



# UPGRADING QUALITY OF 275KV Y-BRANCH PRE-FABRICATED TRANSITION JOINT



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## ABSTRACT

In order to utilize existing underground power cable line effectively, the demand of Y-branch transition joint box (hereafter called as YJB), which can branch the existing line by jointing new line, is increasing for EHV cable line in recent years.

This paper introduces (1) upgrading of manufacturing inspection for 275kV YJB, (2) performance evaluation of installed YJB at the time of rapid temperature change in the manhole, and (3) workability of installation and recovery for such large and heavy YJB in the narrow manhole.

## 1. INTRODUCTION

In underground EHV power transmission lines, the demand using YJB to effectively branch system has increased. In 2002, with Tokyo Electric Power Co., Ltd (hereafter called "TEPCO"), J-Power Systems Corp. (hereafter called "JPS") has jointly developed YJB which is capable of jointing different types of cables, SCFF and XLPE cables. On the demand of the other utilities, YJB has already been installed in a tunnel and is applied for actual commercial circuits of a power station outgoing line [1].

In applying this YJB to system change works for Kansai Electric Power Co., Inc. (hereafter called "KEPCO"), it was planned applying YJB to existing manhole without modification of it to save construction period. Therefore, it was necessary not only to carry large and heavy weight (approx. one ton) YJB epoxy units into an existing narrow and small manhole for SCFF cable, but also to assemble them. The verification of the assembling method and the construction in a space which simulates a narrow and small manhole, the verifying the recovery measures from accident, and the result of rapid cooling test in atmosphere which assumes open manhole during winter season are reported herewith.

Furthermore, as a result of reviewing the past trouble of 66kV class YJB, we have encountered a case in which a trouble occurred due to external damage originating the surface of epoxy during production of epoxy unit. The result of study on reliability improvement for quality control during epoxy unit production is also reported herewith.

## 2. CONSTRUCTION OF 275KV YJB

Fig. 1 shows the construction of YJB. At XLPE cable side, epoxy unit and stress relief cone, which have been quality-

controlled and electrically tested in advance at the factory, are assembled together at site, and are compressed with a spring. At SCFF cable side, oil-immersed insulating papers are wrapped around and an epoxy bell-mouth is positioned around. Features of the construction of YJB are as follows:

- 1) Epoxy molded component of large and complex shape
- 2) Integral molding of aluminum high-voltage electrode in epoxy unit
- 3) Epoxy unit for both SCFF and XLPE cables
- 4) YJB can be used with one bank empty sealed by insulating plug.

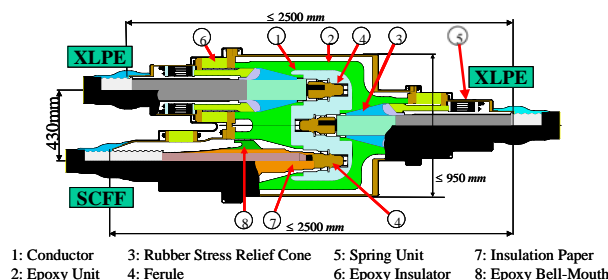


Fig. 1 Construction of YJB

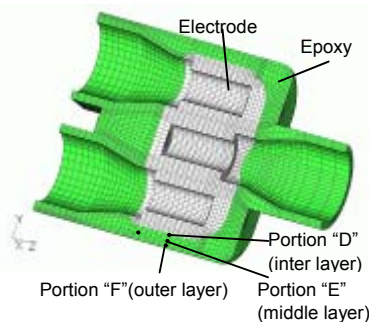


Fig.2. Model of thermal Stress analysis 275kV YJB epoxy unit (For Figs. 3-1 and 3-2, analysis was conducted with a model having outer casing and compound.)

## 3. IMPROVEMENT ON RELIABILITY DURING PRODUCTION OF EPOXY UNIT

### 3-1 Necessity of measures against external damage during production of epoxy unit

As a results of manufacturing process review, the following measures to avoid external damage during production of epoxy unit were taken for further