WHAT IS ASTM E3022-25 & WHY DO WE NEED IT

As responsible members of the NDT community, trusted by thousands of companies and NDT technicians worldwide, as well as being one of the authors of ASTM E3022-25, we are frequently asked questions relating to ASTM E3022-25.

ASTM E3022-25 was written to promote safety and quality and prevent manufacturers from taking shortcuts. It is a manufacturer requirement. The responsibility is on the manufacturer to prove the reported values and invest in equipment that can perform the required tests.

This document explains the positive impact ASTM E3022-25 had on MPI and FPI methods. It also highlights the complexity and time-consuming nature of testing if a UV-A light complies with ASTM E3022-25 if tests are performed adequately.

The weakness of this ASTM standard is that it is not audited adequately unless you are audited by a NADCAP auditor or similar. NADCAP adopted this standard in its checklists.

It is advisable to ask to visit the testing lab of the manufacturer you entrust with your investment. If you own a Labino light, you are welcome to visit ours.

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Authored by:
Oliver Schalk

oliver.schalk@labino.com

1 Why was the ASTM E3022-25 standard created?

ASTM E3022-25 was created to fulfill the need for a standard outlining the minimum requirements needed to confirm that a UV-A LED light is suitable for inspections in an application as critical as NDT. Unless you can replace the landing gear of a plane while flying or take the responsibility that a non-compliant UV-A LED light can be used, this standard is necessary for safety.

ASTM E3022-15, the predecessor of E3022-25 was released on September 1st, 2015. This standard was the collective work of a task force comprised of UV-A light manufacturers and industry experts with over 200 years of combined experience. This task force was chaired by a member of the US Airforce and convened regularly for several years before submitting its findings in its final form for voting. Labino AB was one of the companies that participated and contributed with its industry knowledge.

Five years later, this standard had developed into a global standard and a benchmark for UV-A LED lights used in fluorescent penetrant and fluorescent magnetic particle inspections. Some PRIMES, such as Airbus, have incorporated ASTM E3022-25 and used it as the cornerstone of their own internal testing method (i.e. Airbus AITM6-1001/2001). NADCAP Audit criteria checklists (AC7101/1) for auditees seeking NADCAP accreditation also incorporate similar requirements as ASTM E3022-25, such as validation of a maximum peak wavelength of 370nm (Section 3.5.1), stabilization and sufficient UV intensity (Section 5.13.7).

The objective of the ASTM E3022-25 standard is to outline the procedures for testing the performance of UV-A LED lights. ASTM E3022-25 lists all reporting requirements that are considered essential to prove such lights are flawless and suitable to be used for fluorescent penetrant and fluorescent magnetic particle inspections.

"…outline the procedures for testing the performance of UV-A LED lights. ASTM E3022-25 lists all reporting requirements that are considered essential to prove such lights are flawless…"

The ASTM E3022-25 standard states that the tests, documentation of all the test results and certification of the UV-A lights are the responsibility of the manufacturer. These actions are not intended to be performed by the end users. No end user is expected, and we suspect the great majority is not willing either, to:

(a) purchase thousands of dollars' worth of equipment (a minimum list of what is required is provided on **page 15**) to validate the performance of inspection UV-A lights, it has already paid thousands of dollars for.

(b) take on the responsibility and allocate resources internally, to master the ASTM E3022-25 procedures and measurements, to the same extent as the manufacturers.

According to ASTM E3022-25, it is the responsibility of the UV-A light manufacturer to test *each lamp sold* for compliance. The manufacturer must report the findings in a Serialized Unit Test Report and submitted to the user of the light along with a certificate stating that the light has been tested and found to be in compliance. UV-A LED lights must be tested:

(a) to comply with the limited acceptance tests required by ASTM E3022-25, Section 8.

(b) as a single unit, taking into consideration ALL the parts that make up the light such as the housing, filter, diodes, electronic circuit design, optical elements, cooling system, and power supply combination (Section 1.2).

According to ASTM E3022-25, it is also the responsibility of the UV-A LED light manufacturer to test *each lamp model* for compliance, using a serialized reference UV-A LED light. The manufacturer must report the findings in a Type Test Report and make this report available to the user. The reference UV-A LED light must be tested:

(a) to comply with the tests required by ASTM E3022-25, section 7.

(b) as a single unit, taking into consideration ALL the parts that make up the light such as the housing, filter, diodes, electronic circuit design, optical elements, cooling system, and power supply combination (Section 1.2).

