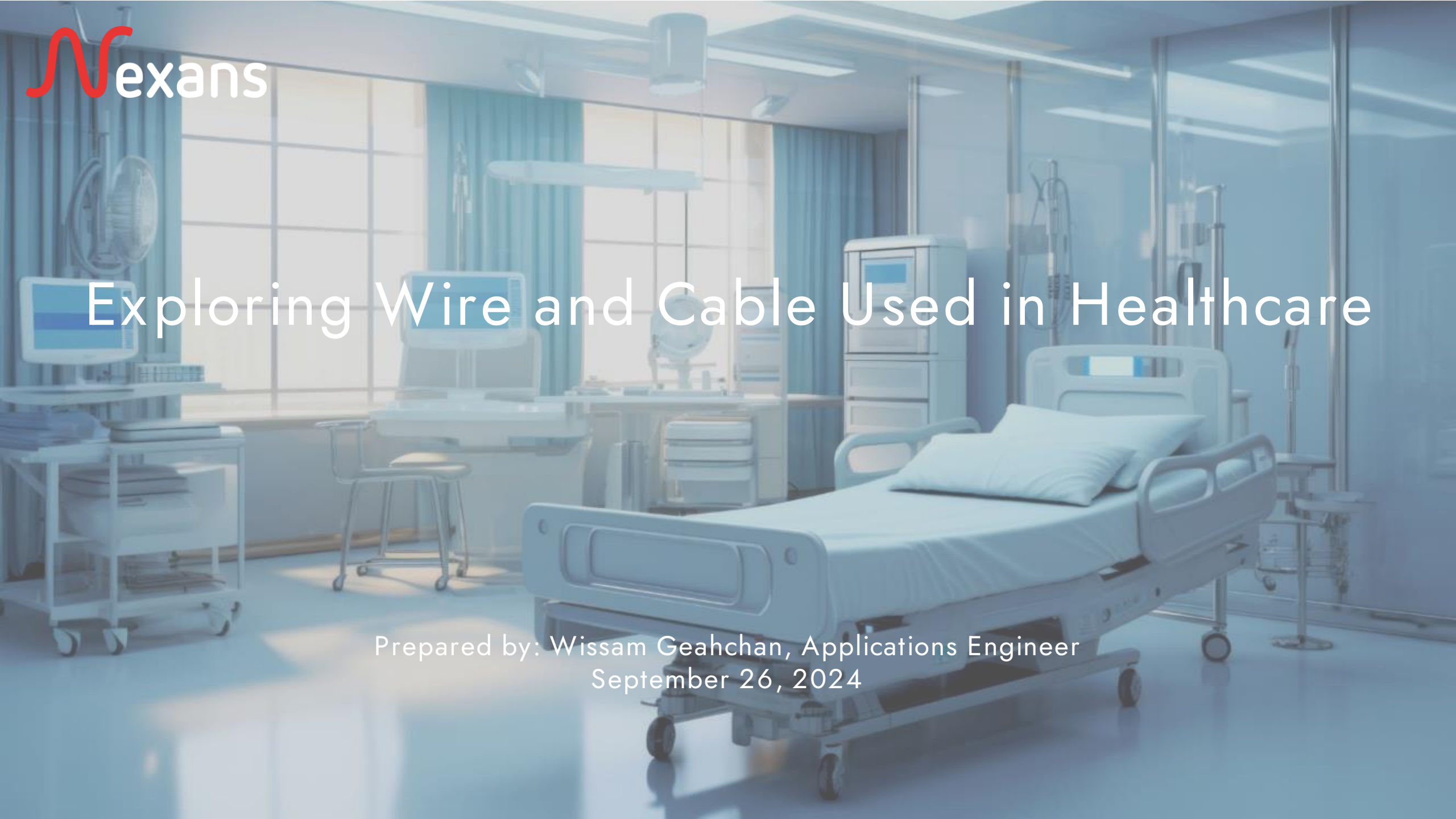


Exploring Wire and Cable Used in Healthcare

Prepared by: Wissam Geahchan, Applications Engineer
September 26, 2024

HOUSEKEEPING

- Questions can be asked at any time using the chat function on the webinar screen
- Any unanswered questions will be followed up through email
- This presentation, a recording of the webinar and a brief survey will be emailed to all registrants

ABOUT MYSELF

Wissam Geahchan
Applications Engineer

- Experience applying the CE Code in a variety of applications
- Active member on several industry standards committees at CSA, UL, and ICEA.
- Licensed soccer coach

Agenda

1 | Brief History

2 | Introduction

3 | Relevant Standards

4 | Different areas in healthcare facilities

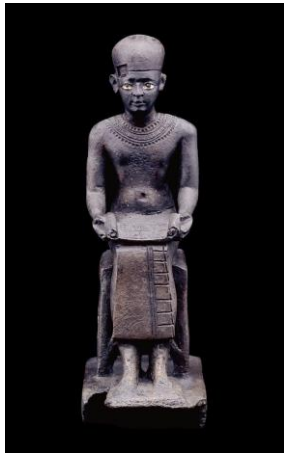
5 | Wiring Requirements

6 | Wiring Products

7 | How Nexans can help

1. BRIEF HISTORY

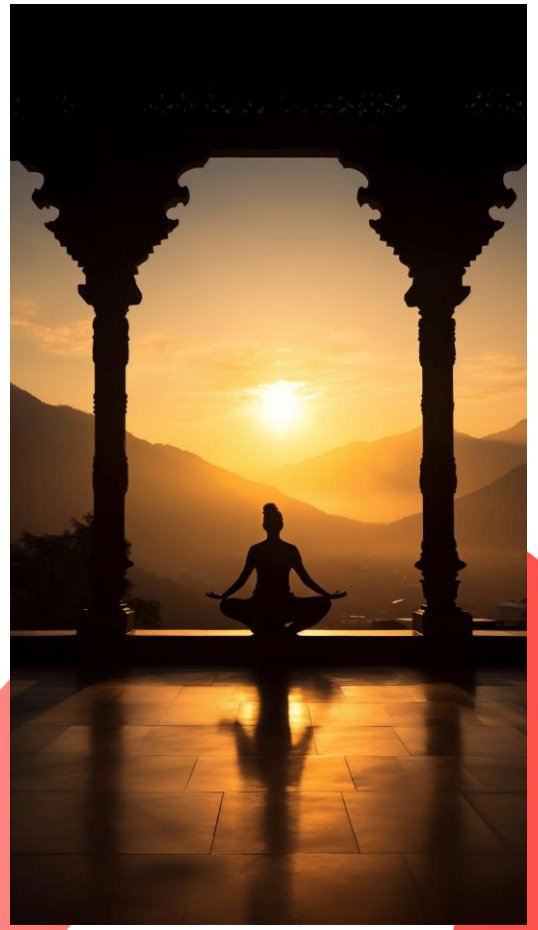
The original facilities for the sick were temples dedicated to “healing gods”. Prayers, sacrifices, and dream interpretations played a big role in healing processes. Ancient physicians also stitched wounds, set broken bones, and used opium for pain.



