



ANNEXURE-B

Tech. Specification of 80MVA 132/34.5KV Power Transformer, Damodar Valley Corporation

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30.000 SPECIFICATION OF 'FIBER OPTIC TEMPERATURE SENSOR':

- 1.0 In addition to WTI & OTI, Optical Sensors are to be used for hotspot temperature measurement. System shall be of proven technology. The temperature sensing tip along with the fiber optic cable shall be robust and of an already type tested design. The Sensor will be mounted inside a tamper proof & mechanically protected disk allowing efficient and secure mounting for perfect positioning of the Sensor on the measuring surface / medium.
- 2.0 Probes shall be all silica, Teflon jacketed fiber with perforations / slits in outer jackets and be able to be completely immersed in hot transformer oil. It should withstand the transformer insulation drying process. The probes shall not get damaged during filtration of the transformer. The fiber with Teflon jacket shall be strong enough to withstand the severe conditions prevailing inside an EHV Transformer. The probes shall meet the requirements to eliminate the possibility of partial discharge in high electrical stress areas in the transformer. Details of the relevant tests should be provided.

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- 3.0 One no Optical sensor shall be used for each phase of HV, two nos. for each phase of LV windings, two nos. for top oil temperature and one no for bottom oil temperature i.e minimum 12 nos. optical sensor shall be provided in the transformer. However, these locations are indicative only and to be finalized during detailed engineering. Sensors will be installed at the hottest spots as per the thermal modeling to be furnished by the Manufacturer of the Transformer. All the temperatures shall be displayed in the Signal Conditioner or the temperature measuring unit.
- 4.0 This optical sensors measuring system shall be of direct measurement non calibrating type. Temperature range of the system should be -30°C to $+200^{\circ}\text{C}$ & accuracy of $\pm 2^{\circ}\text{C}$ and the entire system shall be capable of withstanding all Routine and Type Tests of the transformer to be conducted at the Manufacture's Works. The Temperature Rise tests shall be carried out with the Fiber Optic Sensors already installed in the Transformers and temperature data for all probes will be recorded and stated in the test report.
- 5.0 All the Fiber Optic Cables will be brought out of the main tank through a leak proof feed through plate installed on the tank wall and Pressure Test Report towards leak proofing of the assembly shall be submitted. The external fiber optic cables shall be routed through flexible SS conduits with large bend radiuses for termination to temperature measuring unit.
- 6.0 The Signal Conditioner or the temperature measuring unit shall be housed in a separate enclosure having degree of protection of IP65 and shall be capable to retain temperature data for at least 90 days of one reading/15 minutes/sensor and shall have facility to download these data. The monitor shall offer user programmable temperature alarm outputs with programmable relays plus one System Status Relay. The monitor will have RS 485, Ethernet (RJ45) & USB communication ports and should allow communication with the SCADA system by using Modbus Protocol & IEC 61850. User friendly Software should be provided to allow easy configuration of the monitor and for data retrieval.
- 7.0 4-20 mA analog output of each channel shall be provided. Temperature of each sensor shall be displayed at the remote RTCC panel using this analog signal. This remote monitor on RTCC panel shall be supplied by the manufacturer (interconnecting cable to carry the 4-20 mA signal from local monitor to RTCC panel will be in the scope of Purchaser).
- 8.0 The relevant tests & certifications from reputed independent Test Labs must be furnished during detail engineering along-with the GTP.
- 9.0 Commissioning of the complete set of Fiber Optic Temperature Sensors shall be undertaken by the Manufacturer at their own arrangement without any additional cost implication to the Purchaser.