2 What are the tests required by the ASTM E3022-25 standard for each Lamp model?

Tests on the lamp model (referred to as Type Test Report) must be made available to users by the UV-A lights manufacturer. The manufacturer cannot claim compliance by only supplying a unit test report and not making available the measurements required on the lamp model.

A Type Test report is a very detailed and comprehensive report that each manufacturer is obligated to make on a specific model using a reference light (not the actual light sold to you) of that same model. This is part of the process to claim compliance. The reference light is stored safely and should be made available in case of an audit. If you are the owner of a Labino UV-A light, regardless of whether you are an individual or company, Labino doors are open for you to visit us with your quality management and/or NDT team, audit us and remeasure the values included in the type test report with our reference light.

If you buy a UV-A LED light that is labeled to have been tested for compliance with ASTM E3022-25, you have the right to ask the manufacturer for this report.

List of Tests Required for every Lamp Model – Type Test Report

Maximum Irradiance	Full Width Half Maximum (FWHM)
Beam Irradiance Profile	Longest Wavelength at Half Maximum
Minimum Working Distance	Excitation Irradiance
Temperature Stability	Current Ripple
Maximum Housing Temperature	Typical Battery Discharge Time*
Emission Spectrum	Filter Transmittance
Peak Wavelength	

* if applicable

The above tests are not just a number each. Each measurement is derived through a process that:

(a) requires multiple actions taken over several hours and

(b) specialized equipment to make these measurements possible.

For example, the *Ambient Temperature Test* (Section 7.6.2) that falls under Temperature Stability (Section 7.6) states: “At lamp switch-on, perform the measurements defined by 7.6.4 (emission spectrum measurements). Repeat the measurements every 5 min until the peak wavelength varies by no more than 1 nm and the excitation irradiance does not vary more than 5% over one (1) hour of consecutive measurements. Once stabilized, measure the current ripple (Section 7.6.5)".

The *Elevated Temperature Test* (Section 7.6.3) that also falls under the Temperature Stability (Section 7.6) requires use of a climate chamber to artificially elevate the temperature around the light. The standard states in relation to the test (Section 7.6.3.1): "Set the chamber temperature to the maximum manufacturer's specified operating temperature of the lamp. At lamp switch on, perform the measurements defined by 7.6.4 (emission spectrum measurements). Repeat the measurements every 30 min until the peak wavelength varies by no more than ±1 nm and the excitation irradiance does not vary more than 5% over three consecutive measurements. Once stabilized, measure the current ripple".

UV-A Lights are classified in three categories:

(a) Type A – These are UV-A lights powered by AC (Mains) and correspond primarily to handheld and overhead applications (i.e. inhouse on a mag bench). There is a specific requirement that type A UV-A LED lights should have a minimum beam profile of 5 inches (127 mm) with intensity greater or equal to 1,000 µW/cm^2. Labino's GX Orion, SB/BB 2.0 Series AC (Mains) and MB 3.0 Series AC (Mains) models fall into Type A category.

(b) Type B – These are lights powered by a battery and correspond primarily to portable and stationery applications. There is a specific requirement that type B UV-A LED lights should have a minimum beam profile of 5 inches (127 mm) with intensity greater or equal to 1,000 µW/cm^2. Labino's SB/BB 2.0 Series battery and MB 3.0 Series battery powered models fall into Type B category.

(c) Type C - These are lights powered by a battery and correspond primarily to single LED flashlights. There is a specific requirement that type C UV-A LED lights should have a minimum beam profile of 3 inches (76 mm) with intensity greater or equal to 1,000 µW/cm^2. Labino's UVG3 2.0 Series and UVG5 2.0 Series models fall into Type C category.

The tests previously listed are required for all three types. Types B and C are also required to illustrate the typical battery discharge time and discharge plot.

The ASTM E3022-25 standard provides detailed instructions on how to perform measurements for every test. It also provides uniformity and clarity on how to report the findings so that users reading the report can make an educated decision on how to use the lights, at what working distance, what is the covered area but also to have like information and compare one model with another (not necessarily from the same manufacturer).

