

Arctic Proven Performance

ELLED™ Driverless LED in Extreme Conditions



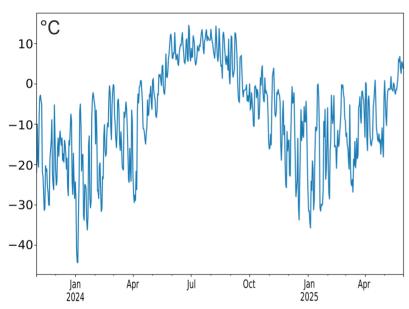
Extreme Reliability in Arctic

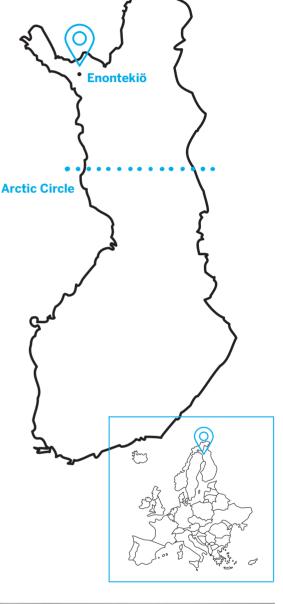
Environments

The ELLEGO™ AGL system, based on ELLED™ Driverless LED technology, has been successfully tested in a real arctic operating environment at Enontekiö Arctic Airport in Finland.

The purpose of the continuing test is to validate the solution's reliability in harsh weather conditions including snow, frost, rime, and extremely low temperatures.

Enontekiö Arctic Airport Temperatures





Test site: Enontekiö Arctic Airport (ENF, EFET)

Test started: November 2023

Status: Ongoing







Low-intensity operational installation

- Apron, taxiway, guidance signs, turnpad and low intensity approach lights
- Retrofitted with 77 ELLED™ bulbs (ELLEDPKM6V4)
- Part of the airport's operational AGL installation

High-intensity test installation

- Runway edge and high-intensity approach lights
- ELLED™ high-intensity bulbs (ELLEDPKDHI12V4)
- Independently controlled test setup emphasizing extreme use scenarios



Test Results: No Failures, No Interruptions

After two winters of testing, both installations have performed flawlessly with no faults or malfunctions. The residual heat from the LED bulbs has proven to be sufficient to keep fixture lenses free from frost and snow during typical operations. In extreme weather, slightly extended preheating periods before use have ensured proper defrosting.



The ELLED™ Driverless LED solution is proven to be both reliable and energy-efficient under extreme cold weather conditions. This arctic performance testing strongly supports the use of ELLED™ technology especially in northern airports, where minimal maintenance, energy savings, and preventing ice formation are mission-critical.



ELLED™ Driverless LED technology offers advantages in icy conditions compared to halogen lamps.

- Cooler fixture operation prevents heatinduced ice formation
- Easier to clear manually when necessary
- ELLED power sufficient for defrosting in cold

The cooler operating temperature of ELLED™ LED based fixtures results in more reliable visibility and easier maintenance in arctic environments compared to traditional halogen systems.

ELLED™ LED Arctic Readiness Confirmed





Driverless LED for AGL – Arctic performance test report

January 2025

To whom it may concern,

The ELLEGO AGL solution has been tested at the Enontekiö Arctic Airport (IATA: ENF, ICAO: EFET) in collaboration between the Airport and ELLEGO Powertec Oy.

Test description

The purpose of the test is to confirm the operation of a bulb based driverless LED solution for AGL in an authentic arctic environment. Of special interest is the real world performance of the low current LED AGL solution in an environment highly susceptible to snow, frost, rime, and exceptionally cold weather.

The test was initiated in November 2023 and will be continued for an unspecified time.

The test includes two separate installations:

- An operational low intensity installation consisting of taxiway edge and apron lighting, a low intensity approach lighting setup, and turn pad lights. This installation included altogether 77 ELLED bulbs (ELLEDPKM6V4) installed into various existing AGL fixtures.
- A separate test installation of high intensity lights consisting of 4 runway edge and two high intensity approach light fixtures. The fixtures represent various models and were all equipped with high intensity LED bulbs (ELLEDPKDHI12V4).

Both installations are low current AGL solutions with maximum primary currents of 1.5 Arms for the low intensity installation and 3.0 Arms for the high intensity installation. The operational low intensity installation is operated according to airport's normal AGL operation. The separate test installation is controlled independently according to the test plan, which aimed for emphasizing worst case scenarios.

The results after one year of testing:

Both test installations have provided similar results and have performed according to expectations without failures or errors. The residual heat from the LED bulbs has proven to be adequate for keeping the fixture optics clear from ice and snow with normal operational use in most instances, and with possibly slightly increased on-times before operational use in exceptional conditions.

Further observations include improved functionality compared to filament bulb based fixtures due to LED's much lower ice-forming properties. An LED bulb based fixture will remain cooler and therefore avoid many of the ice formation issues experienced with filament bulb based (halogen) fixtures.

In condition where the residual heat is not adequate for fully defrosting the fixture, the cooler LED-based fixture has been found to be easier to manually clear compared to filament based fixtures, which are prone to excess heat based ice formation.

Jussi Sorsa

CEO, Chief of the Arctic Airport





