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In the event of any differences in interpretation of this guide the Finnish version shall take precedence over this translation.

NUCLEAR POWER PLANT PRESSURE VESSELS. MANUFACTURING LICENSE

CONTENTS

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1. GENERAL

1.1 Manufacturing License

The fabrication of nuclear power plant pressure vessels which are in use in Finland is allowed only on a manufacturing license issued by the supervising authority. The manufacturing license of a vessel in Safety Classes 1 or 2 shall be granted by the Institute of Radiation Protection (IRP). Pressure vessels of Safety Classes 3 or EYT may be fabricated on a manufacturing license granted by either the Technical Inspectorate (TI) or the IRP. Pressure vessels that are under the control of the IRP are defined in Guide YVL 3.0, subsection 1.2, where they are divided into pressure tanks and piping.

Prior to the issuance of the manufacturing license, the IRP may, when deemed necessary, conduct audits and inspections at the fabrication site.

The scope of manufacturing licenses can be specified so as to include fabrication at the mill, installation or repair and modification during operation.

1.2 Manufacturing Classes

The manufacturing licenses for pressure vessels and their component parts are divided into manufacturing classes as follows:

1. Class NA: pressure tanks of Safety Classes 1 or 2 and pressure tanks with a design pressure over 10 MPa.

2. Class NB: pressure tanks of Safety Classes 3 and EYT requiring registration in accordance with Guide YVL 3.0, subsection 1.5, with a design pressure no more than 10 MPa.

3. Class NC: pressure tanks of Safety Classes 3 and EYT not requiring registration in accordance with Guide YVL 3.0, subsection 1.5.

4. Class ND: piping in Safety Classes 1 and 2.

5. Class NE: other piping

In case the size of the pressure vessel is small or its operating parameters low, the Institute of Radiation Protection can, on application, accept a deviation from the afore-said classification.

2. SCOPE OF APPLICATION

This guide applies to the fabrication, installation, repair and modification of pressure tanks (with internals) and piping, including component parts, of all Safety Classes, with exceptions mentioned below.

If the manufacturer engages sub-contractors, for example, to participate in fabrication or quality control, an explanation thereof shall be included in the license application or the license shall be later supplemented with this information. Sub-contractors are subject to the same regulations, where applicable, as the manufacturer. The power company may also file an application for its own fabrication.

The fabrication of construction materials, welding filler materials and seamless standard parts does not require a manufacturing license provided in this guide. The approval procedure of construction materials and welding filler materials is explained in Guide YVL 3.9. Standard parts are parts of pressure tanks and piping (flanges, screws, form parts, small pipe ends and auxiliaries outside the scope of this guide) the standards of which are submitted to the IRP or referred to in connection with the approval of the construction plan. If the fabrication of seamed standard parts is comparable with that of construction materials, the IRP can, on application, permit the fabrication of these parts without license. Automatically manufactured seamed pipes require a manufacturing license only in exceptional cases.

Valves and pumps do not require a manufacturing license provided in this guide. However, a description of the manufacturer and supervision of manufacture shall be delivered in connection with the construction plan, as explained in Guides YVL 5.3, YVL 5.4 and YVL 5.7.

This guide also applies to the steel shell of the reactor containment, including penetrations in accordance with the requirements set for pressure tanks of Safety Class 2.

Directions based on this guide also apply to the manufacturing license and supervisor of manufacture of unregistered pressure tanks defined in Guide YVL 3.0, subsection 1.5, and piping in Group A defined in subsection 1.6. The manufacturer of piping in Group B is not required a manufacturing license provided in this guide. However, the principles set forth in this guide shall be complied with where applicable in the manufacture.

3. APPLICATION AND PREREQUISITES FOR MANUFACTURING LICENSE

3.1 Application for Manufacturing License

When an application for a manufacturing license is filed with the IRP, the application or other required documents, including supplements, are submitted through the power company in accordance with Guide YVL 1.2.

The manufacturing license is specific to power company and the application must be filed in good time so that the IRP can go through it before the planned commencement of fabrication. The fabrication cannot be commenced until the manufacturing license is granted. On application, the scope of the license may be extended so as to include also another power company, if the necessary qualifications are satisfied.