For example, you can compare graphically the beam irradiance profile (Section 7.4 and Fig. 1) between two models. The standard specifies:

(a) the range of intensities to be used, and

(b) the colors to be used illustrating each range as follows:

- Blue: < 200 µW/cm^2
- Green: 200 – 1 000 µW/cm^2
- Yellow: 1 000 – 5 000 µW/cm^2
- Red: 5 000 – 10 000 µW/cm^2
- White: > 10 000 µW/cm^2

To perform non-destructive testing using a UV-A LED light you need to use a light that makes the chemicals fluoresce. NDT chemicals for MPI and FPI only fluoresce under a certain wavelength. Most standards, including ASTM E3022-25, specify the wavelength to be between 360-370 nm. The more the wavelength moves away from this range, the probability of seeing an indication diminishes.

The tests performed essentially make sure that the light is stable and there are no variations observed in beam intensity, flickering or strobing. Not just when a light is powered on, but also when it is warm. Why is this important?

(a) *Intensity is not fixed; it changes due to heat*. If the light generates more heat than it should, intensity can drop significantly, much below the initial intensity, without the NDT operator even noticing.
Risk: The more the intensity drops, the working distance and the covered area, both decrease much more than the NDT inspector is used to (or told to expect) and there is a greater risk of missing the indication.

(b) *Wavelength is not permanent; it changes due to heat*. If the light generates more heat than it should, the wavelength shifts higher values, potentially above the allowable limit of 370nm without the NDT operator even knowing.

Risk: The more the wavelength moves away from 370nm, the greater the risk of missing a crack.

“…tests are performed as a single unit to determine the effectiveness of the cooling system on the LEDs and keep the intensity and wavelength within check.“

The key reason why the ASTM E3022-25 standard specifically asks the tests to be performed as a single unit, taking into consideration ALL the parts that make up the light such as the housing, filter, diodes, electronic circuit design, optical elements, cooling system, and power supply combination, is exactly that. To be able to determine the effectiveness of the cooling system on the LEDs and keep the intensity and wavelength within check.

All parts listed above and in Section 1.2 of the ASTM E3022-25 standard affect heat one way or another; how heat is generated, how heat circulates inside the unit and how heat is extracted outside the light. Regardless of whether the unit is fan cooled or whether it has a mechanical cooling system, the intensity must not drop more than 20% and the peak wavelength must not exceed 370nm. For this reason, it is not possible for any component to be tested individually as no measurements relating to ASTM E3022-25 standard can be derived from such exercise.

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LED replacement bulbs that are marketed as ASTM E3022-compliant for use by lights that used to carry mercury bulbs are deceiving. They have nothing to do with the ASTM E3022-25 standard. An ASTM E3022-25 certification cannot be performed without testing ALL the parts that make the light, as one unit. We have a list of several Chinese and Indian manufacturers with American and European distributors that sell such bulbs and are falsely claiming compliance. If you have been offered such products, I strongly suggest you report these to your local ASNT or other NDT related chapter.

“LED replacement bulbs that are marketed as ASTM E3022-compliant for use by lights that used to carry mercury bulbs are deceiving. They have nothing to do with the ASTM E3022-25 standard.“

Furthermore, LED replacement bulbs for self-maintenance on existing LED lights are not allowed by ASTM E3022-25. The manufacturer needs to recertify a light that had a critical part to the optical output of the light replaced.

There is always a reason when an LED fails. Most of the time is due to one of the following: the wrong current was used, an inefficient driver was implemented, or the cooling system does not correspond to the requirements of the overall system. LEDs are not meant to last a few months as low-cost manufacturers that sell freely replacement parts claim. If your stationery light needs frequent replacement of LEDs, you cannot trust it to emit the correct wavelength either. It means it overheats much above what the light can take and prompts intensity and wavelength to move in the wrong direction. Intensity moves lower and wavelength moves higher.

The ASTM E3022-25 standard makes sure that these mistakes are kept in check. As ASTM E3022-25 tests and measurements are made by the manufacturers for their own products, it is prudent to choose a manufacturer with credibility.

“…LEDs are not meant to last a few months as low-cost manufacturers that sell freely replacement parts claim. If your stationery light needs frequent replacement of LEDs you cannot trust it to give you the correct wavelength either. It means it overheats much above what the light can take and causes variations in intensity and wavelength.“

Labino’s GX Orion stationery light carries a 4-year warranty and has not had a single LED out eight years after its launch in any of the 50 countries it was sold. Several other manufacturers have quality products as well. There is a large difference in quality and adaptation of standards such as ASTM E3022-25 between serious manufacturers and low-cost manufacturers who like to take shortcuts.

