

# ISOLATED PHASE BUS DUCT TESTING

with EMI Diagnostics<sup>SM</sup>



**What is the condition of your isolated phase bus that delivers power from your generator to transformers? Consider the consequences to your plant operation if your bus fails.**

Your present testing program should be able to identify the following defects:

- Loose or broken support insulators
- Loose or corroded hardware
- Defective insulation
- Stray circulating currents
- Foreign material or objects inside bus
- Defective bus PT connections
- Open PT high-voltage fuses
- Contaminated insulators (dirt, dust or water)

An Electromagnetic Interference (EMI) Diagnostics survey from Doble is an on-line, non-invasive test that can detect a wide variety of defects in isolated phase bus duct, transformers, generators, motors and associated electrical system components that other technologies are unable to detect. EMI Diagnostics has been successfully performed on electric power systems since 1980. It has been proven with over 8,000 successful field tests on more than 500 different designs with over 70 types of defects and conditions identified, catalogued and verified.

Electromagnetic interference is the precise frequency domain measurement and identification of radio frequency energy that results from electrical partial discharge and arcing at defects. EMI data is collected from the temporary placement of a single split core radio frequency current transformer (RFCT) around the power conduit, safety ground or neutral lead of the component being tested. The acquired radio frequency spectrum, or EMI signature, is unique for each physical location and defect present within the electrical system.

## **BENEFITS OF EMI DIAGNOSTICS**

- Provides broader view of system defects including partial discharge
- Enables limited maintenance budgets to be targeted toward critical and/or problematic units
- Empowers improved condition assessment and optimized preventative maintenance programs

## IDENTIFY LOOSE BOLTED CONNECTIONS IN YOUR BUS DUCT

### Phase 1: Loose Connections

Problems with iso-phase frequently begin with loose bolted connections which causes pitting and discoloration due to heating and arcing in the early stages of the developing problem. At this point, heat generated is not likely to heat the bus duct enclosure, but the defect will produce an electromagnetic field which can be detected by EMI Diagnostics.

### Phase 2: Melting of the Metal

If allowed to continue, heating will melt the metal. Current is still flowing and at this point discharge activity would be obvious on the EMI Diagnostic survey. You may be able to detect the problem with infrared scanning techniques at this point. Do you want to wait until the problem reaches this point before detection? Even now, time consuming and costly repairs are needed.

### Phase 3: Failure

It does not take long to get from phase 2 to complete failure. At this point, a forced outage will shut down the generating unit and the cost will include lost production as well as the cost of replacing the iso-phase bus connection. This could have been prevented with an annual EMI Diagnostics survey from Doble.



## OPTIMIZE CONDITION BASED MAINTENANCE PROGRAMS

Doble's experience has shown that 80% of the equipment tested does not require maintenance during the next outage. However, 15% are in the process of developing a problem and 5% need immediate attention to prevent premature equipment failure. Identifying the 80% is extremely important since it releases maintenance resources to the 5% that require immediate attention. Additional inspections or tests can be scheduled to confirm the existence of these conditions and condition based maintenance can be scheduled before a failure occurs.

## IDENTIFY CRACKED INSULATORS WITH EMI DIAGNOSTICS



Another problem that can lead to bus duct failures is damaged insulators. Cracks and chips in insulators will result in discharge activity which EMI can detect.

## About Doble Power Services

Doble has been a trusted name in electric power diagnostic solutions for over 90 years. Doble's unique business proposition combines three elements - diagnostic test instruments, expert consulting and testing services, and the world's largest resource library of related knowledge - into complete diagnostic solutions. Doble Power Services leverages the resources of Doble's extensive library and experienced team of engineers to deliver the highest level of consulting services and knowledge-based solutions.

## Why Doble Power Services?

### Extensive Global Experience

Doble has more than 40 consulting engineers each with extensive experience in power systems engineering applications.

### Independent Expert Opinion

Trust Doble's expert consulting & testing services for unbiased diagnosis and assessment of critical assets.

### Doble Peer Review Process

When you hire Doble, you are hiring the shared experience of our entire engineering team. Each Doble field service report is reviewed by at least one other consulting engineer.

### Doble KnowledgeBase

Provides valuable benchmark data for use in evaluating test results on your equipment.



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MKT\_SL\_ISOTesting\_12/15