The application for a manufacturing license submitted to the IRP shall include:

1. An account of the applicant and place of fabrication (articles of association and an excerpt from the commercial register or corresponding documents).

2. An account of the pressure vessels to be manufactured. The account shall show the Safety Classification and intended use of the vessels as well as the most important design and operating parameters including potential system designations.

3. An account of the applicant's technical expertise with respect to pressure vessel fabrication.

4. An account of any previous fabrication programmes for nuclear power plant components and for other corresponding components as well as a description of the standards that the fabrication has been based on.

5. An account of the measures taken in the supervision of manufacture or a copy of a resolution on the supervisor of manufacture issued by the IRP or the TI (Safety Classes 3 and EYT).

6. A plan for the fabrication and inspection of a welded sample of proficiency or other sample of workmanship relating to the manufacture.

7. A report on the sample of workmanship mentioned above in paragraph 6, issued by the Technical Research Centre of Finland or by some other research institute approved by the IRP.

Paragraphs 3, 5 and 6 are dealt with in more detail in subsections 3.2.2, 3.2.3 and 3.2.4.

3.2 Prerequisites for Manufacturing License

3.2.1 General

Prior to the issuance of a manufacturing license the following conditions shall be met:

it can be demonstrated that the applicant has sufficient technical knowledge and the necessary machines and equipment for the fabrication of pressure vessels indicated in the application,

the pressure vessels are fabricated under the supervision of an approved supervisor of manufacture.

In the manufacture of pressure vessels of Safety Classes 1 and 2, the supervisor shall be employed by the manufacturer. If the work is performed on the power company's manufacturing license and it belongs to Safety Classes 1, 2 or 3, the supervisor shall be employed by the power company.

3.2.2 Description of Manufacturer

The description of the manufacturer's technical expertise and of the equipment to be used for fabrication, inspections, testing, etc shall comprise the following information:

- an account of the organization of the company, describing the duties of the organizational units and responsible persons participating in design, fabrication and quality control and the execution of quality assurance

- instructions and procedures to be used in fabrication (e.g. quality assurance programme in accordance with Guide YVL 1.4) and a catalogue of the internal standards and guides relative to the various phases of fabrication and inspection. Prior to issuance of the manufacturing license, the IRP shall be provided with these standards and guides or it shall have access to them during audits at the fabrication site.

- an account of procedure tests that have been or will be made for the welding of construction materials applicable to fabrication. The results and scope of applicability of these tests shall also be described.

- Inspection equipment in use in the fabrication of pressure vessels and the licensing and qualification procedures for the materials testing institute, quality control inspectors and welders of pressure vessels.

- a plan for the employment of outside experts and subcontractors, which may be part of design, moulding of materials, welding, heat treatment, finishing or the quality control mentioned in the previous paragraph.

Inspectors and inspecting bodies carrying out quality control of pressure vessels shall be accepted before commencement of manufacture, as provided in Guide YVL 1.3. In case the manufacturer will only inspect his own products, the application for the inspection rights of the manufacturer's quality control department and inspectors may be filed in connection with the application for the manufacturing license.

3.2.3 Supervision of Manufacture

The application for the approval of a supervisor of manufacture shall be presented in writing to the supervising authority. It should be noted that the application to the IRP is submitted through the power company. The application shall give the applicant's personal data and domicile as well as a description of his competence, as specified below.

1. Requirements set for the supervisor of manufacture:

- he is a citizen of Finland
- he has a university degree that is suitable for the task or has graduated from a technical college or school The required education depends on the intended use and

operational parameters of the pressure vessels to be fabricated

- sufficient working experience, as deemed by the supervising authority, in the fabrication of pressure vessels specified in the application

On the basis of competence, the supervisors of pressure vessel manufacture and their rights are classified as follows:

- Competence class A: the supervisor has the degree of Master of Science in Engineering from a university of technology or from some other university or he is an engineer graduated from the department of mechanical engineering of a technical college. In addition, he must have at least four years' experience in the design or fabrication of pressure vessels or as a full-time inspector of pressure vessels.

- Competence class B: the supervisor is an engineer or a technician graduated from the department of mechanical engineering of a technical college or school. In addition, he must have at least two years' experience in the design or fabrication of pressure vessels or as a full-time inspector of pressure vessels.