Labino AB as well as several other manufacturers keep their reference lights locked and safe. Any end user that has bought a Labino UV-A light is welcome to come and verify with us that the properties we publish in our Type test reports match the actual Labino reference model.

The ASTM E3022-25 standard also requires the manufacturer to specify the extreme temperatures that a light can withstand. That is why specialized equipment is required, such as a climate chamber, to regulate and test at different temperatures. Labino UV-A models, for example, are routinely checked to endure 122 Fahrenheit (50˚ Celsius).

The standard also requires measurements of the filters used to minimize visible light and UV-B and UV-C emission, all variables that can be the cause of a distraction during an inspection and / or cause damage to the human eye. A filter must have the following transmittance qualities at each wavelength: 380 nm ≤ 85%, 400 nm ≤ 30%, 420 nm ≤ 5%, 425 to 670 nm ≤ 0.2%.

Ambient light during tests performed, including when you perform your daily irradiance measurements, must be less than 2 fc (21.5 lux). Temperature during tests must also be stable at 77 ± 5°F (25 ± 3°C).

3 What are the tests required by the ASTM E3022-25 standard for the unit you bought?

Tests on the lamps available for purchase (referred to as Unit Test Reports) should be included with every light. Make sure you ask for it if it did not come with the light. You will need it for your next ISO or Nadcap audit.

A Unit Test report is shorter in nature than the Type Test report because fewer tests are required. The manufacturer of the UV-A light that tests and claims compliance with ASTM E3022-25 is obligated to supply you with a unit test report and a certificate stating compliance.

List of Tests Required for every Lamp sold – Unit Test Report	
Maximum Irradiance	Full Width Half Maximum (FWHM)
Emission Spectrum	Longest Wavelength at Half Maximum
Peak Wavelength	

The important thing to ask is, if we already tested the model through a Type test report, why do we need a Unit test report? The answer is the same if we asked the question, why do we need to recertify a light if an LED failed?

The answer lies in the fact that every UV-A light is unique. Every LED is unique, including the most high-end ones. No two lights are exactly the same. If you buy two lights and measure them from the same distance, the intensity will not be exactly the same. If you buy two lights and measure the wavelength with a spectrometer, they will not be the same although they should peak between 360-370 nm as the E3022-25 specifies. There is a reason a range is required and not a single number.

Different single UV LEDs have different power as well as wavelengths. Several mistakes can happen with any of the components that make a UV-A light and mistakes do happen. Therefore, the ASTM E3022-25, Section 8, lists the essential tests that must be performed to ensure that all UV-A lights available in the market are suitable for inspections.

"If one removes the requirement of a unit test report and/or the requirement to recertify a UV-A light that had a critical part to the optical output replaced by re-issuing a unit test after repair, no end user should expect the manufacturer to deliver units with the correct wavelength and intensity."

If one removes the requirement of a unit test report and/or the requirement to recertify a UV-A light that had a critical part to the optical output replaced by re-issuing a unit test after repair, no end user should expect the manufacturer to deliver units with the correct wavelength and intensity. The element of quality is lost together with all that the industry has achieved by adopting the ASTM E3022 after 2015.

4 What equipment is required to perform the tests listed in the ASTM E3022-25 standard?

Just any equipment is not good enough

In order to perform the tests listed in the ASTM E3022-25 standard the following specialized equipment is needed:

List of equipment needed to perform the test	
UV-A Radiometer	Thermometer
Spectroradiometer	Photometer
Spectrophotometer	Infrared Thermometer
Climate chamber	Camera
Oscilloscope	

The ASTM E3022-25 standard has specific requirements on two of the several equipment needed to perform the tests above:

(a) The ASTM E3022-25 standard requires that UV-A radiometers shall be calibrated in accordance with ANSI/ISO/IEC 17025, ISO 10012, or equivalent. UV-A radiometers use a filter and sensor system to produce a bell-shaped (that is, Gaussian) response or top-hat response centered near 365 nm (3650 Å). 365 nm (3650 Å). Radiometers shall provide a resolution of at least 5 µW/cm^2 up to 10 000 µW/cm^2 and a resolution of 10 µW/cm^2 above 10 000 µW/cm^2. The sensor front end aperture width or diameter shall not be greater than 0.5 inches (12.7 mm).

(b) The ASTM E3022-25 standard requires that a spectroradiometer is used that has a resolution of at least 0.5 nm and a minimum signal-to-noise ratio of 50:1. The system shall be capable of measuring absolute spectral irradiance over a minimum range of 320 to 420 nm. The instrument shall be coupled to an integrating sphere or cosine corrector.