Imhotep

Asclepius

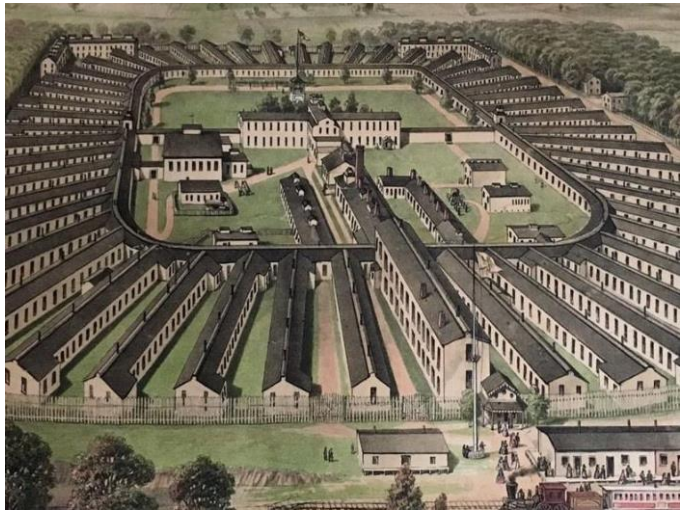
Some researchers believe the earliest dedicated hospitals were in Mesopotamia, while others believe that they were at Buddhist monasteries in India and Sri Lanka.



The Romans provided us with the root of the word “hospital” from the Latin word “hospes” for host and “hospitum”, meaning a place to entertain.

1. BRIEF HISTORY

The ward concept



The pavilion plan

The first North American hospital Hotel-Dieu (House of God) was built in Quebec in 1639 with one 10-bed ward.

2. INTRODUCTION

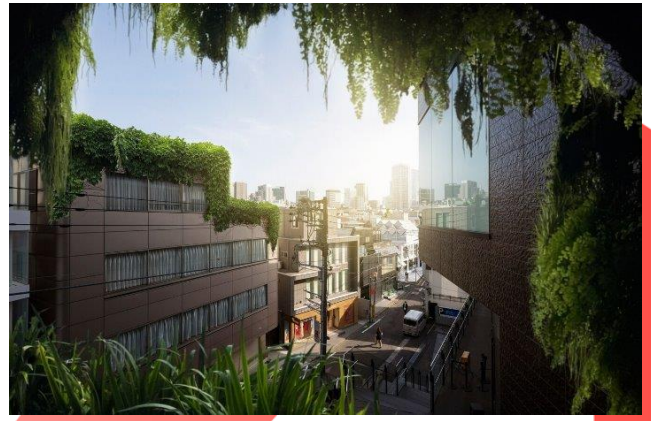
Healthcare environments and design concepts continue to grow in complexity.

Today's ideal hospital design addresses many functions for a variety of users, including patients, families and staff, addressing:

Architecture and Campus Design

Wayfinding

Clinical Environments



Safe and Healthy Building

2. INTRODUCTION

Many new hospitals aim to be LEED-certified and at Nexans, we are doing our part to help.

LEED – Leadership in Energy and Environmental Design

CAGBC | Canada Green Building Council

Location and Transportation

Sustainable sites

Water efficiency

Energy and atmosphere

Nexans' EPDs can help with credits for category*

Materials and Resources

Indoor Environmenetal Quality

Project Priorities and Innovation

Integrative Process, Planning and Assessment

*Click here to watch our Sustainability webinar from Nov 2023 for more information.

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3. RELEVANT STANDARDS THAT GOVERN THE DESIGN OF HEALTHCARE FACILITIES

Canadian Electrical Code, Part 1 (CE Code)

National Building Code of Canada (NBC)

CSA Z32 – Electrical Safety and Essential Electrical Systems in Healthcare Facilities

NFPA 70 National Electrical Code

NFPA 101 Life Safety Code

NFPA 99 Health Care Facilities Code

NFPA 72 National Fire Alarm and Signaling Code

CE Code, Part 1 – HCF Classes

CLASS A

Patients are accommodated based on medical need and are provided continuing medical care and other diagnostic/therapeutic services generally involving an overnight stay.

Ex: acute care hospitals and trauma centers.

CLASS B

Patients cannot function independently and require daily care by a healthcare professional.

Ex: Long-term care and mental health facilities.

CLASS C

Patients are provided with supportive, diagnostic, and treatment services on occasional basis.

Ex: Chemotherapy centers and public health clinics.

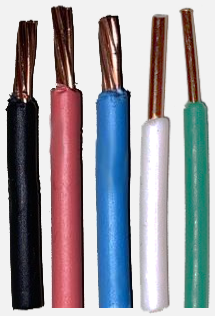
4. ROOMS/AREAS IN A HOSPITAL

Patient Care Rooms

Some electrical design considerations

- Lighting and lighting controls
- Receptacles
- Nurse call
- Fire alarm devices
- Cameras/ Patient Monitoring /Security
- Essential electrical system

NEXANS CABLE OFFERING



RW90

AC90

AC90
ISO-BX

4. ROOMS/AREAS IN A HOSPITAL

Operating Rooms

Some electrical design considerations

- Specialized lighting
- Receptacles
- Isolated power system
- Fire alarm devices
- Essential electrical system

NEXANS CABLE OFFERING

RW90

AC90

AC90
ISO-BX

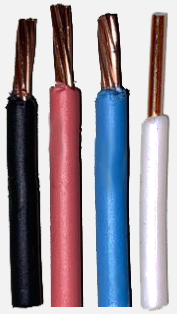
4. ROOMS/AREAS IN A HOSPITAL

Corridors and Nurses' Stations

Some electrical design considerations

- Adequate lighting
- Receptacles
- Data/voice drops
- Security and door hardware
- Nurse call dome lights
- Fire alarm devices
- Paging Speakers

NEXANS CABLE OFFERING



RW90

AC90

ARMOURED POWER CABLES

Special considerations – Patient Care Areas

An area intended primarily for the provision of diagnosis, therapy, or care of patients

BASIC CARE AREA

An area where body contact between a patient and medical electrical equipment is neither frequent nor usual.

