

20 years later..... Battery system replacement

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Station
Infobatt 2005
October 3 - 4, 2005

Previous battery system configuration

- 8 Battery Rooms, each with 2 battery banks
- Battery # 1, 116 cells. Each cell 11 positive plates, approx. wt.: 65 kg per cell
- Battery #1 arrangement: two parallel rows with two tier racks
- Battery #2 180 cells. Each cell 9 positive plates, approx. wt.: 112 kg per cell
- Battery # 2 arrangement: three parallel rows with two tier racks

Challenges with Bank #1

Involved the installation of equivalent replacement for this bank with use the old rectifier system:

- Design margin reviews
- Changes to low temp operating margin
- Applying new criteria for battery testing load profile versus capacity discharge testing

Bank #2 Challenges

Battery Bank # 2 had to be larger due to new UPS system:

- Sizing battery for new larger UPS system
- Old load profile review
- Changes to low temperature operating margin
- Number of cells will need to increase from 180 to 240.
- Individual cell size will also increase
- Applying new criteria for battery testing load profile versus capacity discharge testing

Design considerations

- Choosing the right battery for the job
- Sizing new battery banks: low temperature limits, minimum operating voltages, design margins
- Battery sizing to accommodate load profile when performing battery capacity test
- Battery room ventilation system
- Design new battery rack configuration
- Design new battery supply cables, end plates and battery disconnects

Consequences of new battery sizes

- New battery # 1, 116 cells. Each cell 8 positive plates, approx. wt.: 115.2 kg per cell
- New Battery # 2, 240 cells. Each cell 11 positive plates, approx wt.: 158 kg per cell
- New Battery #2 will require higher float terminal voltage of 540V
- New arrangement for battery racks is required to accommodate increased number of cells
- Checking ventilation system suitability for new, larger battery banks

Changes to Battery Maintenance and Operation Practices

- Changes to design Manuals
- Changes to Operating Procedures
- Changes to Maintenance Procedures
- New ways to do battery testing and equipment
- Checking mtce practices and mtce intervals
- Changes to inspection routines

Decision on Battery Commissioning

What testing do we require?

- Factory testing
- Battery connection checks
- Post installation tests

Logistics for Installation and Commissioning Phase

1. Battery # 1 to be installed and commissioned
2. Installation of new cable trays for battery #2 in parallel with its new UPS system
3. Battery # 2 commissioning
4. Commissioning new UPS for battery #2
5. Final equalize charge for battery #2
6. 2 weeks later, final checks of all cell voltages and SGs on battery banks #1 and #2

Post installation inspections

- Checking for low voltage cells
- Spare cells
- Checking battery life after 2 years in operation (capacity testing)

Planning for the future

- Are the new battery banks performing as expected?
- Do we experience unpredicted cell behaviors?
- Will new battery banks survive next 20 years?