There are clear and precise specifications for the diameter of the radiometer sensor, otherwise the errors can be arbitrarily large. The specifications above improve precision. The larger the diameter of the sensor is, the more UV readings deviate from their true values. If you have a sensor covered by a filter surface that is much larger than the actual sensor, it causes the readings to differ. It puts the burden of guessing where the true sensor is under a large surface, on the unsuspected NDT operator.

An NDT operator has no obligation to open the sensor unit to see what is inside – that would automatically bring the sensor "out of calibration". If a unit test report or a type test report was performed with such a meter, the tests are invalid, and the UV-A light needs to be retested. If you have come across UV meters with varying sensor sizes, i.e. greater than 0.5 inches (12.7 mm), that are calibrated but show different readings, this could be one explanation.

Why is having an accurate UV meter so important? Some lamps or lamp models are borderline acceptable due to several reasons such as beam diameter, irradiance etc. If we take a modest 5% error as the error generated by an out of spec sensor, this can easily push the lamps outside the allowable limit. Please note that a 5% error due to an out of spec sensor is <u>in addition</u> to the calibration uncertainty already incorporated in a sensor. This calibration uncertainty, that is specified on your calibration certificate, can add an additional 3-5% to the error of each sensor. Further errors include the spectral response of the radiometer and problems in the actual calibration process (read more at https://www.ndt.net/article/panndt2025/papers/PANNDT2025_10.pdf). Therefore, having a sensor that generates wrong readings because the size is too large, gives an overall error of at least 8-10% or even higher.

ASTM E3022-25 does not specify the allowable error percentage, but if common sense should prevail, the size of the error should be kept to a minimum and as all UV calibrations, within the 5% limit. Have in mind that if your daily business is related to NADCAP and/or you have a NADCAP approval, **NADCAP AUDIT CRITERIA AC7114/1 Rev. M**, Section 5.13.4 states the following criteria question:

Is the light meter accurate to within ± 5% of the standard reading? YES NO

As all critical organizations whose primary concern is safety, NADCAP concern is accuracy and safety. It is impossible for any organization to validate the use of a meter that knowingly measures in excess of 5% of the standard reading.

<u>Impact on Beam Diameter</u>: As previously discussed on **page 7**, ASTM E3022-25 has a limit of 5 inches diameter for Type A and B lights and 3 inches diameter for Type C lights. Therefore, an error of the magnitude discussed above, 8-10%, can wrongly make a light be out of compliance because the beam diameter will measure smaller, if intensity is understated, which what a larger sensor does.

<u>Impact on Irradiance</u>: There are end users that not only follow ASTM E3022-25 but also work according to PRIMES requirements, with very strict rules relating to the level of intensity to be used. For example,

Rolls-Royce engineering specification RRES 90061 and Airbus testing methods AITM6-1001 and AITM6-2001 have a maximum limit of 5 000 µW/cm² at 15 inches (38.1 cm). Their vendors cannot work if their lamp shows > 5 000 µW/cm², but they can when the lamp shows 4 750 µW/cm². If a UV-A lamp manufacturer uses brand UV-A meter (with the larger sensor) and sets intensity at 4 750 µW/cm² but the end user (i.e. Rolls-Royce) uses brand B (with the sensor that is within specifications) and measures 5 150 µW/cm², the end user will get a non-conformity when audited.

Impact on Working Distance: Some standards allow the use of an intensity level higher than 5 000 µW/cm² at 15 inches, if the working distance is stated where 5 000 µW/cm² is reached. A wrong measurement turns an error in irradiance to an error in working distance.

Beam diameter, irradiance, working distance, all are interlinked variables that give the NDT operator knowledge and confidence not only to perform an inspection, but also to reject a UV-A light if it does not meet the specifications, as long as the NDT operator knows what these variables actually are.

This comment is not part of the ASTM E3022-25 standard but is good for you to know because there is a plethora of old meters in use. Sooner or later, you will come across this issue.

We are often asked by NDT inspectors why old meters do not measure the same for a UV-A LED light versus a Xenon UV-A light. The answer is simple. Xenon UV-A lights emit a lot of light in wavelengths away from 365 nm and meters are not designed to handle large concentration of light around a specific wavelength.

