIP DIP • WIRE LUBE PADS
COOLING FLUIDS • STAINLESS STEEL PICKLING PASTE • ALUMINUM CLEANER