INSPECTION OF SCUBA GEAR BY ULTRAVIOLET LIGHT

When used with pure oxygen of gas mixtures of high 02 content, dive equipment such as tanks and regulators must be free of all combustible hydrocarbon materials. Procedures employed to inspect parts being prepared for O2 service often include the use of ultraviolet light, also called "blacklight" or just "UV". Hydrocarbon contaminants usually fluoresce or "glow" under UV-light, producing a radiance which is readily visible in a darkened room.

PHYSICS OF ULTRAVIOLET LIGHT: UV-light is part of the invisible electromagnetic spectrum covering wavelengths from 1800 to 4000 angstrom Units. An Angstrom (A°) is a measure of wavelength equal to 10^{-10} meter or 0.1 nanometer (nm). UV-light is divided into 3 subgroups based on wavelength: types B and C, ranging from 1800 to 3200 A°, are powerful and potentially dangerous rays which have germicidal mutational effects. UV-B and UV-C have applications for mineral fluorescence, material sterilization, chromatography, and molecular biology. Both types can produce serious burns on skin and eyes, thus requiring protective clothing/eyewear during use. Blacklight (UV-A), with wavelengths from 3200 - 4000 A°, relatively benign and has many uses including night club illuminations, leak testing in automotive systems, counterfeit currency detection and, of course, material cleanliness inspections.

APPLICATIONS OF UV-A LIGHT INSPECTIONS: Unfortunately, UV-light is NOT infallible as applied for hydrocarbon detection. Many modern chemical products DO NOT fluoresce and therefore cannot be sensed by UV A-light methods. Two diving-related examples of non-fluorescing materials are synthetic compressor oils and most silicone grease compounds. Among diving technicians, these chemicals are recognized as the most likely contaminants to pervade scuba oresce. Consequently, GMC does not recommend UV-inspection of dive tanks after oxygen-cleaning. If the presence of the most common pollutants cannot be confirmed by UV-A, the purchase and use of a tank VIP Blacklight costing many hundred of dollars makes no sense! Many military and research organizations agree with this point, and no longer mandated Blacklight inspections for all types of oxygen equipment.

On the other hand, scuba regulators, tank valves, and oxygen/Nitrox fittings and hardware are NOT closed systems in the same sense that a cylinder is and could become contaminated by various substances during use, transport, storage, or assembly. Therefore, UV-light seems a sensible final inspection procedure for such items after oxy-cleaning and prior to assembly. It can be very effective when used in conjunction with other indirect methods such as pH or shake tests and visual bright-light inspections.

Because modern chemistry has created such an enormous variety of chemical compounds, it is advisable to test the common ones around your shop to see which of them fluoresce. For example, the regulator lubricants you normally use, your compressor oil, and common silicone sprays would all be likely candidates for testing. Having some reference data as to which of your "scuba related chemicals" do or do NOT fluoresce is useful information.

INSTALLING AND USING THE GMC BLACKLIGHT: #43305 is a 15-watt, overhead light fixture with a fluorescent Blacklight tube covered by a clear, plastic UV-shield. The light operates on ordinary 110v household current and produces UV A-light at about 3600 A°. The fixture has a rotary on/off switch and an auxiliary 110v outlet on one end. Mount the light by hanging it from the two nylon loops atop the housing; it should be NO MORE than 15 inches above the inspection bench.

Before inspections are conducted, allow Blacklight to "warm-up" for at least 5 minutes. Proper temperature within the tube is critical to the production of UV-light at the correct wavelength. Parts to be checked are placed under the light and observed for fluorescence. Any sign of surface fluorescing or "glowing" must be considered unacceptable and the parts must be rejected and cleaned again.

SAFETY WITH UV-A-LIGHT: Although Blacklight is relatively harmless, eye irritation can occur from prolonged or repeated UV-A exposure. Experts recommend that UV-blocking goggles or spectacles be worn during A-light operations. To that end, GMC has fitted our light with a clear plastic, UV-shield. This shield blocks UV while making contaminants more apparent by increasing fluorescent contrast and eliminating blue-haze interference. Obviously, safety is enhanced by observing parts through the UV-shield.

ANY QUESTIONS REGARDING THIS INFORMATION SHOULD BE DIRECTED TO OUR TECHSUPPORT DEPT:

414-774-1616 (Voice) OR 414-774-9568 (Fax) OR techsupport@gmcscuba.com

GLOBAL GMC MFG. CORP.