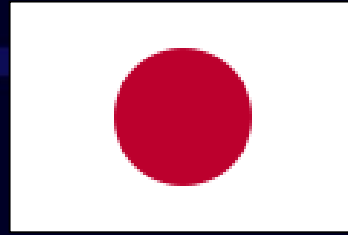


Paris Session  
2022



# Environmental consideration on IoT -based power equipment in HV/EHV outdoor substation

B3 / PS3.1

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**TOSHIBA**

# 1. Question and our contribution

## < Questions >

Q3.1: Which measures are necessary to increase the acceptance of intelligent IoT-based power equipment in substations?

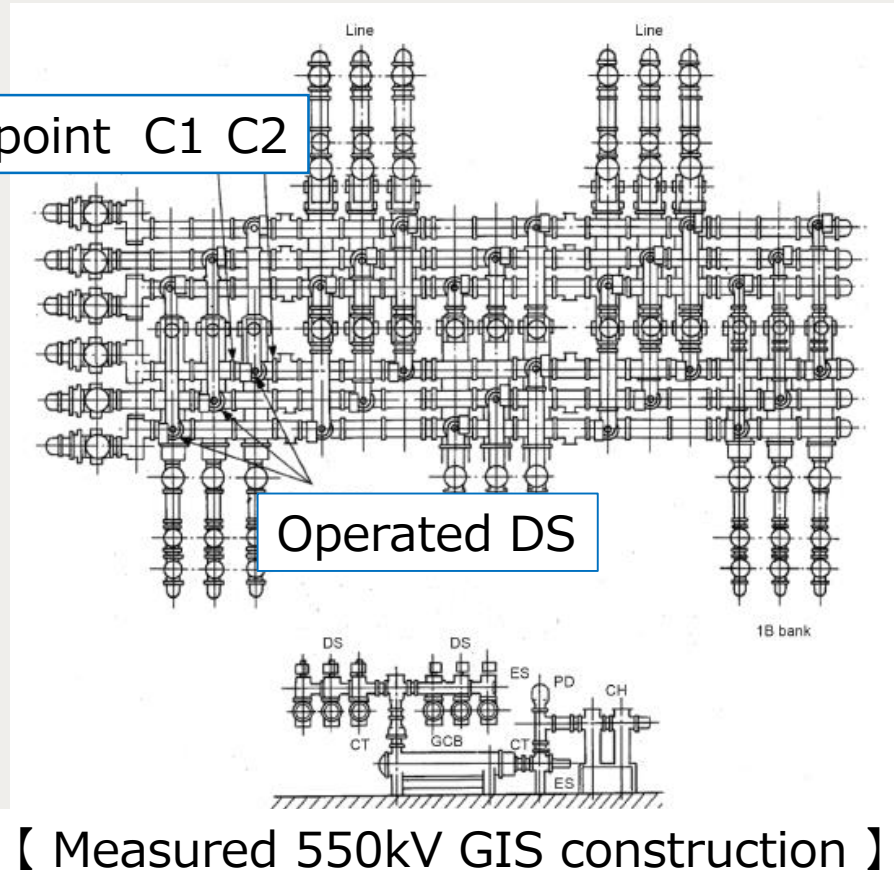
## < Answer >

- By fully considering environmental performance and surge resistance, IoT technology can be applied to substations.
- It will allow to increase the acceptance of intelligent IoT-based power equipment in substations.

