

## New porcelain insulators for reducing maintenance work on the Tokaido Shinkansen

On the Tokaido Shinkansen, many porcelain insulators (hereinafter referred to as “insulators”) are used as insulating devices to prevent the electricity from flowing between electric wires and their supporting structures (such as utility poles). To maintain from the reduction of the electrical insulation due to contamination, a special paint is applied to more than 50,000 insulators. The paint application and repainting works are physically demanding since it involves working at high places and are manually done one by one, requiring a great deal of efforts. In anticipation of a future decline in the workforce, as a part of our business reforms, we have conducted a series of demonstration tests using “Coated insulator” with NGK Insulators, Ltd. (Headquarters: Nagoya City, Aichi Prefecture; President: Shigeru Kobayashi) for purpose of eliminating these works.

We are now pleased to announce that sufficient performance was confirmed in the demonstration tests and that the introduction of coated insulators on the Tokaido Shinkansen is now in sight. This will be the first time that coated insulators will be introduced on a railway in Japan.

### 1. Overview (Attachment)

- If contaminants such as salt in seawater adhere to insulators and the surface of insulators becomes wet, their insulation performance will decrease by electricity flowing through the wet contaminants.
- Silicone’s properties to absorb contaminants and prevent the surface from wetting due to superior hydrophobicity are effective in maintaining the electrical insulation.
- Current situation, a special silicone-based paint is applied to insulators on site. On the other hand, coated insulators are pre-coated with silicone rubber at the factory.
- In order to evaluate the performance of coated insulators in harsh environments, long-term field tests were conducted under various environments such as severe salt contamination conditions along the Tokaido Shinkansen line from 2017. As a result, it was confirmed that they have sufficient insulation performance.



Conventional paint application work



Field test

### 2. Benefits of introduction

- The introduction of coated insulators will eliminate the need for physically demanding repainting with a special paint. This is expected to reduce the labor required for maintenance work as well as the costs of repainting work on the Tokaido Shinkansen.

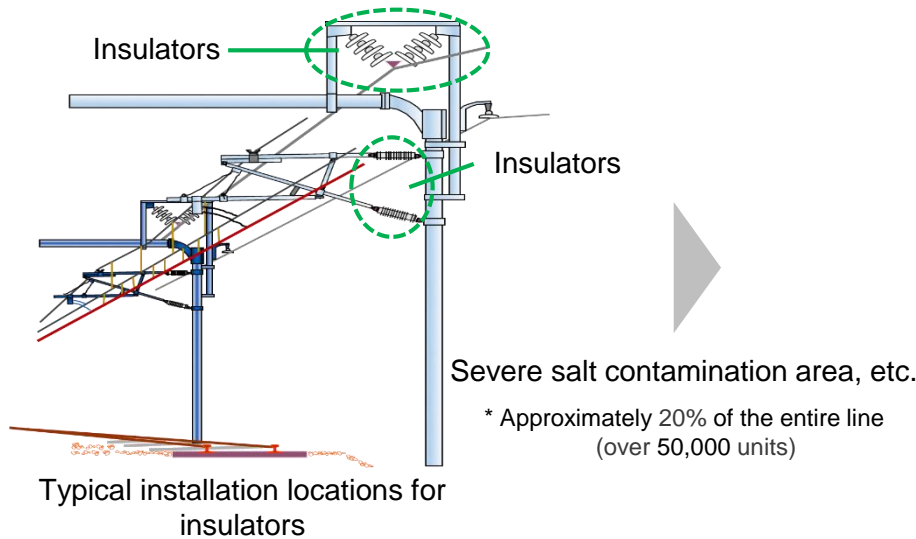
### 3. Future plan

- Coated insulators are scheduled to be introduced at applicable locations from FY2025 onwards.

# Introduction of Coated Insulators

[Current situation] A special paint is applied to insulators and repainted as a measure against contaminants such as salt in seawater.

- Insulators are devices that electrically insulate between electric wires and their supporting structures (such as utility poles).
- If contaminants such as salt in seawater adhere to insulators and the surface of insulators becomes wet, their insulation performance will decrease by that the electricity flows through the wet contaminants.
- A special paint made mainly of silicone (silicone compound), which absorb contaminants and prevent the surface from wetting due to superior hydrophobicity are effective in maintaining the electrical insulation of insulators.
- Workers have to repaint each insulator manually during limited hours at night (every one to two years).



## Repainting work

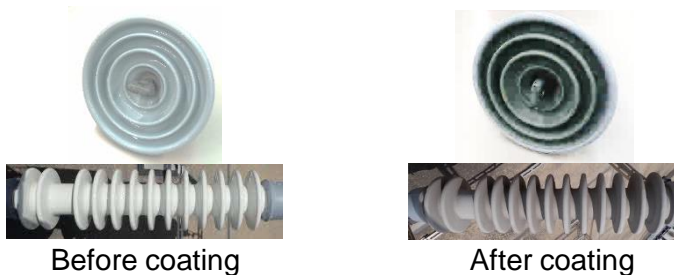
- ⇒ After removing all the paint from the surface of an insulator, apply new paint.
- ⇒ The paint is sticky, so it easily sticks to the worker's clothes etc.

Repainting work (working at heights at night)

\* Paint application and repainting work conducted approximately 200 times a year, with more than 200 insulators being painted and repainted each time

[Future plan] By introducing coated insulators, the need for the application of a special paint and repainting will be eliminated.

- Insulators will be coated with silicone rubber, which is highly effective in maintaining the electrical insulation of insulators.
- Insulators will be pre-coated with silicone rubber at the factory, eliminating the need for repainting with a special paint on site.



## Demonstration tests

- ⇒ Long-term field tests were conducted under various environments, including conditions that were more severe than the actual service environment.
- ⇒ It was confirmed that coated insulators have sufficient insulation performance.