1.0 Mechanical Characteristics:

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
1.1	**Stainless Steel Body AISI 316 Grade**	The luminaire's body is constructed from corrosion-resistant stainless steel. AISI 316 SS Grade offer the best corrosion resistance in harsh environments.	Ensures the fixture's durability and longevity in challenging outdoor environments, including exposure to rain, pollutants, and salt spray, which are common near airports. Critical for coastal airports.	The fixture may corrode quickly in harsh environments, leading to structural failure, increased maintenance, and higher costs. In some cases, luminaires can fall from the masts due to corrosion, causing a serious health and safety issue.	Supplier declaration
1.2	**Minimum IP66 Protection**	IP66 provides complete protection against dust ingress and high-pressure water jets from any direction, ensuring a sealed enclosure for optical and electrical components.	Prevents damage from weather elements like heavy rain and dust storms, ensuring reliability in outdoor, high-mast applications where maintenance is difficult.	Dust and water ingress can damage electrical components, causing failure, reduced lifespan, and frequent maintenance or replacements. Lower IP ratings can make the luminaire susceptible to damage.	Independent lab test report
1.3	**Anti-Yellowing, Weather-Resistant Polycarbonate Optics**	Secondary optics made of durable polycarbonate resist UV degradation and yellowing caused by prolonged sunlight exposure.	Ensures consistent and high-quality light output over the fixture's lifetime, which is critical for maintaining compliance on aprons.	Optics may yellow over time, reducing light output and visibility, compromising safety and requiring costly replacements.	Lens material data sheet
1.4a	**Maximum Dimensions - Head (600 x 300 x 200 mm)**	Specifies the maximum size of the luminaire head to ensure compatibility with mast-mounted systems and maintain compactness for optimized performance.	Ensures compatibility with standard high-mast configurations while maintaining aerodynamic stability and minimizing wind load. Foe new masts, costs are lower. More compatibility during retrofit.	Oversized fixtures may exceed wind load tolerances, risking structural instability of the masts and failure during strong winds and over time. Retrofit may not be possible.	Luminaire data sheet

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
1.4b	**Maximum Dimensions - Driver (450 x 200 x 100 mm)**	Defines the maximum size of the remote driver to ensure it can be conveniently mounted either on the bracket or in an electrical panel.	Facilitates proper integration into varied installation scenarios, ensuring operational flexibility and compatibility with space-constrained electrical setups.	Oversized drivers may cause space limitations in electrical panels or mast brackets, complicating installation and maintenance.	Driver data sheet
1.5a	**Maximum Weight of Head -15kg**	Limits the total weight of the luminaire for ease of handling and secure mounting on masts.	Lightweight design reduces the load on high-mast structures, which is critical for structural stability. Critical for retrofit, especially in cases when lux levels are increased.	Excessively heavy fixtures may compromise mast stability to failure, increase wind loads, and make installation and maintenance more challenging and costly.	Driver data sheet
1.5b	**Maximum Weight of Driver - 6kg**	Limits the total weight of the Driver for ease of handling and secure mounting on masts.	Lightweight design reduces the load on high-mast structures, which is critical for structural stability. Critical for retrofit, especially in cases when lux levels are increased.	Excessive weight of the driver may compromise mast stability, increase wind load effects, and create difficulties during installation or servicing.	Driver data sheet
1.6	**IK09 Protection**	Ensures the luminaire body can withstand mechanical impacts of up to 10 Nm without damage.	Prevents damage from accidental impacts during installation, maintenance, or debris strikes.	Fixtures may break or be damaged by debris, leading to failures, safety risks, and increased replacement costs.	Independent lab test report

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
1.7	**Tempered Glass Screen Enclosure**	A robust, shatter-resistant tempered glass protects internal components while allowing optimal light transmission.	Provides a strong barrier against environmental hazards like hail, stones, or debris from aircraft operations. Critical in high dust or sandy environments.	The glass may shatter under impact, exposing internal components to damage and increasing safety risks. Dust or sand can create a barrier on the lenses without a glass cover.	Luminaire data sheet
1.8	**Remote Driver with Flexibility to Attach to the Bracket**	The driver is separate from the luminaire but designed for optional mounting on the bracket or at the base of the mast for flexible installation. In cases where the mast is raised and lowered, it may be preferable to install the driver on the top of the mast. Conversely, for fixed masts, installing the driver in an electrical panel at the bottom might be more practical. Airports often have specific preferences, and both options should be available.	Lightweight design reduces the load on high-mast structures, which is critical for structural stability. Critical for retrofit, especially in cases when lux levels are increased.	Excessively heavy fixtures may compromise mast stability to failure, increase wind loads, and make installation and maintenance more challenging and costly.	Driver data sheet
1.9	**IEC 60068-2-52 Environmental Testing (Salt Mist)**	Compliance with the Salt Mist (Test Kb) standard ensures resistance to corrosion caused by exposure to sodium chloride environments, such as coastal or humid regions.	Essential for airport applications in regions prone to salt-laden air, preventing early corrosion and extending the lifespan of the luminaire.	Fixtures may corrode quickly in coastal or humid environments, leading to premature failure and increased maintenance or replacement costs.	Independent lab test report
1.1	**Individually replaceable components**	All main working parts of the luminaires must be replaceable on site, without removing the fixture form its installation position. This includes the AC/DC Driver and the LED Engine	Allows for on site maintenance and repair, resulting in low downtime in case of failures.	Fixtures which do not allow on-site repair must be swapped as a whole and result in waiting time for replacements or expensive/large spare stock for the customer.	Supplier declaration