UV-A LED lights emit a lot of light around 365 nm. Irradiance coming out of a UV-A LED lamp is best measured with a digital meter. Digital UV-A radiometers for NDT are made with a filter and a detector. The detector is measuring ALL the light that gets transmitted through the filter, typically around the 365 nm area.

5 Who objects to ASTM E3022-25 standard?

Manufacturers unable to perform certifications or recertifications and their resellers

The ASTM E3022-25 was created to lift the quality of UV-A LED lights used in fluorescent penetrant and fluorescent magnetic particle inspections. There are many UV-A lights unsuitable for inspections available on the market, most of which come from low-cost countries.

Testing a light for ASTM E3022-25 is an expensive and time-consuming business. Several hours are required before a unit is tested, data documented, and ultimately a certificate is issued. Serious manufacturers have developed and implemented all necessary infrastructure required to test if the lights delivered to users are within the limited acceptance tests.

Several manufacturers from low-cost countries have not created such capabilities. They are instead selling replacement parts on already sold UV-A LED lights, claiming compliance and without informing unsuspected users of their obligations for compliance. Replacement parts and self-maintenance are not an advancement in technology. They are the ultimate excuse to a badly designed, badly manufactured light.

> *"Replacement parts are not an advancement in technology. It is the ultimate excuse to a badly designed, badly manufactured light."*

A user of a light, an NDT Technician whose training and expertise is the inspection of materials, should not be given the burden of repairing and confirming that a UV-A LED light has been tested to be in compliance with ASTM E3022-25. Ask your NDT team if they have ever used a spectrometer or even seen one.

Do you, if you are a vendor to a major aerospace or auto manufacturer or if you are an inspection company providing 3rd party services to a refinery or an oil rig, want to perform an inspection with a light that does not give you the correct intensity or wavelength after 30 minutes in use?

The ASTM E3022-25 standard states that the tests, documentation of all the test results and certification of the UV-A lights are the responsibility of the manufacturer. These actions are not intended to be performed by the end users. No end user is expected, and we suspect the great majority is not willing either, to:

(a) purchase thousands of dollars' worth of equipment (a minimum list of what is required is provided on **page 15**) to validate the performance of inspection UV-A lights, it has already paid thousands of dollars for.

(b) take on the responsibility and allocate resources internally, to master the ASTM E3022-25 procedures and measurements, to the same extent as the manufacturers.

6 Frequently Asked Questions

Is my mercury vapor light in compliance with ASTM E3022-25?

No. ASTM E3022-25 is only applicable for UV-A LED lights. It is not applicable for mercury vapor, gas-discharge, arc or luminescent (fluorescent) lamps or light guides (for example, borescope light sources).

Is my mercury vapor light in conjunction with an LED replacement bulb in compliance with ASTM E3022-25?

No. It is the responsibility of the manufacturer to certify a specific lamp as a single unit, taking into consideration ALL the parts that make up the light such as the housing, filter, diodes, electronic circuit design, optical elements, cooling system, and power supply combination. When you buy one of the above components, in this case the diodes, there is no guarantee that use of the diodes with any mercury unit will not shift the wavelength of the diodes outside the 360-370 nm region. Nobody tested the body with the diodes and therefore nobody can claim compliance with ASTM E3022-25.

If my certificate says E3022-15 or E3022-18, should I ask for a certificate which says E3022-25?

No. There is no need. The difference between E3022-15 and E3022-18 is just a conversion factor that was corrected. There were only a few minor changes in the E3022-25 version, mostly refining the wording. The emission spectrum now needs to be measured between 320 and 420 nm instead of between 300 and 400 nm which is the only change that directly affects unit tests and type tests.

I have lost my ASTM E3022-25 certificate, can I get a copy?

Although the standard does not refer to storage of data, all major manufacturers store the data to reproduce your certificate. Labino does that for free.

Can I repair my UV-A light on my own?

It depends on what is broken. If it is something unrelated to the optical output such replacing the PSU or an external cable, so long as you are qualified and/or authorized by your company, you can repair it. However, the burden and most often the knowledge of making a light perform in accordance with ASTM E3022-25 lies with the manufacturer (Sect. 1.2). A certification is an action that requires several hours to complete, requires specialized equipment (for example a spectrometer) and an excellent interpretation of the standard. Repairs relating to the optical performance of the light must be left to the manufacturer or an authorized service center.

When does my UV-A LED light need re-certification?

