ELECTRICAL AND I&C CODES AND INSPECTION

DAY 3

Part 3

Electrical Components

Continued

Switchgear

- Medium voltage switchgear
- Low voltage switchgear

Medium Voltage Switchgear

MV Switchgear Attributes

- Rated voltage
- Bus transfer scheme
- MV short circuit analysis
- CB rating/ interrupting capability
- MV motor protection
- Protective relay coordination
- Non-1E associated breaker coordination

MV Switchgear Attributes

- Degraded voltage analysis
- UV relay settings
- UV relay interlocks
- Grounding transformer
- Ground protection relaying
- Equipment grounding

Low Voltage Switchgear

LV Switchgear Attributes

- Voltage rating
- LV short circuit analysis
- CB rating/ interrupting capability
- Supply breaker coordination
- Load breaker coordination
- Ground detection

Motor Control Center Attributes

- Rated voltage
- LV short circuit analysis
- Load breaker coordination
- MCCB selection
- TOL relay heater selection
- Fused disconnect selection

Motors and Generators

Motors

- Medium Voltage Motors
- Low Voltage – Continuous Duty Motors
- Low Voltage – Short-Time Duty Motors

Generators

- Medium Voltage Generators
- Low Voltage Generators

Motors and Generators

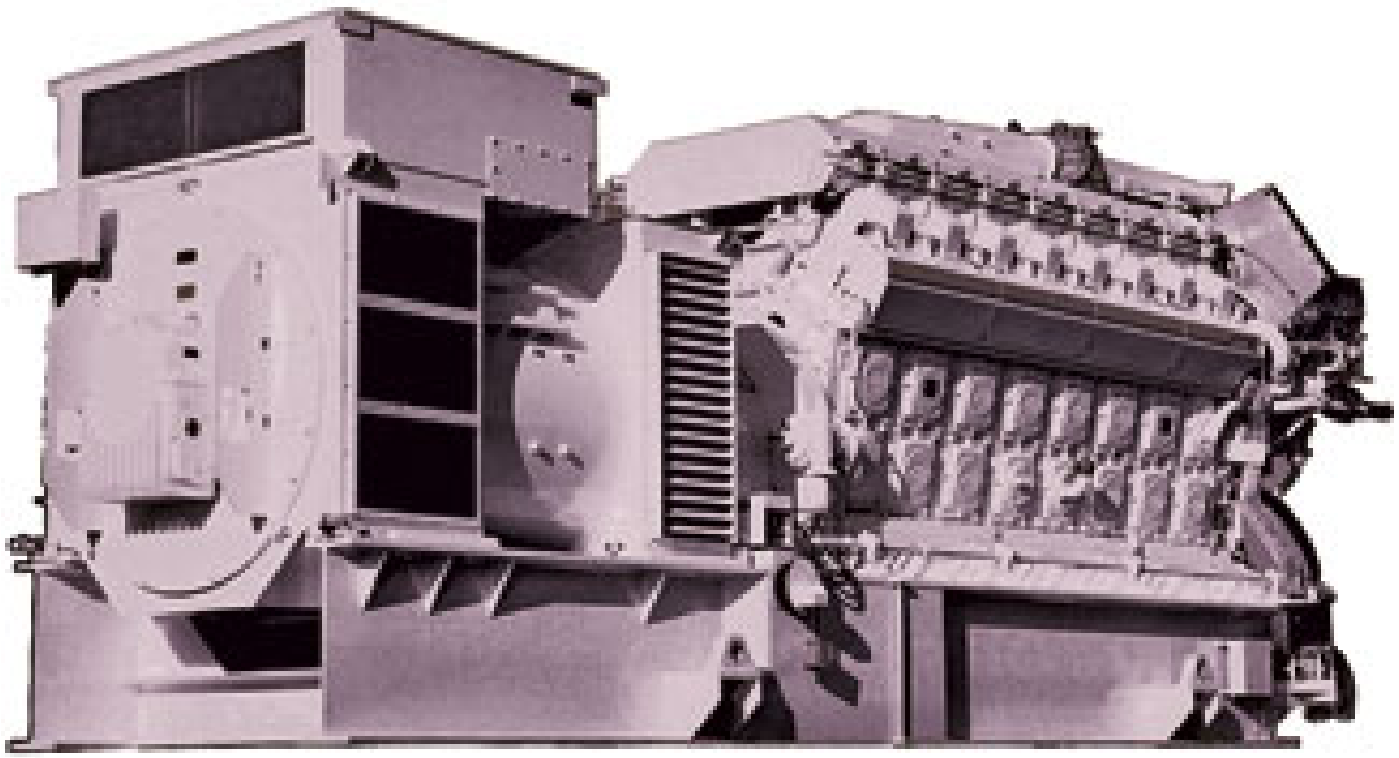
Multiple Speed Motors

- Multiple winding connection changes the number of poles

Adjustable Speed Drives

- Hydraulic transmission coupling
- Electronic controllers modulate the power frequency

Medium Voltage Diesel Generators



Medium Voltage Diesel Generators

Medium Voltage Generator Attributes

- Rated voltage
- Steady state voltage limits
- Steady state frequency limits
- Steady state loading capability
- Protective relay settings

Medium Voltage Generator Attributes

- Overload capability
- Dynamic transient loading capability
- Maximum voltage transients
- Maximum frequency transients
- Load sequence timing
- Manual loading procedures

Heater Drain Pump

Medium Voltage Motor Attributes

- Minimum starting voltage
- Rated HP
- Full load current
- Locked rotor current
- Operating environment and insulation type
- Load acceleration at minimum voltage
- Overload capability