Ex: Patient exam room, patient room in long term care facility.

INTERMEDIATE CARE AREA

An area in which body contact between a patient and medical electrical equipment is frequent or normal.

Ex: Areas for non-invasive electrodiagnosis, patient prep areas, dental clinic.

CRITICAL CARE AREA

An area in which cardiac contact between a patient and medical electrical equipment is frequent or normal.

Ex: cardiac care unit, emergency trauma unit, ICU, operating room, burn unit.

GROUNDED SYSTEM *

GROUNDED SYSTEM OR ISOLATED POWER SYSTEM *

NOTE

Circuit conductors shall be copper and > 12 AWG

Additional GREEN bonding conductor required

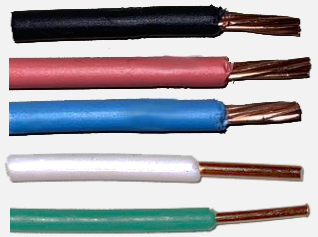
*Refer to CE Code, Part 1 Section 24 for rules.

Special considerations – Grounded vs Isolated Power Systems

GROUNDED SYSTEM

Single-phase

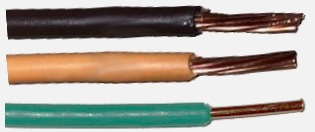
Three-phase



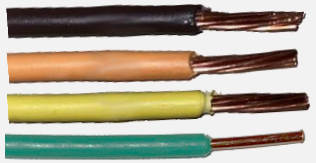
LINE ISOLATION MONITOR

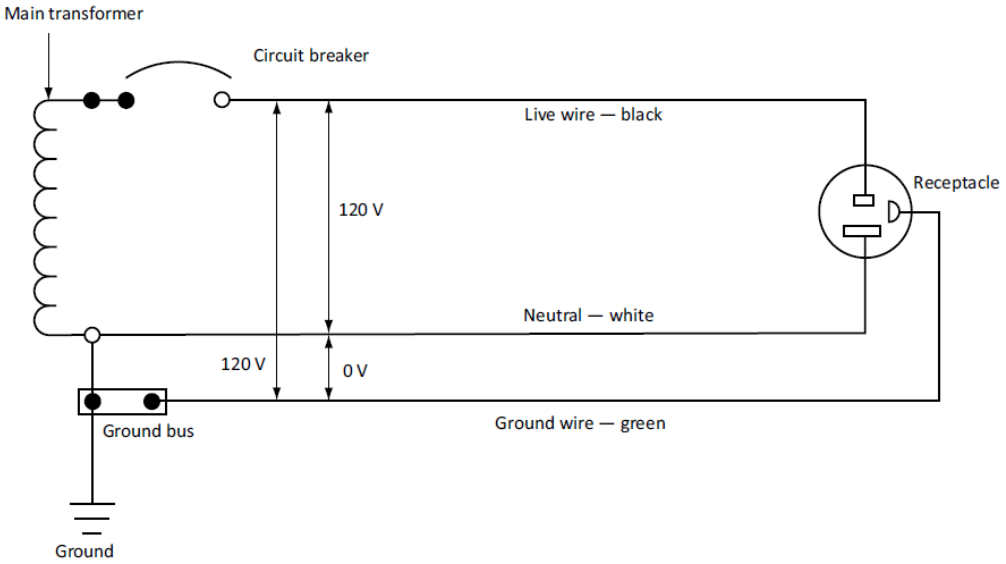
ISOLATED POWER SYSTEM

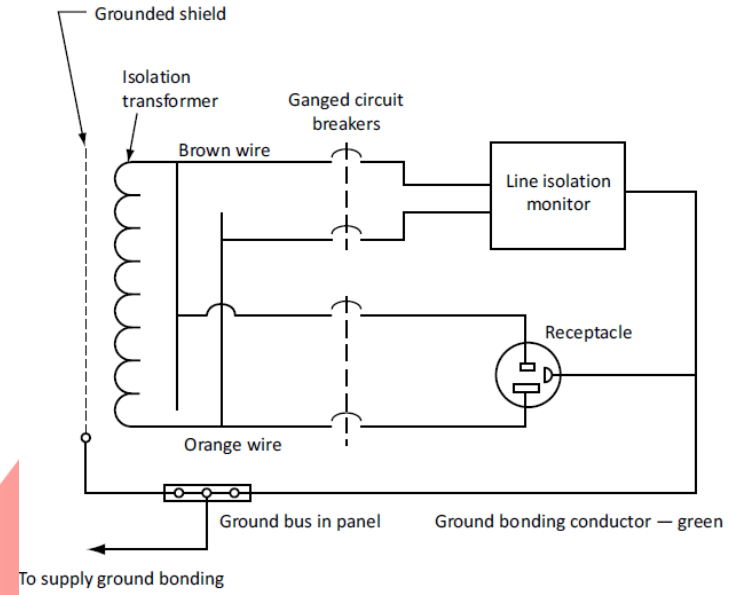
Single-phase



Three-phase







Special considerations – Testing for Building Electrical Systems

Test	Grounded Systems	Isolated Systems	Post-Installation Test	Maintenance Test
Conductor insulation integrity test	✓	☒	✓	☒
Voltage drop test	✓	☒	✓	☒
Branch circuit breakers: mechanical operation	✓	✓	✓	Annually
Receptacle: Retentive force	✓	✓	✓	When receptacles are replaced Basic care: min. every 2 years Interm/critical care: min. annually
Receptacles: Polarity	✓	✓	✓	When receptacles are replaced
Voltage different between ground points	✓	✓	✓	Every 5 years
Ground return path voltage rise for grounded systems	✓	☒	✓	When receptacles are replaced
Impedance to ground: single-phase isolated system	☒	✓	✓	Annually (for systems without LIM and for multiple systems with LIM)
Impedance to ground: Three-phase isolated system	☒	✓	✓	Annually (for systems without LIM)
Impedance to ground: Maximum hazard index test	☒	✓	✓	Annually

