Book 5

Technical Specification and Requirements of Modification of Diesel Generator

Technical Specification for Modification of Diesel Engine In Microgrid Development Project at Mae Sariang District Provincial Electricity Authority

1. Introduction

This Technical Specification presentsthe modification of diesel engine in the bidding document of Microgrid Development Project at Mae Sariang District, Mae Hongson. The diesel engine is one source of power supply in Microgrid project. This document specifies the necessary details of modification of diesel engine.

Scope

This Technical Specifications define the requirements for modified diesel engine within the scope of MGDP. The document defines the following aspects

- Functionalities and interface requirements of diesel generator.
- Preheating system for diesel generator.

2. Principal Requirement

2.1 Interface of diesel generatorcontroller

Currently, there are 4 units of diesel generator have been used at Mae Sariang area. These diesel generators will be used as power supply during long interruption, and used as voltage regulation during heavy load. The diesel generators are consisted of 2 of 1 MW of PERKINS, and 2 of 1 MW of DORMAN. Each of PERKIN diesel generator is connected to one 1.25 MVA, 400/22 kV step-up transformer. While 2 DORMAN diesel generators are connected to one 2.0 MVA, 400/22 kV step-up transformer. Each diesel generators are controlled by individual controller, DSE8610, detailed in Appendix A. In addition, all 4 individual DSE8610 will be controlled by master controller DSE8660, detailed in Appendix B. The DSE8660 is an easy-to-use single or multi-mains controller with automatic transfer switch capability. It is designed to synchronize single or multiple DSE8610s with single or multiple mains (utility) supplies. The DSE8660 will automatically control the change over from mains (utility) to generator supply or run generators in synchronization with the mains (utility) to provide no-break, peak lopping and peak shaving power solutions. Therefore, the microgrid controller shall connect to input port of master controller, DSE8660, which are RS232, RS485 or Ethernet. The configuration and connection of diesel generator with transformer and controller is shown in Fig. 1.

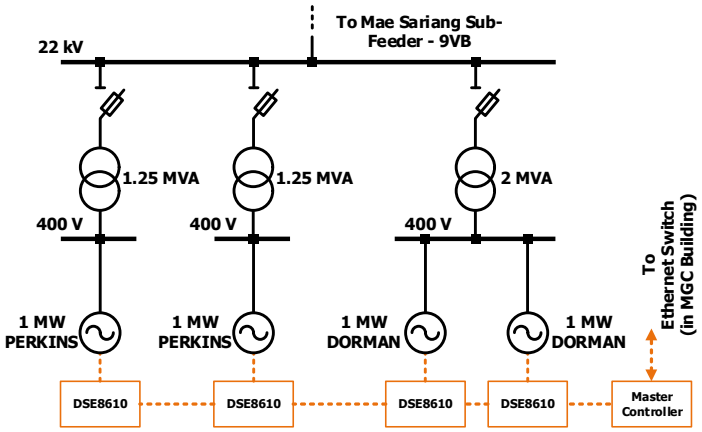

Figure 1: Existing configuration of diesel generator at Mae Sariang.

However, these 2 units of old DORMAN diesel generator will be removed. Then, PEA will purchase additional 3 new units of 1MVA diesel generators, according to TOR, PEA-I(F)-030A/2017. Therefore, the total diesel generator will be 5 units. Hence, the total capacity of diesel generator will be 5 MW. Each of PERKIN diesel generator is connected to one 1.25 MVA, 400/22 kV step-up transformer as before. While 2 new diesel generators are connected to one 2.0 MVA, 400/22 kV step-up transformer. The other new diesel generator is connected to one 2.0 MVA, 400/22 kV step-up transformer. Each diesel generators are controlled by individual controller, DSE8610. Then, all 5 individual DSE8610 will be controlled by master controller DSE8660. The microgrid controller shall connect to input port of master controller, DSE8660, which are RS232, RS485 or Ethernet. The new configuration and connection of diesel generator with transformer and controller is shown in Fig. 2. If the controller has to do peak shaving of each diesel generator, it has to install the current transformer (CT) for controller too. The microgrid controller shall be able to display and monitor all 5 diesel generators on the display of microgrid controller screen. The contractor shall provide and make connection of power cable, control cable and communication cable between Mae Sariang substation, microgrid control center building, and diesel generator building.

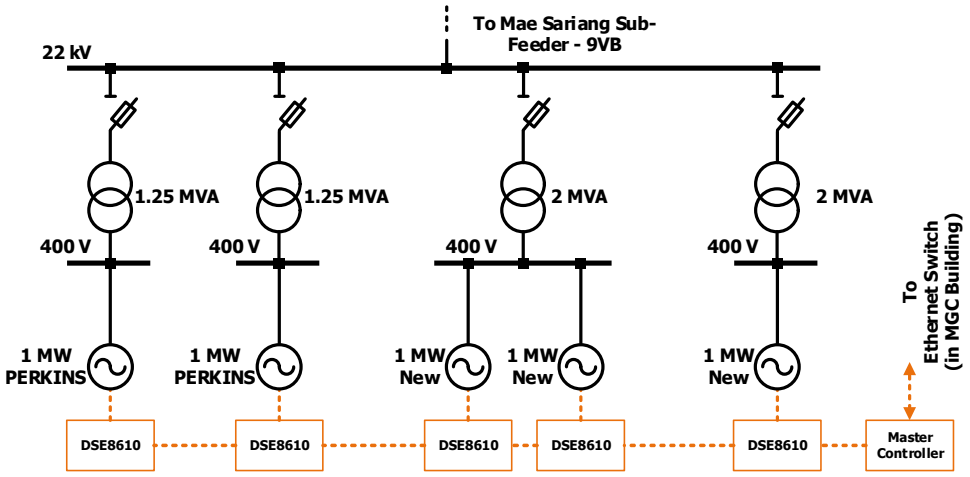

Figure 2: New configuration of diesel generator at Mae Sariang after replacement old diesel generator and additional new diesel generator.

2.2 Preheating system for diesel generator

One objective of MGDP is to improve reliability of system. However, these diesel generators cannot delivery power instantaneously, because diesel engines are starting from idle. There will take time at least 5 minutes to be ready for delivery power. They can be retrofitted with preheating system that can make these diesel generators to be ready within one minute. Therefore, the MGDP will have diesel generators as available source during interruption or when there are needed. The rating of delivery power of diesel generators is about 70% of its rating depended on working condition of generator (temperature, lubricated oil, etc.). However, it can delivery power up to 80-85% for short period of time.

The contractor shall provide preheating system to all diesel generators at Mae Sariang area. The preheating system will be needed it for easy engine starts and also immediate full power within one minute. The contractor has to propose the preheating system to PEA for approval.

Appendix

Appendix 5.A

Details of individual diesel generator controller, model DSE8610

Appendix 5.B

Details of master controller of diesel generator, model DSE8660