- Competence class C: the supervisor is a technician graduated from the department of mechanical engineering of a technical school. In addition, he must have at least one year's experience in the design or fabrication of pressure vessels or as a full-time inspector of pressure vessels.

A supervisor of competence class A is entitled to supervise manufacture in all manufacturing classes; a supervisor of class B in manufacturing classes NB, NC and NE and a supervisor of class C in manufacturing classes NC and NE.

The IRP may, on application, deviate from the requirements set for the competence of the supervisor, if the Safety Classification and operating parameters of the pressure vessels to be manufactured are low.

2. Duties of the supervisor of manufacture

The supervisor of manufacture shall see to it that the provisions in the manufacturing license and the requirements set forth in this guide for the the manufacturer are complied with. In component-specific supervision, the supervisor shall see to it that the vessel is manufactured in accordance with the construction plan approved by the IRP, with appropriate techniques and following given orders. For each pressure vessel, he shall prepare a written statement showing that the requirements presented below are met. Any deviations that come up in the manufacture shall be mentioned in the statement. Because the supervisor of manufacture is the person responsible for the manufacture, he is granted no inspection rights.

During the fabrication, installation or repair of the pressure vessel and its component parts, the supervisor of manufacture shall supervise

- quality, storage and handling of construction and filler materials and material certificates
- moulding of construction materials and heat treatment
- acceptability of required procedure tests and reporting of results
- the welders' competence and workmanship and preparation and cataloguing of work tests
- preparation of weld grooves, applicability of forms and dimensions to the welding method in use and the matching of parts with each other
- condition of equipment to be used in welding and in other fabrication processes
- welding conditions, pre-heating and the welders' work
- form and quality of the welds and execution of postweld working and treatment
- inspection and repair of construction materials and welded joints
- testing of pressure vessels (e.g. pressure and leak tests)
- deviations that are detected during fabrication and the handling, reporting and acceptability of these deviations
- compliance with special requirements related to fabrication (sand blasting, finishing, inspection of measurement, inspection of cleanness, transportation)

When the supervisor of manufacture relinquishes his job, the holder of the manufacturing license shall notify the IRP thereof without delay and apply for the approval of a new supervisor within one month. The manufacturer shall make arrangements for temporary supervision until a new supervisor is approved and begins his work.

3.2.4 Sample of Workmanship

A welded sample of proficiency matching the Manufacturing Class or some other sample of workmanship relating to fabrication is necessary only in connection with the manufacturing license of piping fabricated in Finland and pressure tanks to which no procedure and work tests connected with the welding of construction materials are applied. The sample is made in accordance with plans approved by the IRP. As for other pressure tanks, the sample of workmanship is replaced by the above-mentioned procedure and work tests that are supervised in connection with audits.

The sample of workmanship shall represent the future fabrication and the plan for a welded sample shall, within limits of variations, include a variety of material qualities, welding processes and forms of joints with heat treatments, various diameters and wall thicknesses as well as inspections. Destructive testing of weld seams is determined on the basis of the intended use and Manufacturing Class.

4. REQUIREMENTS SET FOR THE MANUFACTURER

In manufacturing pressure vessels, the holder of the manufacturing license is responsible for compliance with the Act on Pressure Vessels (98/73) and requirements set forth in this guide. The provisions in the manufacturing license and the construction plan approved by the IRP shall be followed in the fabrication. The manufacturer is responsible for the up-dating of information in the license and in the appendices of the application. If the modifications result in changing the Manufacturing Class or control procedures, they shall be submitted to the IRP for approval in the same way as the original application. The manufacturer shall inform the IRP and the power companies of other essential modifications as far as they concern nuclear vessels.

5. MANUFACTURING LICENSE ISSUED BY THE TI

Before the fabrication is begun on the manufacturing license issued by the TI, an account of the license, the acceptance of the supervisor and the rights of the quality control inspectors and inspecting bodies shall be given to the IRP. The account shall also include a description of the functions and duties of the organizational units connected with the fabrication.