Special considerations – Essential Electrical Systems

An essential electrical system has the capability of restoring and sustaining a supply of power to specified loads in the event of a loss of the normal supply for:

1. Life safety;
2. Care of the patient; and
3. Effective operation of the health care facility.

An emergency electrical power supply system shall be one or more generator sets in accordance with CSA Z32.

Vital branch circuit

power is restored within 10 seconds.

Delayed vital branch circuit

power is restored within 1 minute.

Conditional branch circuit

sustain the continued operation of some services that are not crucial to patients.

Nexans

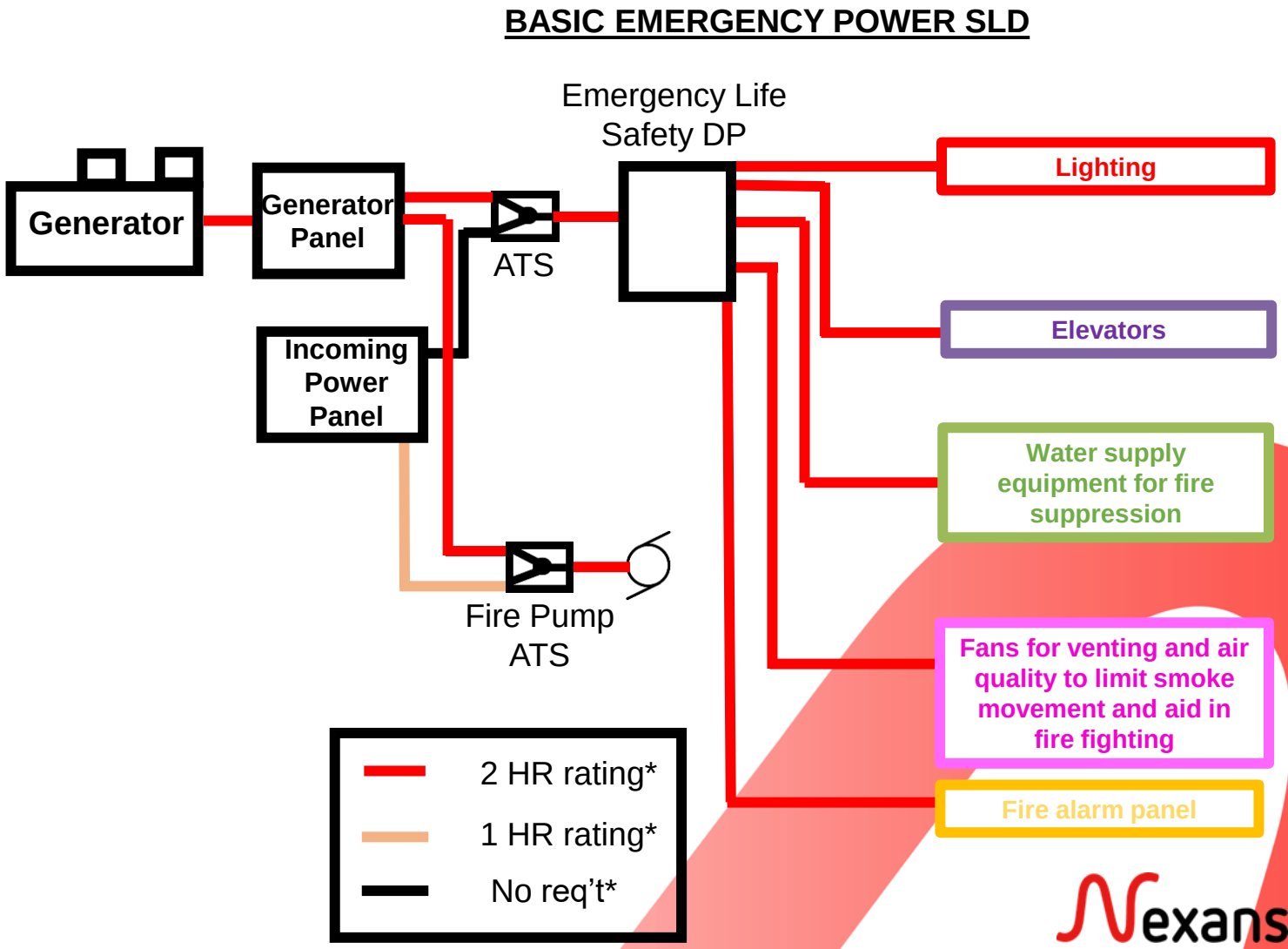
Special considerations - Essential System Load/Branch Classification

	Essential system loads			Essential system branches		
Area and/or function	LTG	Receptacle	Direct-wired equipment	Vital	Delayed Vital	Conditional
Life Safety						
Exit Signs and Emergency Lighting	All					
Fire Alarm System and Fire Pump			✓			
Smoke control and venting to aid firefighting			✓			
Fire fighter's elevator			✓			
General function service requirements						
Nurses station	Partial	Partial				
Public washrooms	Partial					
Medication Room Lighting		Partial				
Medication Room Refrigerators and Freezers		All				
Medical records storage	Partial					
Intensive Care Unit (ICU)						
Patient care areas	All	All	✓			
Ventilation only			✓			

Special considerations – Lighting and Emergency Power Systems

Certain levels of protection* (circuit integrity) for electrical conductors are required for certain systems and can be achieved by:

1. Use of fire rated cables; or
2. Installing cables in a fire rated enclosure.



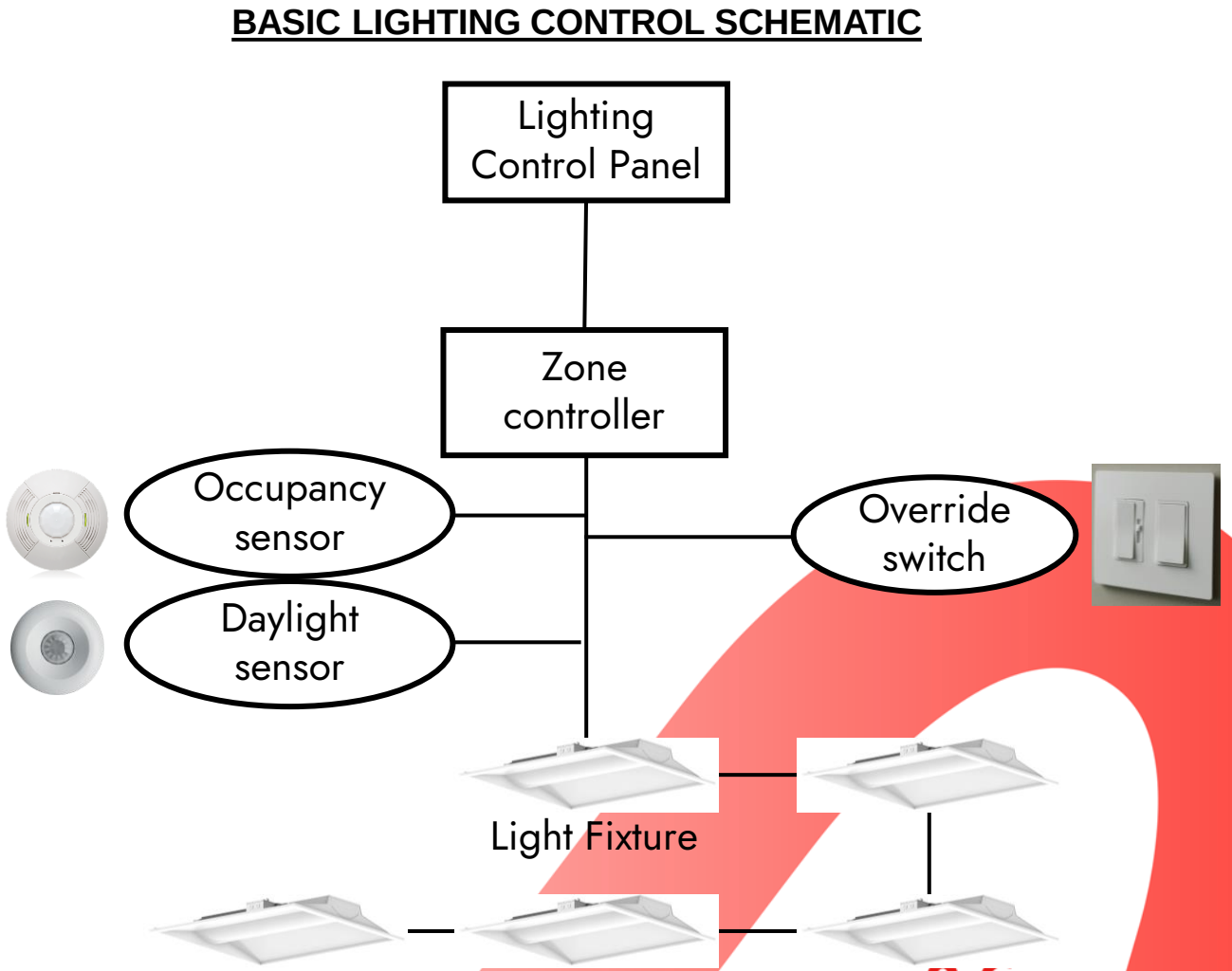
*Refer to NBC Subsection 3.2.7 for more details, requirements, and exceptions.

Special considerations – Lighting systems

Many hospitals employ lighting control systems to allow for

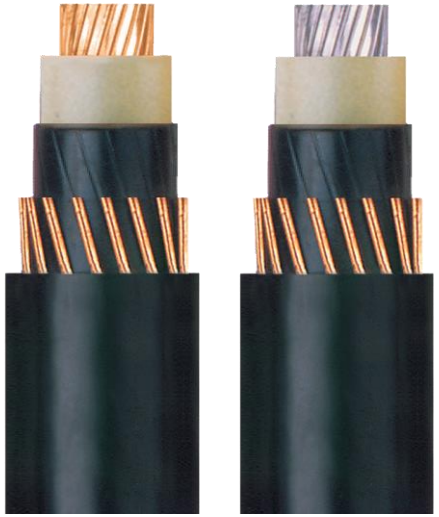
1. flexibility,
2. energy-efficiency; and
3. customization

Lighting control systems are typically wired using communication cables for network connectivity, low voltage wiring (< 600 V) and/or extra low voltage wiring (0 – 10V).



