



UNDERWATER
LOCATING
DEVICES

GREEN90

Ninety days of locating power.
Zero transport restrictions.



GREEN90 has TSO/ETSO approval and is not subject to FAA SC3 and SC5, EASA CRI, RTCA-DO227A, TSO-C142b.



Lithium-free and powerful

The name says it all: With the GREEN90, Novega has developed an Underwater Locator Beacon (ULB), also called an Underwater Locating Device (ULD), whose battery meets the 90-day requirement of TSO-C121b and does not contain any lithium.



Hermetically sealed housing

Novega has equipped the GREEN90 with an alkaline-based battery that provides the necessary operating power for more than 90 days, even under extreme conditions. Absolutely reliable and safe – embedded in a hermetically sealed, highly robust housing.



Risk-free and uncomplicated

The strict guidelines for the installation and transport of lithium batteries are irrelevant for airlines using the GREEN90. They benefit from a greatly reduced handling effort – compared to the use of lithium ULBs.



Quickly certified

Aircraft manufacturers must pass stringent approval tests and obtain certificates for the installation of ULBs with lithium batteries. The requirements are defined in the 8 SCs (Special Conditions) agreed by the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA).

For example, fire and fire hazards are tested, as well as the risks of leaking harmful gases. The GREEN90 eliminates these tests. Certification is granted much faster.



RoHS and REACH compliant

The GREEN90 meets the conformity of Directive 2011/65/EU and 2015/863/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.



Cut costs – raise value

Time is money – and with the GREEN90 you save money right from the start. The reason? High test and certification hurdles are not only time-consuming, but also involve a lot of effort and high costs. These hurdles do not apply to the GREEN90 – not even when shipping spare parts by air freight. This makes many things easier.



Classic in design

The design and geometry of the GREEN90 are exactly the same as those of classic lithium ULBs. Your advantage: Conversion to the GREEN90 is possible immediately and without any conversion measures for mounting on Flight Data Recorders and Cockpit Voice Recorders.

The innovative lithium-free ULB.

General structure

The GREEN90 from Novega is a battery-operated Underwater Locator Beacon (ULB). It consists of three main technical components:

- Electronic module for the automatic control of the system
 - Signal transmitter for emitting an acoustic signal
 - Lithium free battery for power supply
- The inner workings of the GREEN90 are protected by an extremely robust, cylindrical housing.

How it works

The GREEN90 activates automatically as soon as both contacts on the opposite sides of the cylindrical housing are immersed in salt or fresh water. From this moment on, the GREEN90 emits a defined acoustic signal at 37.5 kHz for at least 90 days.

Mounting types

The GREEN90 is mounted to the intended location using a suitable bracket. Most common are top or tunnel mount brackets. The GREEN90 will fit in all new and legacy mounting brackets for 90 days beacons.

Technical design in a nutshell.



The GREEN90

- The GREEN90 will fit in all new and legacy mounting brackets for 90 days beacons
- Transmits an acoustic signal at 37.5 kHz for at least 90 days
- Withstands extreme temperature and environmental conditions
- Resists high g-forces and a deep sea pressure of up to -6096 meter (20,000 ft)
- Is water- and weatherproof as well as corrosion-resistant

All tests passed.

Condensation	Temperature Storage	Temperature Variation	Vibration	Magnetic Effect	Sand and Dust	Salt Spray (Salt Fog)	Fungus Resistance
Altitude, Decompression and Overpressure	Fluid Immersion	Induced Signal	Susceptibility	Performance Verification	Salt Water Immersion	Impact Shock	Impact
				Static Crush	Pressure		

> The GREEN90 has successfully passed all tests.

Minimum performance standards:



Dimensions Installation/Overall

Installation Length	3.845 inches (98 mm)
Overall Length	3.920 inches (100 mm)
Diameter	1.300 inches (33mm)
Weight	6.84 oz (194 g)

Battery Details

Housing/Design	C-cell
Chemistry	Zn-MnO2 (Alkaline)
Electrical Voltage	3.0 Volt nom.

Acoustic Outputs on Activation

Actuation	Fresh- and salt water at all depth	SAE AS8045A § 4.1
	from 0.15 m (0.5 ft)	
	to 6096 m (20 000 ft) within 4 h	
Acoustic Output		
- initial	min. 160.5 dB vs 1 µPa at 1 metre (106 N/m)	
- after 90 days	min. 157 dB vs 1 µPa at 1 metre (70 N/m)	

Operating Details

Operating Depth	Surface to 6096 m (20 000 ft)	SAE AS8045A § 4.2
Temperature Range		SAE AS8045A § 4.4
- Operating/Transport	-55°C (-67°F) to +85°C (185°F)	SAE AS8045A § 4.5
- Operating Temperature	-2°C (+28°F) to +38°C (+100°F)	SAE AS8045A § 4.6
Operating Frequency	37.5 ± 1 kHz	
Pulse Length	9.0 ms minimum	SAE AS8045A § 4.3
Repetition Rate	0.9 pulse/s minimum	SAE AS8045A § 4.7
Pulse Repetition Rate	0.9 pulse/s	SAE AS8045A § 4.8.1
Radiation Pattern	min. 80% of a spherical pattern	
Operating Life	90 days minimum	
Initial Operation	106 N/m ² (1060 dyne/cm ²) r.m.s.	
	pressure normalized to 1 metre range,	
	that is, at a level of 160.5 dB	
	vs 1 µPa at 1 metre	
Continuous Operation		
- Immediately after 90	70 N/m ² (700 dyne/cm ²) r.m.s.	
days	pressure normalized at 1 metre range,	
	that is, at a level of 157 dB	
	vs 1 µPa at 1 metre	

Lithium-free locating power.

