

Montrouge, 16/11/2021

Letter reference:

CODEP-DCN-2021-044800

For the attention of the Director

EDF UTO

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Subject: Monitoring the procurement of NPP equipment

MDEP inspection

Vendor FLOWSERVE, Raleigh, USA Plant

Topics: R9.9 Vendor:

Code: Inspection INSSN-DCN-2021-0302 of 20/09/2021

References:

- [1] Environment Code, and more specifically chapter VI of title IX of book V
- [2] Environment Code, and more specifically chapter VII of title V of book V and Article L.593-33
- [3] Order of 7 February 2012 amended, concerning basic nuclear installations
- [4] Order of 30 December 2015 relative to the manufacture of nuclear pressure equipment
- [5] European Directive 2014/68/EU relative to nuclear pressure equipment
- [6] MDEP VICWG Common position, CP-VICWG-02, "*Common position: witnessed, joint, and multinational vendor inspection protocol*" of 4 November 2020

For the attention of the Director,

As part of the ASN remit concerning the monitoring of the referenced basic nuclear installations, an ASN inspection of your vendor FLOWSERVE was held in the presence of the NRC on 20 and 21 September 2021 on the topic R9.9 "Vendors".

Pleased find below the summary of the inspection, along with the main requests and observations arising from the findings made by the inspectors on this occasion.

Inspection summary

The inspection of 20 and 21 September 2021 conducted in accordance with the inspection protocol of the MDEP (*Multinational Design Evaluation Program*), of the Nuclear Energy Agency (NEA), in reference [6], concerns the steps taken by your vendor “FLOWSERVE” to comply with the requirements associated with the manufacture of equipment or components intended for nuclear power plants.

In the light of this examination based on spot-checks, the organisation defined and implemented by your vendor is good with regard to the manufacture of nuclear equipment.

The inspectors were pleased to note that at the beginning of 2021, FLOWSERVE had initiated measures to reinforce the safety culture amongst its personnel as a whole. Video communications and newsletters were produced for this purpose. In addition, the company has placed yellow forms around the entire plant, so that the personnel can use them to immediately record any non-conformity thus reinforcing their questioning attitude.

The inspectors also found that FLOWSERVE has set up a database for monitoring its vendors. This database, containing all available information, allows easier and structured monitoring of the subcontracting chain.

Finally, the inspectors conducted spot checks to verify application of French regulations concerning the requirements regarding pressure equipment, via application of the RCC-CM construction code, and those concerning the detection and analysis of non-conformities.

This inspection is the subject of two additional information requests.

A. Corrective action requests

Not applicable.



B. Additional information

B.1 - Monitoring of the subcontracting chain

FLOWSERVE performs qualification audits on its subcontractors. These qualifications are conducted either directly by the company’s auditors or by one of the vendors of the NIAC group (*Nuclear Industry Assessment Corporation*). In order to comply with the requirements of the American

ASME code, these qualifications of safety-related nuclear subcontractors are conducted every three years.

However, for the manufacture of nuclear pressure valves intended for the French reactors and subject to the Order in reference [4] and to the RCC-M code, FLOWSERVE does not supervise the specific subcontractors performing important activities for the protection (“AIP”)¹.

However, the company’s representatives are committed to performing an annual evaluation of the vendors manufacturing components according to the RCC-M for the steam isolation valves (VIV) as well as for the main steam isolation valves (MSIV) and the main feedwater isolation valves (MFIV) for the EPR. The methods used for this supervision must be transmitted to ASN.

I would recall that Article 2.2.2. of the Order [3] states that *“the licensee shall exercise surveillance of its outside contractors enabling it to ensure [...] that the operations they perform, or the goods or services they provide, comply with the defined requirements.”*

Request B1: I would ask you to send me the methods used for your surveillance of the subcontractors of your vendor FLOWSERVE performing protection important activities, as well as the methods used for FLOWSERVE supervision of these subcontractors.

