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The Important Correlation Between the Welding Process and NR-13

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1. Introduction

As we all know, NR-13 is a health and safety standard, not just an inspection standard.

In order for us to provide safety to the equipment, NR-13 determines that the performance and integrity of the equipment must be monitored from the construction and installation of periodic inspections and certainly one of the most used in the manufacturing process is welding, and therefore, it has a strong correlation with the integrity of the equipment and consequently with the NR-13 standard.

In the same way, throughout the equipment it is possible that it is necessary to carry out repairs and alterations, and for such actions the welding process will most likely be used and an alteration and repair project will be required. This is another relevant point and establishes a strong link between welding and NR-13.

Therefore, this connection between NR-13 and the need for knowledge and mastery of the welding process has been established, below is a set of information and suggestions for the proper conduct of this subject within our work environment.

2. Reference Standards

- ASME IX;
- ASME VIII Div.1;
- NBEC;
- API 650;
- B31.3;
- B31.1;
- Among others.

3. Development

NR-13 has requirements related to well-developed document control and encompasses the need for the existence of medical records, safety record book, inspection report, manufacturing certificate, among other documents.

Therefore, the proper analysis of these documents when evaluating the integrity of a piece of equipment is very important and among the documents cited, some of them will have a deep connection with the welding process. For example, in the medical record there is a need to make manufacturing procedures available, and among the manufacturing procedures are welding procedures. These welding procedures as we all know must be qualified, as well as the professionals who did the welding on the equipment, must also be certified.

Welding procedures are based on qualification standards, such as, ASME IX, and must follow all requirements determined by this standard. Similarly, when making a repaired alteration project known as a BAR, the welding procedures that will be used should be cited as well as the welders who will be responsible for performing the welding.

The existence of the EPS or Welding Procedure does not end the analysis regarding its adequacy. The items below must also be checked so that this EPS is in fact accepted within the medical record or within the BAR.

The main items to be checked in an EPS are:

- Base metal according to the metal of the equipment;
- Qualified thickness compared to the thickness of the equipment;
- Welding position, both in the EPS and in the welders, in relation to the possible positions used in the production of the equipment;
- Need for post-welding heat treatment;
- Process used and existence of the consumables certificate in the equipment's databook,
- Robustness of the EPS in the face of the existence of RQPS of support and signature of the certified professional in the field of level 2 weld inspector.

A good NR-13 professional should also have an understanding of base materials and their thicknesses, such as when post-welding heat treatment is required by the standard. This process is related to these two variables, the base metal and its thicknesses.

Often the manufacturer may not realize the specific need for heat treatment because of the special characteristics and thickness of a base material. In addition, a good NR-13 professional must have a perfect understanding of the importance of monitoring the manufacture or assembly of equipment, in which this assembly is framed within the standard. However, no welding can be performed after the final hydrostatic test of this equipment has been done, under penalty of losing the hydrostatic test and having to redo this test, which is expensive and time-consuming, which demands attention because of its intrinsic risks.

4. Conclusions

Welding is characterized by being a special process and because of this it requires full knowledge and existence of documentation compatible with the responsibility of the equipment manufactured. The presentation of documents that do not meet the real construction situation, as well as heat treatment and hydrostatic testing, point to the non-mastery of this process and the non-mastery can result in equipment built with quality failures.

The start-up of equipment with a failure in its construction can lead to unexpected accidents or, at best, to the reduction of its useful life and the need for repair throughout its use. However, it is recommended that professionals in the industrial sector associated with these issues be more and more reliable in order to give the equipment and your company more and more reliability.

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