Everything you need. Safe and simple.



PRESSURE DISPENSE CLAMP
Facilitates opening of the ULB



SOCKET WRENCH
For a safe opening and closing of the ULB



DC-METER
Facilitates the measurement of the ULB sleep mode current during battery replacement



BATTERY REPLACEMENT KIT
Battery plus greased O-Ring for GREEN90



TUNNEL MOUNT BRACKET
1:1 replaceable with existing designs



TOP MOUNT BRACKET
Where top installation/removal is required

No lithium, no restrictions

The battery in the GREEN90 is classified as a dry cell.

The advantage:

There are no transport restrictions for the lithium-free battery even in the USA. When transporting lithium-containing cells, on the other hand, countless regulations must be observed. With the GREEN90 you no longer have to worry about the rules of the following institutions for the transport of lithium cells:

- > US Department of Transportation (DOT)
- > International Civil Aviation Administration (ICAO)
- > International Air Transport Association (IATA)
- > International Maritime Organization (IMO)
- > Accord Européen Relatif au Transport International des Marchandises Dangereuses par Route (ADR)
- > Regulations concerning international transport ferroviaire de marchandises Dangereuses (RID)

The Green90 Battery

The alkaline manganese cell in GREEN90 is as reliable in performance as any lithium cell. It convinces with its enormous safety advantages of this type of battery.

The result

- > Safe for normal use
- > Housing 100 percent leak-proof
- > High drain and impulse capability
- > Ready for operation in a temperature range from -55°C to +85°C (-67°F to 185°F)
- > Shelf life is 8 years

Answers to the frequently asked questions about the GREEN90.

Why not use lithium batteries?

The problem is thermal runaway. FAA and EASA therefore set new conditions for ULBs. Novega fulfilled these conditions with the GREEN90 and created additional benefits for the customers in comparison to lithium battery beacons.

Does alkaline batteries bring cost advantages?

Definitely, because the efforts for obtaining transport permissions, dangerous goods surcharges, additional insurances and complex shipping instructions are completely eliminated.

Why alkaline, of all things?

Novega has tested all conceivable alternatives. Alkaline leads in 5 central points:

- 1. Certifications:**
FAA and EASA special conditions do not apply
- 2. Safety and handling:**
Non-hazardous, non-combustible, no explosion hazard
- 3. Thermal outliers:**
There are no thermal runaway conditions
- 4. Transport:**
No transport restrictions
- 5. Shelf life:**
8 years

Do high temperatures or temperature variations change the ULB lifetime?

No. If the alkaline battery is operated in the intended temperature range, the chemistry does not change. The thermocycling test for a full life cycle showed that temperature variations do not alter the internal resistance, battery voltage and functionality of the cell.

According to which criteria did Novega test?

To select the alkaline cell for the GREEN90, we tested a wide range of high performance cells from various manufacturers. All products were of industrial quality. The selected alkaline cell has the best performance with excellent properties in terms of voltage stability, vibration and shock resistance, temperature stability and power density.

Can the alkaline battery leak?

Alkaline batteries tend to leak at low pressure, in uncontrolled environments and when discharged. Novega constructively excludes these conditions:

- 1. The cell is hermetically sealed.**
This prevents a drop in pressure and pressure fluctuations.
- 2. Due to the high energy density** and a shelf life of 8 years, a low-voltage operating condition is virtually impossible.
- 3. Several insulation layers** guarantee a hermetically sealed housing and reliably prevent cell leaks.

Does the alkaline ULB from Novega have an approval?

Novega's GREEN90 is tested to the latest ETSO-C121b and has been fully approved since February 2019.

Top quality and service.

Novega's quality is not created by chance, but is the result of a systematic and consistently implemented quality process. In this way, we comply with the highest global standards set by maritime and aviation safety authorities, as documented by numerous certificates, as well as regular quality and safety audits. In addition, we offer you a service that truly deserves this name – without any ifs and buts, including personal availability and proximity.



Following the commands, each acoustic beacon is programmed and tested individually. Accuracy and calibration – a must to meet the requirements.



Novega stands for excellent quality. We achieve this with qualified staff and reliable manufacturing processes as well as systematic monitoring.



Up-to-date – Novega's in-house testing capabilities for temperature, pressure, corrosion, vibration, shock and many more.



An automated production line with a series of linked workstations – efficient manufacturing and a stable process.

Certification standards.

EN 9100

Sales, marketing, development, production and maintenance of aviation and maritime products:

- Low-Frequency Underwater Locator Beacons
- Underwater Locator Beacon 90 days for Flight Data and Cockpit Voice Recorders
- Accessories for maintenance and repair of Underwater Locator Beacons



EASA Part 145

Maintenance of components other than complete engines or APUs, Rating C6 Equipment:

- Emergency Locator Beacon



EASA Part 21G

Production of C1/C2 Appliances/Parts:

- Underwater Locator Beacon (ETSO in conjunction with ATA 2560)



EASA Part 21J

EASA authorized Alternative Procedures to Design Organisation Approval:

- ETSO-C121 (Underwater Locating Device)
- ETSO-C200 (Low-Frequency Underwater Locating Device)
- ETSO C142 (Non-Rechargeable Lithium Cells and Batteries)





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