2.0 Lighting Characteristics:

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
2.1	**Minimum Efficiency of 140 lm/W (LM79 certificate) ** For 3000K; 125lm/W**	High luminous efficacy ensures the luminaire delivers more light output per watt consumed, verified by LM79 testing, which evaluates the fixture's efficiency after accounting for optical losses.	Reduces energy consumption, which is critical for airport operations due to large-scale lighting needs. Fewer luminaires required for the same tasks.	Inefficient luminaires will increase operational costs and fail to meet energy efficiency standards, reducing sustainability. More luminaires will be required for the task, increasing capital cost.	LM79 certificate
2.2	**Minimum Net Lumen Output of 120,000 lm **For 3000K: 105,000lm**	Ensures sufficient light levels for high-mast applications by delivering a powerful and consistent light output, meeting operational and safety requirements.	Provides adequate illumination for critical tasks, enhances visibility for ground crew and pilots, and ensures compliance with international airport lighting standards.	Lighting levels may fall below regulatory requirements, causing safety risks, decreased operational efficiency, and potential non-compliance with airport standards	Test report from inde-pendent lab according to LM79 or EN13201
2.3	**Minimum Power of 850W**	Ensures adequate brightness and reliable performance, especially for large-scale applications requiring consistent and uniform light distribution.	Enables luminaires to deliver the necessary lighting output for expansive areas, maintaining uniformity and visibility critical for operational safety.	Luminaires may fail to meet the required light levels, leading to poor visibility, increased downtime, and possible accidents.	Test report from independent lab according to LM79 or EN13201
2.4	**ULR (Upward Light Ratio) Less than 5%**	Limits the proportion of light emitted upward to 5% or less, minimizing light pollution, glare, and ensuring compliance with dark sky recommendations. Ensures more light is directed to the target area, improving overall system efficiency. Typically achieved with asymmetric optics and symmetric optics are avoided."	Reduces glare for pilots and ground staff, improves visibility, ensures compliance with environmental standards and dark sky initiatives, and increases lighting efficiency by minimizing wasted upward light.	Excessive upward light contributes to glare, distracts pilots, increases light pollution, and wastes energy by reducing the proportion of light directed to operationally critical areas.	Lighting design eg Dialux, relux report

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
2.5	**Colour Temperature of 5000K**	Produces neutral white light that closely resembles daylight, providing balanced visibility and enhanced perception of detail.	Ensures optimal visibility for pilots, ground staff, and operational safety.	Incorrect colour temperature may result in low visibility, colour distortion, and reduced safety for personnel and equipment. 4000K is too yellow and 5700K is too blue.	Luminaire data sheet
2.6	**Photobiological Risk Class RG0**	Ensures that the light emitted poses no risk of retinal damage or photobiological hazards to personnel exposed to the luminaire for extended periods.	Protects the health and safety of personnel working near the high-mast lights.	Without this specification, lights may pose risks to personnel's eyes, leading to health issues and potential regulatory non-compliance.	Independent lab test report
2.7	**Colour Rendering Index (CRI) >70**	Measures the accuracy of colour reproduction under the light source, with CRI >70 providing adequate colour differentiation for operational tasks.	Enhances the ability to distinguish markings, uniforms, and equipment for safety and operational efficiency.	Poor colour rendering may result in misidentification of objects and markings, reducing safety and operational precision. Highter CRI increases cost without any additional benefit for this application.	Luminaire data sheet
2.8	**Lumen Depreciation L90 > 90,000h**	Indicates that the luminaire maintains at least 90% of its initial light output after 90,000 hours of operation.	Reduces maintenance costs and ensures long-term consistent lighting for safe operations. Demonstrates the use of high quality components and a well built system.	Luminaires with lower lumen maintenance will dim over time, requiring frequent replacements and compromising visibility.	LM80 and TM21 reports