INCOMING SERVICE

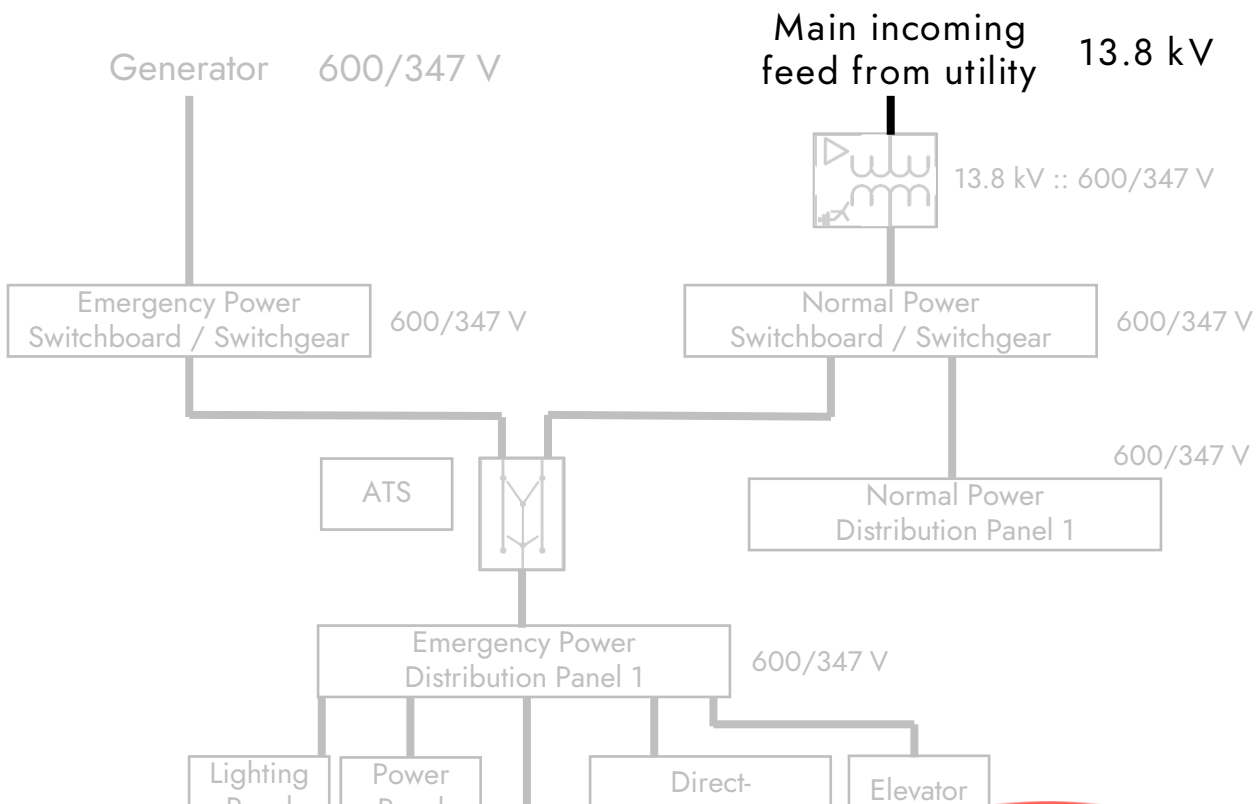
Medium voltage power supply from a supply authority to a consumer's service



MV CONCENTRIC NEUTRAL
(5-46 kV)

MV ARMOURED
(5-15 kV)

Method of installation	Exposed Concealed Raceway Direct burial	Exposed Concealed Raceway Cable tray Direct burial

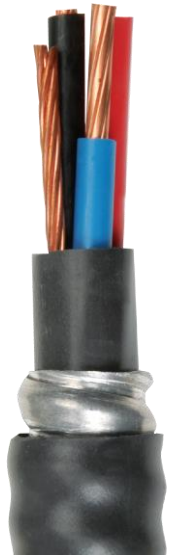


6. WIRING PRODUCTS FROM NEXANS

LOW VOLTAGE FEEDERS (< 1 kV)

Any portion of an electrical circuit between the service box or other source of supply and the branch circuit overcurrent devices.

RW90

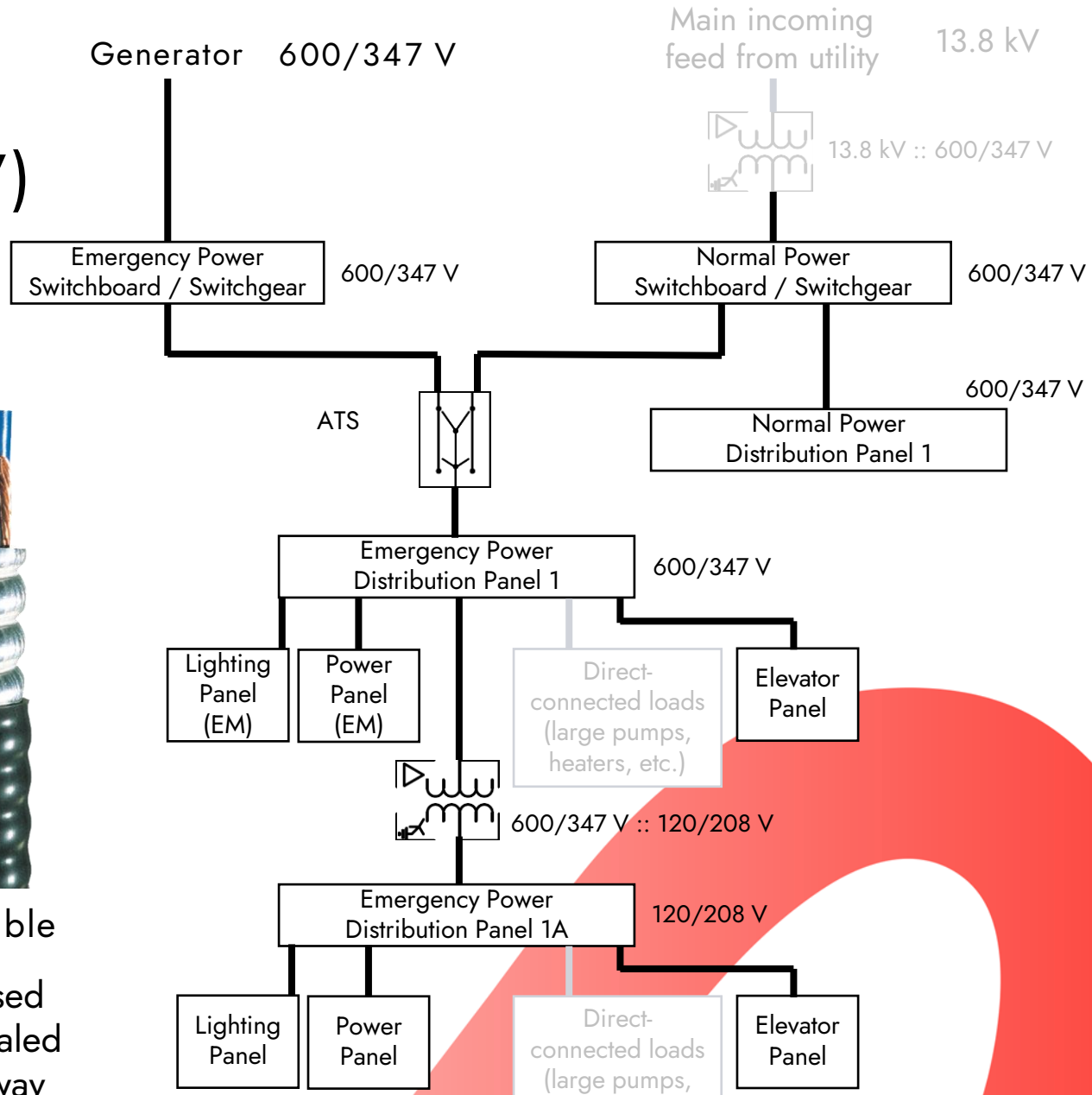


TECK90

ACWU90

VFD Cable

Method of installation	Raceway	Exposed Concealed Raceway Cable tray Direct burial	Exposed Concealed Raceway Cable tray Direct burial	Exposed Concealed Raceway Cable tray Direct burial



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BRANCH CIRCUITS

The portion of the wiring installation between the final overcurrent device protecting the circuit and the outlet(s).

