ParagonLED

TTL Touch the Limit

Lighting Product Family for Extreme Environments



ParagonLED ACCOB LIGHT ENGINE

Shared technology core

TTL-XT	TTL-HZ	TTL-RH
		
Extreme Temperature Industrial Lighting	**High Temperature Hazardous Location Lighting**	**Radiation Hardened Lighting**

One light engine platform extending to three extreme applications

Extreme Temperature | Hazardous Locations | Radiation Environments

ParagonLED Three Extreme Environment Lighting Platforms

Shared core: ACCOB Driver-on-Board | Wide temperature operation | Zero inrush | High surge protection | Modular maintenance

TTL-XT

Extreme Temperature Industrial Lighting



Technical highlights

• -80°C to +115°C; selected models up to +125°C
• IP66 / IP68
• 120-600 VAC | 250 VDC

Main applications

Paper mills | Steel mills | Glass furnaces | Incinerators | Cold storage | Boiler rooms

Extreme environments in ordinary locations

TTL-RH

Radiation Hardened Nuclear Lighting



Technical highlights

• Gamma: 1,000 kGy
• Fast neutron: 4.46 × 10^{14} n/cm^2
• Quartz glass | Cobalt-free

Main applications

Hot cells | Nuclear waste treatment | Nuclear medicine | Accelerators | Gamma sterilization

Long-term reliable lighting in high-radiation environments

TTL-HZ

High Temperature Hazardous Location Lighting



Technical highlights

• C1D2 | C2 | C3
• High ambient temperature × T-Code
• >20 kV surge protection
• Multi-brand mounting hood retrofit

Main applications

Refineries | Petrochemical plants | Natural gas | LNG | Offshore platforms | Combustible dust areas

Hazardous locations × High temperature × Retrofit

Product selection by site risk

Extreme heat or cold? → TTL-XT Gamma or neutrons? → TTL-RH Flammable gas or dust? → TTL-HZ

The key to product selection is site risk, not wattage.

TTL XT Ecosystem

The complete value network for lighting in high temperature and harsh environments

APPLICATIONS Paper mills | Steel mills | Cement plants | Power plants | Petrochemical plants | Ports and shipyards

The optimal solution for environments with high temperatures, high humidity, heavy dust, strong vibration and difficult maintenance access.

TTL-XT • Exceptional reliability • Ultra-long life • Lowest TCO

High temperature resistance: up to 85°C | Ultra-reliable: 5-year warranty | Low maintenance: maintenance-free for 5 years | Low TCO: lowest total cost

Upstream Suppliers	Core Technologies	Value Delivery	Customers and Stakeholders
LED chip partners High-reliability, long-life LEDs **Driver power supply partners** High-temperature and surge-resistant design **Thermal structure partners** Efficient heat dissipation and corrosion resistance **Sealing and materials partners** IP66/67/69K and chemical resistance **Component partners** Power cables, connectors, brackets and other parts	**High temperature thermal design** Patented heat dissipation structure; effective temperature control **High reliability design** Surge and vibration resistance; long-life components **Harsh environment protection** IP66/67/69K; corrosion and dust resistance **Long-life driver technology** High efficiency; low lumen depreciation; stable long-term output	**Exceptional reliability** 5-year warranty; stable, uninterrupted operation **Lowest TCO** Less maintenance and downtime; lowest total cost **Greater safety** Reduced work-at-height and maintenance risks **Greater sustainability** Energy savings and carbon reduction; extended product life cycle	**Plant operations teams** Lower downtime risk; more stable production **Maintenance teams** Fewer maintenance interventions; lower operational risk **Procurement and finance teams** Lower total cost of ownership (TCO) **EHS teams** Improved workplace safety **Management** Higher asset reliability; sustainable operations

Enablement Ecosystem

R&D and testing partners: Laboratories and certification bodies; joint development and validation. • Certification and standards: UL / CE / IEC / RoHS; compliance with international standards.

Logistics and supply chain partners: Global supply, rapid delivery and localized service. • System integration and installation partners: Professional installation and on-site support to ensure optimal performance. • Channel and distributor partners: Market promotion and local service to expand market coverage.

Overall Impact

Increase productivity: reduce downtime losses. • Reduce operating costs: lowest TCO. • Improve safety: reduce maintenance risks. • Extend asset life: stable and reliable operation. • Achieve sustainable development: energy savings, carbon reduction and ESG.

Our mission: Provide the most reliable light in the harshest environments, keeping industry running and creating value.

TTL HZ High Temperature Hazardous Location Lighting

Focused on environments above 65°C

From the mainstream temperature market to high temperature application needs

Mainstream Explosion Protected Lighting	TTL-HZ High Temperature Market Positioning
Most common models **≤65°C** Comparison based on the major products reviewed  **Ambient temperature Ta: 65°C**	**>65°C** **Product development and certification targets** **85°C | 105°C**  **High temperature reliability** **Retain the existing mounting hood** **Reduce maintenance and downtime burden**

At the same Ta, confirm the classification, T-code and complete installation assembly together.

Market-positioning illustration, not market-share statistics. Some competing products already offer 70-75°C or higher temperature ratings.

Actual TTL-HZ Ta, T-code and certification scope are subject to the final approved models and documentation.

TTL RH Radiation Hardened Lighting

Purpose-built for harsh radiation environments

Supporting critical operations in nuclear power, research, nuclear medicine and industrial irradiation

Nuclear Power Plants and the Nuclear Fuel Cycle



Radiation work areas | Nuclear fuel handling | Inspection and maintenance

Hot Cells and Remote Operations



Shielded hot cells | Manipulator arms | Remote observation and inspection

Industrial Irradiation and Polymer Processing



Cobalt-60 irradiation | Polymer crosslinking | Material modification and sterilization
Electron-beam facilities are evaluated according to the installation area.

Research Laboratories and Accelerators



Irradiation experiments | Particle accelerators | Research facilities

Nuclear Medicine and Radiopharmaceuticals



Isotope handling | Production hot cells | Process inspection

Waste Treatment and Nuclear Decommissioning



Handling and treatment | Interim storage facilities | Decommissioning operations

Configured for your application conditions

Cumulative dose • Dose rate • Radiation type • Operating temperature • Installation conditions • Maintenance requirements