3.0 Electrical Characteristics:

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
3.1	**Operational Voltage: 200-480V AC**	The luminaire supports a wide range of input voltages to accommodate different electrical systems.	Ensures compatibility with diverse power grids worldwide, making the fixture adaptable for international airports.	Incompatible voltages may lead to fixture malfunction, reduced reliability, or failure.	Driver data sheet
3.2	**External, replaceable Type 2 + 3 AC Surge Protection Device (50 kA)**	Provides surge protection for the luminaire against electrical surges caused by lightning strikes or grid disturbances, handling up to 50 kA.	Ensures the luminaire can withstand significant electrical surges, critical in open airport environments prone to lightning.	Without surge protection, fixtures are highly vulnerable to power spikes, leading to potential failures and high maintenance costs.	Surge protection device data sheet
3.3	**Integrated in driver Surge Protection - Minimum: 10kV Line-Earth, 6kV Line-Line**	Guarantees a baseline surge protection level to handle transient voltage spikes.	Protects against common electrical disturbances, reducing the risk of damage to the luminaires and ensuring uninterrupted operation.	Without this level of protection, frequent failures due to electrical surges may occur, increasing maintenance and downtime.	Driver data sheet
3.4	**Smart Driver DALI 2 / D4i Dimming Electronics Included**	Enables dimming and advanced lighting control using the latest DALI-2 standard for IoT (Digital Addressable Lighting Interface).	Allows for energy-efficient lighting management by adjusting light levels as needed and ensures centralized control of airport lighting systems and data collection - energy consumption, temp, out of range working environments. Alarms.	Without dimming capabilities, energy savings and centralized control would be limited, reducing system efficiency. Feedback for diagnostics would be impossible. Future controls cannot be implemented.	Driver data sheet

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
3.5	**Active Power Factor Control (PF) 0.96**	Active power factor control minimizes reactive power, improving energy efficiency and reducing load on the electrical system.	Reduces energy waste, lowers operational costs, and ensures compliance with international energy efficiency standards.	Poor power factor leads to higher energy consumption, inefficiency, and non-compliance with energy standards.	Driver data sheet
3.6	**Total Harmonic Distortion (THD): 10% (200-240V), 20% (277-480V)**	Ensures minimal distortion in the power supply caused by the luminaire.	Reduces interference with airport systems like radar and navigation, ensuring smooth electrical operations and regulatory compliance.	Excessive THD can disrupt sensitive equipment, reduce fixture lifespan, and cause operational inefficiencies.	Driver data sheet
3.7	**Thermal Protection**	The luminaire reduces output current when overheating is detected, protecting components from damage.	Ensures operational safety by preventing thermal damage to the fixture in extreme conditions.	Fixtures may overheat, leading to failures, reduced lifespan, or potential fire hazards.	Driver data sheet
3.8	**Protection Against Short Circuit and Overheating**	Incorporates safeguards to prevent failures caused by electrical faults or excessive heat.	Prevents catastrophic failures, ensures operational continuity, and minimizes safety risks.	Without these protections, the luminaires may fail abruptly, posing risks to operations and safety.	Driver data sheet
3.9	**Ambient Temperature Suitability: -40°C to +50°C**	Designed to operate reliably in extreme temperature ranges, from freezing cold to extreme heat.	Ensures consistent performance in diverse climates, including hot deserts and freezing regions, critical for global airport installations.	Fixtures may fail or degrade quickly in extreme climates, leading to frequent replacements and operational disruptions.	Independent lab test report
3.10	**Protection Against Short Circuit and Overheating**	Demonstrates compliance with European safety standards for luminaires, ensuring that the product is safe and reliable for use.	Provides assurance of quality and safety, meeting regulatory requirements for airport operations in Europe and other regions where CE compliance is mandatory.	Without the CE mark, the luminaire may not meet safety and reliability standards, leading to regulatory non-compliance and increased operational risks.	CE Marking certificate

4.0 Control System Characteristics:tics:

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
4.1	**Each Router Has to Support 64 DALI Devices**	The router must support up to 64 DALI (Digital Addressable Lighting Interface) devices, allowing for centralized control of multiple luminaires.	Enables efficient management of large-scale airport lighting installations with flexibility for individual or grouped control.	Limited router capacity may hinder scalability and make system management inefficient.	Control system data sheet
4.2	**Certified DALI-2**	Certification ensures compliance with the latest DALI standard, enabling interoperability with other DALI-compliant devices and systems.	Ensures seamless integration into existing or future lighting control systems at airports.	Lack of certification may result in compatibility issues with advanced lighting systems.	Control system data sheet
4.3	**Built-in Real-Time Clock**	The luminaire includes an internal clock for accurate scheduling and timing of lighting operations without the need for external synchronization.	Allows precise scheduling for energy savings and operational efficiency.	Without a real-time clock, scheduling would be inaccurate, leading to energy wastage and operational inefficiencies.	Control system data sheet
4.4	**Networked System Using 10/100 Ethernet Connection**	The luminaires can connect via Ethernet to form a scalable control system, enabling centralized or distributed lighting management.	Essential for managing high-mast lighting across large airport aprons. Supports remote monitoring and diagnostics, reducing downtime and enabling proactive maintenance.	Without network capability, the system cannot scale or be monitored remotely, increasing response times for failures and reducing system efficiency.	Control system data sheet