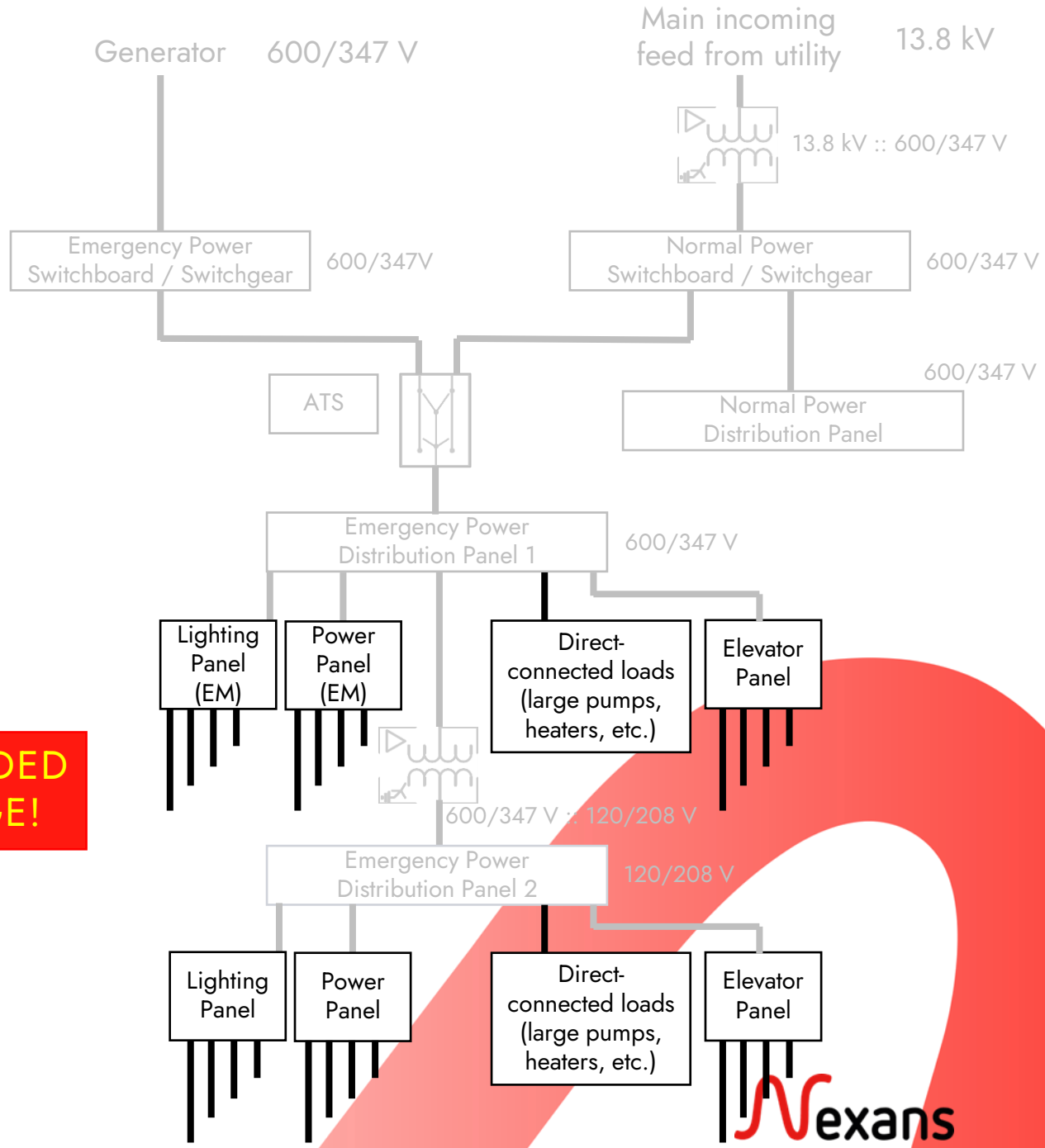
RW90

AC90

AC90 ISO-BX

EXTENDED RANGE!

Method of installation	Raceway	90C Dry/Wet Exposed Concealed Cable tray Plenum	90C Dry/Wet Exposed Concealed Cable tray Plenum

