Topic 1

One-Page Brief — Hidden Risks of LED Lighting in High-Temperature Industrial Facilities

Past: Traditional Light Sources

• Mercury, Metal Halide, HPS (HID)
• Lamp operating temperatures often reached several hundred °C (≈ 600–1000 °F)
• Always hotter than the environment, so no one questioned their ability to withstand heat
👉 High-temperature lighting was never a concern

Present: The LED Era

• LED luminaires have replaced traditional lamps in industrial facilities
• The issue lies in the Driver (power supply):
- Most products are rated for maximum ambient of only 55 °C (≈ 131 °F)
- Actual industrial zones often run at 65–90 °C (≈ 150–195 °F)
- In some process areas, such as steel mill cooling beds or molten metal pouring zones, radiant heat can momentarily approach 200 °C (≈ 392 °F). In paper mill drying sections, sudden bursts of high-temperature steam can also create extreme thermal stress.

Core Conflict

🔺 Traditional sources: “Hotter than the environment → No issue”
🔺 LED drivers: “More heat-sensitive than the environment → A critical weak point”

Consequences

• Rapidly shortened lifespan → frequent failures and higher maintenance costs
• Increased risk of short circuits and fires → electrical fire hazards
• Insurance disputes → Non-compliant use → Claims may be denied
• Safety risks → Violates the intent of NFPA 70 (NEC) and NFPA 101

📌 One-Sentence Summary

In the LED era, for the first time, lighting systems face a systemic conflict where ambient temperatures exceed rated limits.
This is an urgent issue that factories, insurers, and safety managers must confront immediately.