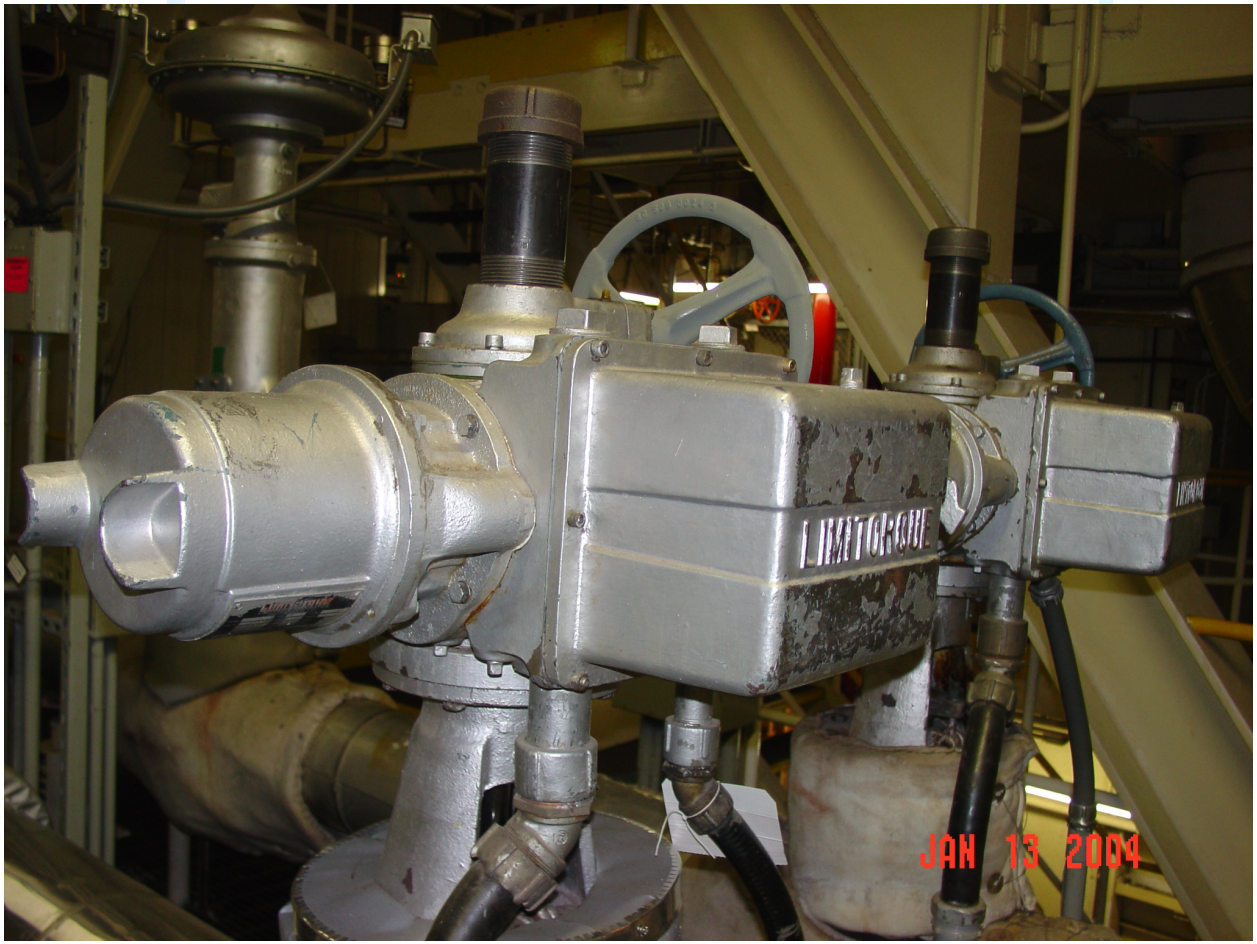
Motor Cooling

32
CONTAINMENT SPRAY
PUMP
31
CONTAINMENT SPRAY
PUMP
JAN 7 2004

480 Volt Motor

LV Continuous Duty Motor Attributes

- Minimum starting voltage
- Rated HP
- Full load current
- Locked rotor current
- Operating environment and insulation type
- Load acceleration at minimum voltage
- Overload capability/service factor


LIMITORQUE
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LV Short Time Duty Motor Attributes

- Minimum starting voltage
- Full load current
- Locked rotor current
- Insulation type
- Rated time duty
- Valve stroke time

Major DC Components

- Batteries
- Battery Chargers
- Inverters

Battery Attributes

- Cell type
- Amp-hour capacity
- Amps per positive plate discharge ratings
- Minimum allowable discharge voltage
- Short circuit contribution
- Physical size and weight

Battery Charger Attributes

- DC output current rating
- Output current limit setting
- Output voltage range
- Input voltage range
- Efficiency
- Output ripple
- Trouble alarm settings
- Paralleling capability

Inverter Attributes

- Output KVA rating
- Output voltage regulation
- Output voltage harmonics
- Allowable input voltage range
- Efficiency
- Short circuit capability

Major Conductive Components

- Bus duct
- Cables
- Containment penetration assemblies

Non-Segregated Bus Duct Attributes

BUS DUCT

- Voltage and current ratings
- Conductor type
- Cooling