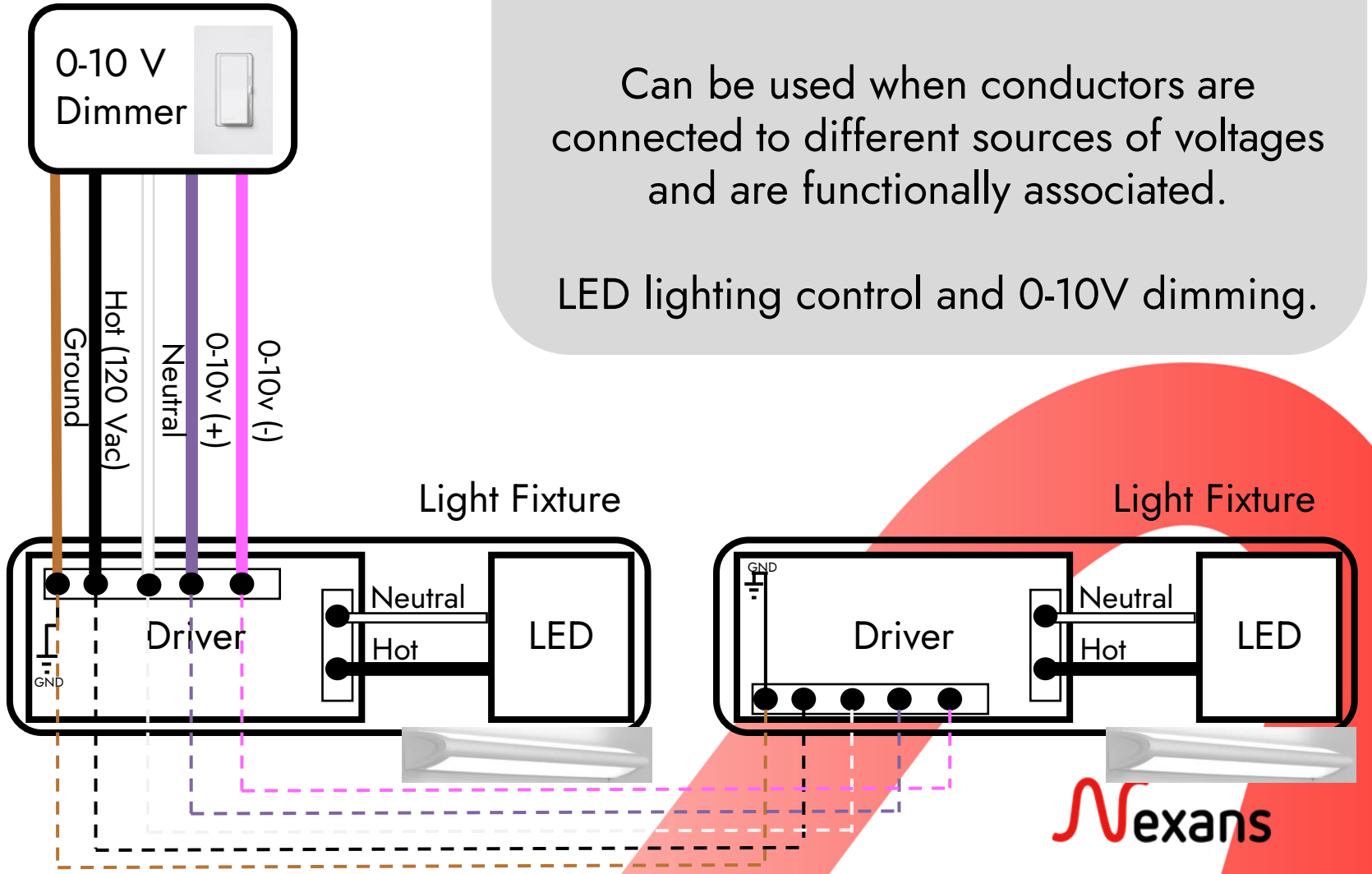


CONTROL AND INSTRUMENTATION

NEW!

ACIC-PCS

Method of installation	90C Dry/ 75C Wet Exposed Concealed Cable tray



BENEFITS

A cost-effective alternative to wire in conduit.

Can be used when conductors are connected to different sources of voltages and are functionally associated.

LED lighting control and 0-10V dimming.

ENGINEERING SUPPORT

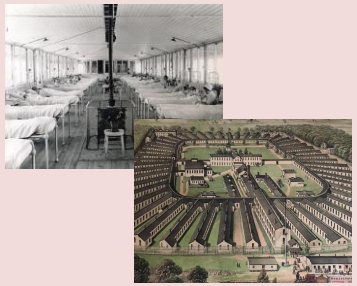
Reducing your project's carbon footprint

Cable selection and installation support

Cable size and type optimization

TAKEAWAYS

Hospital designs have come a long way and continue to evolve.



Understanding the various areas in a hospital and their requirements allows safe, efficient, and compliant electrical designs.

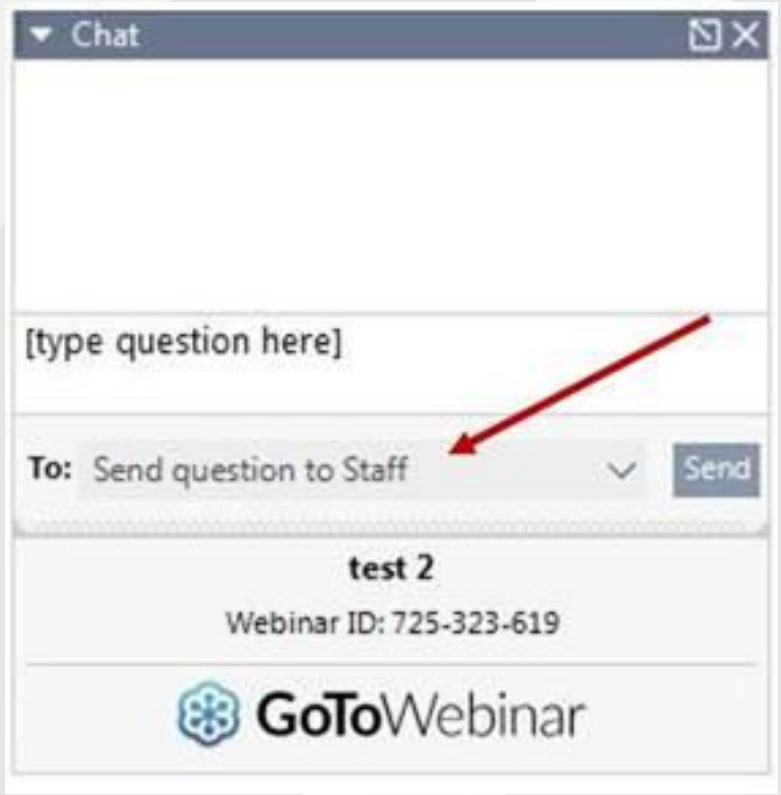
Nexans has a wide range of products to suit your hospital designs.

Nexans environmental product declarations can help in efforts to obtain LEED credits.

Nexans now sells ACIC-PCS cable which is designed for lighting requiring 0-10V dimming and is a cost-effective alternative to wire in conduit.

Leverage Nexans' knowledge and expertise by reaching out to our engineering team.

Q&A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