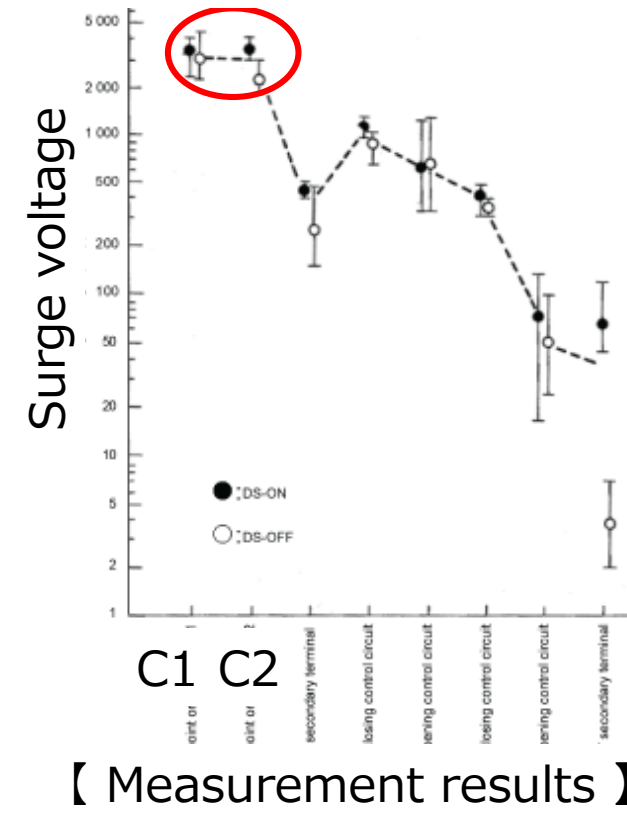
Group Discussion Meeting

## 2. Measured switching surge in 500kV substation in Japan - IEC 61869-13 Annex13B -

Measured point C1 C2

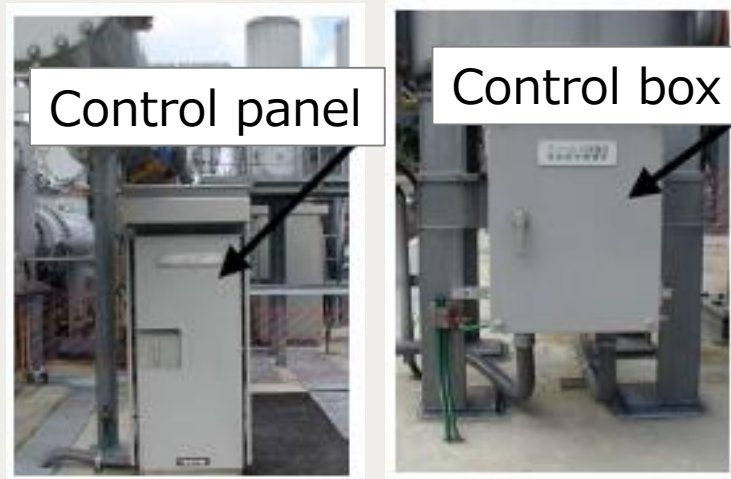


Close to 5kV



- Close to 5kV surge was observed during DS closing-operation.
- This result is referenced in IEC.

### 3. Measured temperature/humidity in outdoor GIS LCP



【 The view of field test 】

	Test results
Temperature	<ul style="list-style-type: none"><li>• 12K temperature rise inside the panel/box due to solar radiation.</li><li>• Shielded plate reduced temperature rise to 6K due to solar radiation.</li></ul>
Humidity	<ul style="list-style-type: none"><li>• The relative humidity reduction was about 20-30% with the use of space-heaters and about 50% with the use of dehumidifiers.</li></ul>

Measured from 1999.July to 2000.Nov.

Reference: Emi Kurosaki, Koji Kawakita et al., "Research and Test of Outside Cubicle's Environmental Condition in Substation", IEEJ (2001) 6-308

- If the outside temperature is around 40°C, the temperature inside could be close to 60°C.

## 4. Developed equipment monitoring unit (EMU)

	EMU Specification	IEC 61869-13
Impulse-voltage withstand capability	7kV	6kV
Rated ambient temperature	-20°C ~ +60°C ( No condensation )	-5°C ~ +55°C

## 5. Conclusion

- IoT equipment installed near the equipment (edge) must have performance commensurate with the surge voltage, temperature and humidity in HV/EHV substation.
- Security may be considered in the future.