

TRENDS IN SWITCHGEAR SPECIFICATIONS

What changes are we seeing in equipment specifications?

What's being discussed in client meetings?

What's happening in the market to support these requests?

EQUIPMENT TYPE

- Arc Resistant Switchgear and MCC
- Equipment Configurations
 - Arc Resistant NEMA 3R non-walk-in
 - Mixing equipment types on a single line-up
 - Close-coupling MCC with switchgear
 - Mixing different manufacturer's arc resistant designs in a single line-up
- Arc Resistant Utility Metering Enclosures

EQUIPMENT SIZE

- The perception of a trend toward smaller equipment – not always true
 - The requested size of the equipment is often based on the cost of real estate at the installation
 - The actual size is dictated by the type of equipment. As an example; AR rated equipment generally cannot be reduced in size without retest

EQUIPMENT SIZE

- Complete front access (no rear doors)
- Smaller gear generally means more difficult installation and repair
- The GIS footprint is becoming more interesting to users, but the costs associated with SF₆ and the EPA are sending mixed signals

SWITCHGEAR RATINGS

- **Short-Circuit Current** – Not as much emphasis in higher current
- **Dielectric** – A trend toward higher than standard for MV gear. No real change in LV gear
- **Continuous Current** – A trend toward higher continuous current and a trend against using force-cooling

SWITCHGEAR RATINGS

- Interest in 15kV ratings for Motor Control
- Interest in higher amperage HRG
- Increased interest in VFDs with more exotic configurations

SWITCHGEAR RATINGS

- **IEEE Design Testing**

- Circuit Breaker Testing is moving more to IEC methods, but the IEEE ratings are retained
- Switchgear Testing and Ratings are solidly IEEE

ADDITIONAL TESTING

- **Design Tests**
 - **Combinations of Design Tests using Different Standards**
 - **Design Tests Made from Customer Specifications**
- **Production Tests**
 - **Partial Discharge Testing**
 - **Design Testing on Production Equipment**

INSTALLATION AND COMMISSIONING

- **Trend toward hiring third party companies to do the installation and commissioning**
 - **The third party is viewed as impartial**

TRAINING

- **When onsite maintenance teams exist, the trend is to have the supplier train the maintenance and operations personnel**
- **General trend toward hiring outside service companies to eliminate the cost of onsite teams**

FEATURES

- **Longer Life**
- **No Maintenance**
- **Monitoring**
- **Communication**
- **Remote Operation**
- **Arc Fault Protection**
- **Seismic Ratings**
- **Customized G&T Devices**

FEATURES

- **Verification of Vacuum (vacuum breakers)**
- **Integrated Ground Switch**
- **Metal-Clad switchgear with switches**

FEATURES – Longer Life

- **What Constitutes “Longer Life” in switchgear used in the power and petro-chem markets?**
 - **The unwritten rule is 40 year life expectancy**
 - **Life of the interrupter?**
 - **Number of mechanical operations of the mechanism?**
 - **Number of electrical operations?**
 - **Time between maintenance?**
 - **Or is It just the time the equipment stands without rusting out?**

FEATURES – Longer Life

- **What Constitutes “Longer Life” for equipment used in the data processing industry?**
 - **Typical life is 5 years**
 - **Switchgear is considered “disposable”**
 - **Does longer life increase the value in this market?**

FEATURES - No Maintenance

- **What Constitutes “No Maintenance”?**
 - **Sealed in an air-tight enclosure?**
 - **No lubricated parts?**
 - **No periodic adjustments?**

FEATURES – Monitoring

- **NO DATA!!!**
 - **System Status and Action Instructions only**
- **Smart Grid – Communications/Connectivity**
 - **Compliance with various protocols**
 - **Compliant with local firewall**

FEATURES – Monitoring

- **Monitored Conditions**
 - **Circuit Breaker Operation**
 - **Partial Discharge**
 - **Atmospheric Conditions**
 - **Bus and Circuit Breaker Temperatures**

FEATURES – Monitoring

- **Circuit Breakers (general)**
 - **Are the coils functional? Test without operating the circuit breaker**
- **Vacuum Circuit Breakers**
 - **Test vacuum while in service**
 - **Visible contact break**

FEATURES – Communication

- **Communication is a tricky area for most companies**
 - **Are communication lines susceptible to hacking?**
- **Most relays come with communication**
 - **IEC 61850 is being spec'd for relays**
- **Most monitoring and detection systems offer communication**

FEATURES – Remote Operation

- **Remote Racking Circuit Breakers and Auxiliary Rollout Trucks**
 - External
 - On-board
- **Remote Control**
 - Racking
 - Circuit Breaker Operation
 - Communication with monitoring systems

FEATURES – Arc Fault Protection

- **Arc Resistant Switchgear**
 - **Mechanical**
- **Specialized Relays and Protective Devices**
 - **High-speed devices to trip or commutate the fault current**

FEATURES – Arc Fault Protection

- **Standard NEMA 1 Switchgear with Specialized Relays and Protective Devices**
- **Extension to Existing Equipment**
 - **Increasing inquiries for making the installed base of non-AR equipment into AR rated gear by adding relay and sensing packages**

FEATURES – Arc Fault Protection

- **Questions about IEEE Arc Resistant Rating Type 2C are more frequent.**
 - **This indicates two things:**
 - **Concern for reducing equipment down time**
 - **Operators are working in energized equipment**

FEATURES – Seismic Ratings

- **Increased interest in seismic rated equipment**
 - **Changes in seismic activity**
 - **Changes in the ratings of locations**
 - **Revisions to building codes**
- **There is still no standardized rating.**
 - **The various test procedures do not produce results that are comparable.**

FEATURES – Customized G&T

- **Users of G&Ts have always requested the device be customize to meet their operating procedures**
- **Remote/Closed-door racking**
 - **Most commonly requested with AR switchgear**

FEATURES – Verification of Vacuum

- **Vacuum Circuit Breakers have two characteristics that are considered negative:**
 - **You cannot see inside them to verify contact part (visible break)**
 - **Monitoring vacuum while energized is not available**

FEATURES – Switches in Metal-Clad

- **Metal-Clad switchgear by definition requires that the primary switching devices be drawout. That means a switch on a breaker truck or similar racking means.**
 - **Stationary switches do not comply, however;**
 - **Load break switches**
 - **Disconnect switches**
 - **Grounding switches**
- are all specified in Metal-Clad designs**

FEATURES – Integrated Ground Switch

- **Automatic/Manual**
- **Static Ground**
- **Fault Making**

EQUIPMENT ROOM

- **Batteries. Slow transition from Lead to Lithium Batteries.**
- **Fire-rated walls on the building**
- **Major changes to buildings due to the government rule changes with regard to insulation, lighting, etc.**

What Did I Miss?

Questions