## Basic requirements:

- FHIC12 – Flue gas denitrification (DeNOx)

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Chap. 4: revised the minimum value of MW realized
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1. INTRODUCTION

The present document describes synthetically the characteristics of the Merchandise Group “FHIC12 – FLUE GAS DENITRIFICATION DeNOx”; it defines the technical and quality requirements necessary for the Suppliers to be included in ENEL’s qualified supplier list.

2. DESCRIPTION OF THE MERCHANDISE GROUP

The systems for the denitrification of the flue gas (DeNOx or SCR) produced by coal, lignite and fuel oil fired power plant boilers, consisting of one or more catalytic reactors in parallel containing one or more catalyst layers for NOx abatement, belong to the Merchandise Group under consideration.

The catalyst is included in the supply, while the gaseous ammonia production system is an optional supply.

All the above mentioned devices are automatically managed by the control system.

Design, manufacturing, factory and site tests, commissioning supervision and start-up are included in the scope of supply.

3. MAIN TECHNICAL CHARACTERISTICS

Functional and manufacturing features of the merchandise group

The DeNOx is intended to reduce the NOx concentration in the flue gas produced by coal, lignite or fuel oil fired boilers.

The system consists of one or more identical catalytic reactors in parallel, each one containing one or more catalyst layers.

The flue enters the reactor and after passing through the flow rectifiers it gets to the catalyst layers where the reaction between the NOx and the ammonia injected upstream takes places.

Gaseous ammonia, before being injected in the flue gas by proper devices, is diluted with hot air produced by an appropriate system comprising air fans and air heaters.

The gaseous ammonia production system can be of different typology, gaseous ammonia can be produced from urea, anhydrous ammonia or ammonia solution.

A clearing system, based on acoustic waves emitters or steam sootblowers, keeps the catalyst layers clean.

The main components included in the scope of supply are listed below.

- One or more catalytic reactors in parallel consisting of steel structural works and metallic plates, including inlet and outlet hoods
- Hoppers for ash collection
- Reactor support structures.
- Catalyst
- Gaseous ammonia distribution and mixing system with the flue gas inside the ducts
- Reactor/reactors by-pass system
- Baffles and flow rectifiers inside the ducts upstream and inside the reactor
- Catalyst clearing system (sonic or steam sootblowers)
- Gaseous ammonia dilution system with hot air
- Physical model for the reactor/ducts flow dynamics simulation
- Provisions for sampling systems (sampling grids, nozzles)
- Gas analysers (NOx, O2, NH3 etc)
- Electric boards (PC and MCC, power and light boards)
- HV and LV cables
- Control system.
- Gaseous ammonia production system – OPTION SUPPLY

The customer can state at least the following parameters in the technical specification:

- Position of the reactor/reactors in the flue gas line (high dust, tail end)
- Catalyst type (plates, honeycomb)
- Maximum SO2 to SO3 conversion
- Type of the cleaning system
- Minimum catalyst pitch/thickness
- Maximum allowable value of ammonia slip during performance test and after one year operation

Controls, workshop tests and acceptance tests

Besides the normal tests required by the regulations or by recognized standards the following tests will be required:

- Catalyst: characterization and acceptance test
- structures: workshop erection of one or more frames
- performance: performance test according ASME PTC38 or equivalent Italian or European standard

Standards and regulations

Reference standards and regulations for the components are as follows:

- Materials: EN, UNI, ASME
- Pressure components: PED
- Electrical equipment: IEC, CEI, NEMA
- Test and performance tests: ASME (PTC 38), IEC
- Fire fighting: UNI, NFPA

4. QUALIFICATION REQUIREMENTS

Requirements

The requirements necessary to be included in ENEL’s supplier list relevant to the present Merchandise Group are indicated hereinafter.
The Supplier shall demonstrate the possession of the above mentioned requirements and shall prove it by providing appropriate documentation signed by his own legal representative.

On the basis of the obtained information the Customer reserves the right to impose limitations on the qualification in particular with reference to the scope of supply.

- References
With reference to the denitrification catalytic systems, high dust type, for the treatment of the flue gas produced by coal or lignite fired boilers or also fired by a mix of liquid and solid fuels (provided that coal and lignite are the predominant fuels), the Supplier shall have references in the last 12 years matching the following requirements:

A: at least 3,000 MWe of SCR systems installed in power plants with at least design, flow model and catalyst included in the supply

B: at least 1,000 MWe of the plant as per the above mentioned A requirement shall be turn-key supply (base design, detailed engineering, supply, erection, commissioning and start-up)

C: at least 2 plants as per requirement A and at least 2 plants as per requirement B shall be rated more than 300 MW

- Design
The Supplier shall be able to perform, inside his own structure, the design of the whole system.

In particular the tools and the staff in order to perform the fluid dynamic design shall be available.

- Workshop fabrication
The Supplier shall utilize workshops provided with suitable equipment and specialized staff in order to perform the required manufacturing. The Supplier shall ensure the implementation of a suitable Quality Control System for the manufacturing activities performed in his own workshops or in the sub-suppliers’ workshop.

- Quality system
The Supplier shall demonstrate the implementation of a Quality Management System fulfilling ISO 9001:2000 Standards. The certification of the Supplier’s Quality Management System released by a Notified Body, according to the model required for the Merchandise Group will be accepted by Enel, However ENEL, if deemed necessary, reserves the right to verify the Supplier’s Quality System.

- Other requirements
The Supplier shall demonstrate:
a) Compliance of the projects during the bid phase and during the realization phase with ENEL’s functional and manufacturing requirements.

b) Availability of design offices provided with the suitable staff and IT systems in order to perform the required activities. In case of licence production, the Supplier shall demonstrate that his own project staff is suitable to get the “know-how”, to develop the detailed engineering phase, the construction phase and the fabrication and control plans according to the licensor’s manufacturing standards.

c) Availability of a management system suitable to perform the coordination and planning of the design phase and of the realization activities according to ENEL’s procedures.

d) Availability of a suitable after sale service in order to assure:
   - The supply of spare parts interchangeable with the original ones, including the updating that could arise from the licensor.
   - Suitable resources for the maintenance activities and for the component overhaul.

e) Workshop capacity and time required for realizing a system with characteristics similar to those of the Merchandise Group considered in the present document.