BUSWAY

- Voltage and current ratings
- Conductor type
- Tap connection

Cables

- Medium voltage cable system
- Low voltage cable system

Medium Voltage Cable Attributes

- Conductor
- Semi-Conductor
- Insulation
- Insulation Shielding
- Jacket
- Covering

Medium Voltage Cable Attributes

- Ampacity
- Short circuit capability
- Voltage drop
- Cable shielding

Low Voltage Cable Applications

- Power
- Control
- Instrumentation

Low Voltage Cable Attributes

- Conductor
- Insulation
- Number of conductors
- Shielding
- Jacket
- Covering

Low Voltage Cable Attributes

- Ampacity
- Short circuit capability
- Voltage drop
- Noise rejection

Containment Electrical Penetration Assemblies Attributes

- Voltage rating
- Ampacity
- Short circuit capability

Containment Electrical Penetration Assemblies Attributes

- Design pressure
- Thermal capability
- Leak test capability
- Redundant circuit protection

Student Activity
Critical Attributes Matrix

Electrical Components

Student Activity Critical Attributes Matrix

Component	Critical Attributes
Transformers	
Bus Duct	
Switchgear	
Motors	
Generators	
Batteries	
Battery Chargers	
Inverters	
Cables	
EPAs	

Electrical SSCs Objectives Review

- Identified the major electrical structures, systems, and components
- Provided a general overview and purpose of these SSCs
- Discussed how these SSCs relate to new reactor inspection by identifying the components' critical attributes