

## Study Committee B2

Overhead Lines

10766\_2022

### Operational Evaluation of RTV Coating Performance over 17 years on the Coastal Area at Jubail-SA

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#### Motivation

- The operational performance of electrical network is dependent on the performance of its insulators. Lots of power interruptions occurred due to insulators flashover as a result of surface contamination level in harsh weather. Different maintenance remedy actions were taken to resolve the insulators surface contamination issue. The best practice is the application of RTV coating on the outdoor porcelain insulators.
- The aim of this study is to evaluate the operational performance of RTV coated insulators in harsh environment.

#### Method/Approach

Following steps/methodology were followed up to monitor the performance of RTV coating:

- Perform Visual Inspection Every 2 years.
- Perform hydrophobicity Classification test every 6 years using STRI 92/1 method
- Thermo-vision Inspection, corona Inspection and monitor arcing level when exist
- Perform Day & Night Inspection every 2 years. and during hi-humid days

#### Objects of investigation

- To evaluate the operational performance of RTV coated insulators in a harsh environment and track the hydrophobicity level and thickness changes on outdoor coated insulators located in Ghazlan P/P switchyard which is subjected to different type of pollution (Saline, desert & Industrial)

#### Experimental setup & test results

- Different type of insulators selected as case study samples (a transformer bushing, a circuit breaker bushing and a disconnector switcher insulator).
- Field testing results were recorded for tracking the performance at different weather condition.
- No single flashover incident related to RTV performance was recorded since application
- Slight thickness changes noticed over 17 years of operation.
- Oil leaks on the surface of coated transformer bushing may reduce the effectiveness of RTV coating with years.

#### Discussion

- Minor cracks and aging on RTV coating were observed only at the portion close to the High Voltage side of some insulators.
- Some surface discoloration changes from grey to light black at the portion close to the H.V side.
- No erosion or coating chalking was detected

#### Conclusion

- HC had a slight reduction on these monitored insulators but still at a good level.
- It is confirmed that the Operational performance of RTV coating and life of RTV coating is dependent on many factors such as the application method, material specification, monitoring method
- Continue performing minor and major preventive maintenance programs and record major changes in HC and plan for re-coating whenever HC class exceeded HC 4.
- The evaluation results indicate that Eastern Coastal Area is of a harsh environment and heavily contaminated area and any new T/L insulator shall be of SiR insulator and S/S outdoor bushings shall be either SiR insulators as well or RTV coated Porcelain

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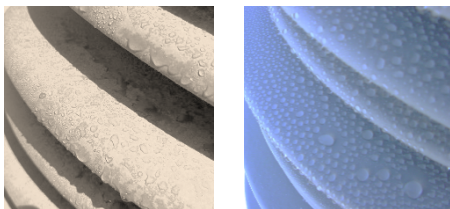
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#### INTRODUCTION

To secure a reliable power supply to bulk customers, different remedies had been taken such as improving specific creepage-distance of the outdoor porcelain insulators, then applying silicone grease and then performing high pressure washing demineralized water washing method to clean insulator surface.

In the end, the more effective method was introduced which is applying RTV Silicone Rubber Coating on the outdoor insulators, this is best in turn of operational performance and operational cost.

#### Physical Appearance of Coating Paint over the Case Study period:



#### Selected Samples

Overview data of Sample Insulators

Equipment	mm/kV	V.L	Equipment Energization Date	Year of RTV Coating Application
Sample#1 XFRM Bushing	36	230kV	1977	2004
Sample #2 BOCB Insulators	32	230kV	1977	2004
Sample#3 Disconnect	32	230kV	1977	2004

#### Findings



HC had a slight reduction on these monitored insulators but still at a good level.



The results did not exceed HC3 level in 94% of the measured value during the overall test period.



The hydrophobicity performance is usually sensitive to insulator surfaces subjected to any minor oil leaks.

#### Results of Hydrophobicity Classification

Period	XFRM			BOCB			Discon.		
	Bottom	center	H.V side	Bottom	center	H.V side	Bottom	center	H.V side
Y1	HC1	HC1	HC1	HC1	HC1	HC1	HC1	HC1	HC1
Y6	HC1	HC1	HC1	HC1	HC1	HC1	HC1	HC1	HC1
Y12	HC1	HC2	HC2	HC1	HC2	HC2	HC1	HC2	HC2
Y17	HC2	HC2	HC3-HC4	HC2	HC3	HC3-HC4	HC2	HC2-HC3	HC3

#### Weather Data

Weather data around the case study:

Humidity Level	More than 80% for (Ave. 17 days/month) between (July –Nov.) More than 90% for (Ave. 5 days/month) between (Aug –Dec)
Wind	Speed (Max) (22- 42) km/h Direction (N & NE, NW) wind come from inland and Gulf Sea
Rain Precipitation	Ave. 94 mm/year, Area was subjected to heavy rain on Nov.2004, Jan. 2007 and Dec. 2014 Only
Temp.	10. – 54 C

#### Thickness Measurement

