With reference to Section 3.2 and 13.4 of doc. "*3-P.013273.2004 RE98005_02 Technical Specification - Scope Description*", **two sets of performance tests** have been defined:

- The first set of tests are intended to be run during commissioning to verify the global efficiency before PAC release – the attention will be focused on the impact of engine load on the global efficiency, independently from the season.
- The second set of tests are intended to be run during the first year of operation to verify the global efficiency before FAC release – the attention will be focused on the impact of both engine load and season.

SECOND SET OF TESTS

The analysis of potential demand profiles leads to identify the scenarios represented in the tables "REFERENCE DEMAND". The summary is represented in the document "Basis of design"

WINTER SEASON

- The ELECTRICAL DEMAND to be satisfy by the engines has been estimated in the range indicated in the dedicated column of the table "REFERENCE DEMAND".
- Depending on the real electrical demand value occurring at the moment of the test, a certain number of engines will be initially set at FULL LOAD (100%)
- The expected HEATING DEMAND when the engines are expected to run at full load is indicated in the dedicated column of the table. It has been preliminary verified that this heating demand is higher than the heat capacity available from the engines, that therefore is expected to be fully delivered to the related users. The remaining heating demand is expected to be satisfy by existing conventional boilers. Therefore, no absorption chillers are not expected to run. COOLING DEMAND indicated in the dedicated column of the table is expected to be satisfied by existing vapour compressor chillers
- No dissipation to the atmosphere is expected. In order to be sure that this is the case, site users actual consumption will be constantly monitored before the test by means of the hot water return temperature and the activation of the engines dissipation systems. When the heat is fully consumed by the user the return temperature is expected to be confined in the range 75 – 80 °C.

- The monitoring will be started days before the test in order to identified a stable period of consumption suitable for the test and its duration – indicatively it should be 1-2 hours.
- In case during the test variation of the users' heat consumption occurs, proper correction curve in function of the dissipated energy will be applied. The correction curves will be prepared by the Contractor. In case of great variation in the consumption, the test will be repeated.
- Reference ambient condition are depicted in doc. RE98005 – Section 3.2.1.1. Contractor shall define proper correction curves for equipment performance guarantees' verification purposes.
- The verification of the PARTIAL LOAD will be executed with the same methodology. The expected HEATING DEMAND range could be larger than that one expected for the full load (min value could be lower and maximum value could be higher). This means that heat from the engines could be available for the absorption chiller. The preliminary analysis of the energy demand shows that this occurs only for few hours. For the purpose of the test this is than not relevant and therefore the site consumption will be monitored days before the test in order to identified periods where heat from the motor is fully utilized for heating.
- The preliminary analysis of the energy demand shows that engine are requested to run above 60-65%. The MINIMUM LOAD will be then verified considering the FULL LOAD scenario, keeping at least one engine at minimum with the others at higher load depending on the electrical demand. The remaining site energy demand will be satisfied by existing back-up equipment. Previous consideration are valid also for this tests.

MEDIUM SEASON

The approach is generally the same explained for the winter season. As the heating demand is expected to be slightly reduced, the activation of the absorption chiller could occurred more frequently. However, test will be executed with no absorption chillers in operation.

SUMMER SEASON

The approach is generally the same explained for the winter season. As the heating demand is expected to be significantly reduced, the test will be carried out with the absorption chillers in operation.

FIRST SET OF TESTS

The first set of test will be carried out with the same approach.

GUARANTEED VALUE FOR THE GLOBAL EFFICIENCY

The target value of 0.80 has been defined based on the reference demand profiles that foresees a certain rate of heating that occurs also in summer and partially compensate the “negative” effect of COP on the global efficiency. Therefore, the value 0.80 is expected to be reached also in summer and it is not necessary to update the global efficiency formulation or the target value. To better clarify, the test in summer will be carried out when the heating demand is above 1000 kWt.

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