B.2 - Heat treatment procedure

In order to reduce post-weld stresses, FLOWSERVE carries out post-weld heat treatment (PWHT) for certain materials. This post-weld heat treatment consists in heating the materials for several hours at a temperature of a few hundred degrees in a furnace, or using a local induction process. The treatment temperature and duration must be controlled, on the one hand to eliminate the stresses resulting from welding (attainment of a minimal temperature) and, on the other to avoid altering the mechanical properties of the material (compliance with a maximum temperature).

The inspectors held discussions with the plant operators and engineering department concerning the heat treatment procedure and the guarantees that could be obtained with regard to the representativeness of the measurements taken with thermocouples to verify compliance with the required temperature range for PWHT. It was pointed out that best practice was to position the control and monitoring thermocouples on each side of the equipment. However, although the internal procedure reference MS1703 specifies the method used for taking and recording the temperature, it gives no indication regarding the positioning of the thermocouples. Moreover, for

¹ That is an important activity for the protection regarding the interests mentioned in article L. 593-1 of the Environment Code (security, public health and safety, or protection of nature and the environment).

two similar equipment items on which heat treatment was performed, the thermocouple positions indicated in the records were not the same (thermocouples either side by side, or a maximum distance apart).

Request B2: I would ask you to ensure that the temperature measurements taken on the parts during the post-weld heat treatments carried out by FLOWSERVE are representative of the treated area as a whole and guarantee compliance with the recommended temperature range.

Request B3: I would ask you to send me the updated temperature measurement procedure used during PWHT in order to meet the objectives set out in request B2.



C. Observations

C1. Prevention of risk of Counterfeit, Fraudulent and Suspect Items (CFSI)

The requirements concerning the prevention of the risk of counterfeit, fraudulent and suspect items at the subcontractors of FLOWSERVE are defined via purchase orders which explain what is required of the inspections. However, FLOWSERVE does not evaluate the effective implementation of this process at its subcontractors. The inspectors wished to recall that the importance of extensive communication to the entire subcontracting chain, regarding the risk of counterfeit, fraudulent and suspect items, was also one of the IAEA recommendations in its report entitled “Managing Counterfeit and Fraudulent Items in the Nuclear Industry”.

During the course of the inspection, the FLOWSERVE representatives undertook to update section 7.6 of the qualification audit checklist, by including the monitoring of CFSI, taking inspiration notably from standard ISO 19443.

C2. Separation of welding electrodes and different types of steels

The inspectors checked the component welding procedures. Although the procedures were satisfactory, they nonetheless found that in the welding electrodes storage area, the electrodes used for the pressurised parts and those intended for the other parts are not physically separated. The inspectors drew the attention of the FLOWSERVE representatives to the risk of mis-identification of the electrodes which could lead to a utilisation error.

The inspectors also found that stainless steels were stored with no physical separation from carbon steels in the raw materials store. The operators are however well aware of the risk of pollution of stainless steels by carbon steels, in particular during machining or welding operations, which can

lead to an increased risk of corrosion. The inspectors therefore recommended that the material streams be separated.

C3. List of AIP

The inspectors consulted the list of AIP for the vendor FLOWSERVE. Although this list details a certain number of activities and the corresponding technical inspections, it is not exhaustive and does not therefore represent all the important activities performed internally or by subcontractors. Similarly, certain technical inspections need to be clarified.

However, the inspectors were able to confirm that the technical inspections of critical activities are carried out by dedicated and independent quality controllers. The FLOWSERVE representatives also specified that the identification of critical activities and the inspections to be performed are the responsibility of their customers and that they must be stipulated in the purchase orders. The EDF representatives have agreed to discussions with the FLOWSERVE company in order to explain the regulatory requirements for the AIP list and make provision for updating it in accordance with the applicable requirements.



Kindly send me your comments and answers concerning these points within a maximum of **two months**. With regard to the commitments you will be required to make, I ask that you identify them clearly and indicate a completion date for each one.

Yours sincerely,

Signed by:

Director of the Nuclear Power Plants Division

Rémy CATTEAU