A light should be recertified by the manufacturer or an authorized service center of the manufacturer only. The recertification is required only if a critical component that affects the performance of the light is damaged. Such components are typically components that are inside the housing such as a failing LED, a burned drive card etc. No re-certification is needed if you need to replace components external to your light such as your power supply unit, a power cord, or batteries.

What is the difference between a Type Test and a Unit Test report?

A Type Test report is a very detailed and comprehensive report that each manufacturer makes on a specific model using a reference light (not the light sold to you) within that model. The reference light is stored safely and should be made available in case of an audit. A Type Test report should be made available to users upon request. A unit test report records tests that are made on the light that users have purchased. A unit test report should be included with your light.

Who regulates implementation of the ASTM E3022-25 standard?

Nobody. ASTM E3022-25 tests and measurements are made by the manufacturers for their own products. It is therefore necessary to choose a credible manufacturer before you make an investment. Specific sections of the standard are audited by Nadcap and/or ISO auditors. ASTM E3022-25 is referenced and adopted by all major NDT procedures such as ASTM E1444 (Standard Practice for Magnetic Particle Testing) and ASTM E1417 (Standard Practice for Liquid Penetrant Testing).

What do I do if I operate a light with several UV-A LEDs bundled together in the same position and I cannot see if any have failed?

ASTM E3022-25 does not comment on how LEDs should be positioned or how many they should be, so long as all the acceptance tests are met. However, one drawback with UV-A LEDs positioned together is that you cannot see if any failed, especially since there is a filter covering them. You will only know if you measure the UV output and detect a sharp drop in intensity. Testing equipment should be controlled, and failures detected.

My company has two different digital UV-A meters that show different readings each. Why?

Check if your units have been recently calibrated from an ISO 17025 or ISO 10012 calibration lab or equivalent, with Scope of UV and White Light measurements. An ISO 17025 calibration lab is not qualified to calibrate everything. Check if the UV sensor diameter is greater than 0.5 inches (12.7 mm). This might explain the extra error. The UV sensor diameter should not be greater than 0.5 inches (12.7 mm). Both requirements are part of the ASTM E3022-25, Section 6.1: *"Ultraviolet radiometers shall be calibrated in accordance with ISO 10012, or ANSI/ISO/IEC 17025, or equivalent. (…) The sensor front end aperture width or diameter shall not be greater than 0.5 in. (12.7 mm)."* Further, look and differences in the spectral response function. Large differences can lead to different readings. The standard reads, Section 6.1: *"UV-A radiometers use a filter and sensor system to produce a bell-shaped (that is, Gaussian) response or top-hat response centered near 365 nm (3650 Å)."*

Why do my old analog meters not measure the same for a UV-A LED light versus a Xenon UV-A light?

The answer is simple. Xenon UV-A lights emit a lot of light in wavelengths away from 365 nm and meters are not designed to handle large concentration of light around a specific wavelength. UV-A LED lights emit a lot of light around 365 nm. Irradiance coming out of a UV-A LED lamp is best measured with a digital meter. Digital UV-A radiometers for NDT are made with a filter and a detector. The detector is measuring ALL the light that gets transmitted through the filter, typically around the 365 nm area.

Are there any safety concerns from the use of UV-A LED lights?

UV-A lights can be harmful to the eyes and skin and protection should be proportionate to the associated risk, as NOT all UV lights are the same. Injuries and blindness can be the result of exposure to ultraviolet (UV). Lights sold in Canada, the European Union, and some Asian countries are required to be tested to the IEC 62471 standard. The equivalent standard in the United States is ANSI/IESNA RP-

27. These two standards are similar in context and provide guidance for evaluating the photobiological safety of lamps. Specifically, they define exposure limits, reference measurement techniques and the classification scheme for the evaluation and control of photobiological hazards from sources of optical radiation, including LEDs, in the wavelength range from 200 nm through 3000 nm. Any UV-A LED manufacturer that claims the CE mark should have these tests taken.

However, UV-A lamps can be considered fairly safe when compared to UV-B or UV-C lamps. A lamp that emits 4 000 µW/cm² UV-A LED light around 365 nm typically has a daily maximum exposure time to the skin of about 100 min (the value can change from country to country and from skin type to skin type) – which is longer than the recommended light exposure to UV radiation from the sun. The same intensity from a 280 nm lamp would result in a daily maximum exposure time of 1 s. That being said, careful operation is always valuable and proper safety precautions are a must when working with UV-A light, especially when working a whole shift.