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
4.5	**Provides Local and Central Control**	The system supports both local (manual) and centralized (automated) control of the luminaires.	Offers flexibility for operational teams to manage lighting directly on-site or through a centralized control room, ensuring uninterrupted operations even if network issues arise.	Without dual control options, flexibility is lost, and any network failure could disrupt lighting operations, compromising safety.	Control system data sheet
4.6	**Operation Voltage: 85 VAC – 264 VAC (Absolute)**	Wide operational voltage range ensures the system can function reliably under varying electrical conditions.	Adapts to fluctuations in power supply, critical for maintaining lighting reliability in airports with diverse grid systems or during power instability.	The control system may fail under fluctuating voltage conditions, leading to frequent disruptions and increased maintenance costs.	Control system data sheet
4.7	**Power Circuit Protection: External Protection Max. 6A**	External circuit protection limits the current supplied to the controllers, preventing damage from overcurrent scenarios.	Protects the control system from electrical faults, ensuring long-term reliability and reducing the risk of sudden failures in critical airport environments.	Without circuit protection, the control system is at risk of damage due to overcurrent, leading to failures and costly replacements.	Control system data sheet
4.8	**EMC Emission: complies with EN 55022 Class A**	Ensures the luminaire meets standards for electromagnetic emissions, minimizing interference with nearby electronic devices.	Prevents disruptions to sensitive airport equipment, including radar, navigation systems, and communication devices, ensuring operational safety and compliance with regulatory requirements.	Excessive electromagnetic emissions can disrupt sensitive equipment, leading to operational failures and potential regulatory violations. May be rejected by IT dept or security dept.	Control system data sheet

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
4.9	**EMC Immunity: complies with EN 55024**	Guarantees that the luminaire is resistant to electromagnetic interference from other devices or systems.	Protects lighting operations from being disrupted by surrounding equipment, ensuring reliability and stability in high-activity airport environments.	Without EMC immunity, the control system is more likely to experience operational disruptions, compromising the reliability of the lighting system and airport operations at night.	Control system data sheet
4.1	**Safety: complies with EN 60950**	Compliance with safety standards ensures that the control system is safe to operate under normal and fault conditions.	Provides assurance of operational safety, minimizing risks to personnel and infrastructure.	Non-compliance with safety standards may result in unsafe operations, legal liabilities, and increased risks to personnel and equipment.	Control system data sheet

5.0 Documents Required:

Section	Specification	Detailed Explanation	Importance for High-Mast Airport Applications	What Happens if Not Included	How to Demonstrate Compliance
5.1	**ISO 9001 and ISO 14001 Certification**	ISO 9001 ensures that the manufacturer adheres to international quality management standards. ISO 14001 certifies compliance with environmental management standards.	Demonstrates the manufacturer's commitment to high-quality production and sustainable practices.	Without these certifications, the manufacturer may lack reliability and fail to meet environmental or quality standards.	ISO 9001 and ISO 14001 Certificates (UKAS or equivalent)
5.2	**ENEC & CB Certification**	ENEC (European Norms Electrical Certification) and CB (Certification Body) certifications verify compliance with European and international safety and performance standards for electrical products.	Ensures the luminaires meet stringent safety and performance standards, making them suitable for mission-critical applications like apron floodlighting.	Without these certifications, there is no guarantee of compliance with safety and performance standards.	ENEC & CB Certificates
5.3	**Reference of At Least 5 International Airport Projects (Apron Floodlighting)**	Supplier must demonstrate successful implementation of apron floodlighting systems in at least five international airports worldwide.	Builds trust in the supplier's experience and capability to deliver high-quality lighting solutions.	Airports are unique environments. Lack of references may indicate inexperience or inability to handle large-scale airport lighting projects.	Company aviation project reference list with reference contact details
5.4	**Lighting Calculation for Apron Areas (ICAO Compliance)**	Supplier must provide lighting calculations demonstrating compliance with ICAO Annex 14 recommendation, along with LM-79 reports confirming actual lumen performance.	Ensures that the lighting design meets ICAO requirements for Lux levels (Av) and Uniformity for each aircraft stand. The Lab report confirms that photometric files in the design are actual and not theoretical.	Without these calculations, there is no assurance of compliance with ICAO Annex 14, leading to potential operational and regulatory issues. There is a high risk that floodlighting system will fail to meet required lighting and uniformity levels.	Lighting design software report and LM79 certificates for luminaires used