6. MANUFACTURE ABROAD

If the pressure vessel is fabricated abroad, the principles in sections 1 - 4 can be applied as follows:

6.1 The IRP makes audit and inspection tours, for which the power company is required to make the necessary arrangements, to find out whether the prerequisites for the manufacture of pressure vessels of Safety Classes 1 and 2 are fulfilled.

The equipment and processes of the various phases of manufacture (moulding, machining, welding, heat treatment and testing) are examined during the audit and inspection tours. In addition, the general quality assurance procedures (quality assurance programme) and the instructions for fabrication and inspection are studied. On the basis of the audits, the IRP may place conditions on the manufacture.

In exceptional cases, mostly in connection with auxiliaries that are related to pressure vessels, the IRP may accept a description of the fabrication given by a foreign supervising authority or a corresponding organization for the issuance of a manufacturing license. The description shall be prepared

in accordance with the principles set forth in this guide. A separate agreement is made on the dispatch of manufacturer's instructions.

A description of the foreign manufacturer of pressure vessels of Safety Classes 1 and 2 shall be presented to the IRP prior to inspection tours and commencement of manufacture. The description shall provide the following information:

- what nuclear vessels or other comparable pressure vessels and components the company has fabricated before and on which standards and guides it has based the manufacture
- the company's quality assurance programme and an account of the organization related to the manufacture describing the duties of the organizational units and persons responsible for quality assurance and quality control
- qualification programmes for welders and quality contro. inspectors (x-ray, ultrasonic, etc)
- potential manufacturing licenses issued by authorities responsible for safety or other licenses relative to manufacture (e.g. ASME)

A prerequisite for the manufacturing license is that, when necessary, an inspector employed or approved by the IRP is given the opportunity to supervise the fabrication, inspection and material testing of test pieces which are used for qualifying welding processes for pressure vessel manufacture. The supervision can also be partly or entirely included in the factory supervision which is carried out by the IRP during fabrication and for which separate instructions are issued.

6.2 The competence of the foreign manufacturers of pressure vessels in Safety Classes 3 and EYT is assessed by the IRP on the basis of the descriptions of the manufacturer that are presented in connection with the inspection of the first construction plan. Inspection tours may also be included. The descriptions shall follow the principles set forth in this guide and they may also be given apart from the construction plan.

6.3 The manufacturing license granted to a foreign manufacturer may be restricted so as to be specific to one plant or one delivery.

If the manufacturer of a foreign pressure vessel will later do installation or repair work in Finland, the necessary additional information for the extension of the manufacturing license is submitted in accordance with the sections 1...4 in this guide, taking into consideration the descriptions that have already been given.

The supervisor of the manufacture of pressure vessels and component parts to be imported to Finland need not be a citizen of Finland. However, the competence of the supervisor is demonstrated, for example, in connection with the above-mentioned audit and inspection tours and descriptions. The manufacturer shall provide information on the organization, persons and

procedures which are used to ascertain that the supervision of manufacture meets the requirements and provisions set forth in this guide. The supervisor of manufacture is approved while the license is under examination.

The power company shall present the IRP with information on all significant changes that are made in the manufacture of a pressure vessel abroad.

7. REQUIREMENTS SET FORTH IN THE ACT ON PRESSURE VESSELS

To fulfill the rights and obligations mentioned in the 4th and 5th paragraphs of the Act on Pressure Vessels 98/73, the power company shall include the requirements in question in its deeds.

On the basis of the Act on Pressure Vessels, an inspector employed or approved by the supervising authority has the right to enter the fabrication site of pressure vessels and to obtain necessary information and specimens in order to control compliance with the given orders. The inspector can prohibit manufacture of a pressure vessel which is in nonconformity with requirements or issue a temporary prohibition of manufacture.

8. REFERENCE LITERATURE

98/73 Act on Pressure Vessels
YVL 1.2 Formal requirements for the documents to be submitted to the Institute of Radiation Protection
YVL 1.3 Acceptance of separate inspecting bodies to carry out inspections of main components and systems of nuclear power plants
YVL 1.4 Quality assurance program for nuclear power plants
YVL 1.8 Supervision of repairs and modifications on nuclear power plants during operation
YVL 2.1 Safety classification of nuclear power plant systems, structures and components
YVL 3.0 Nuclear power plant pressure vessels. General guidelines on inspection
YVL 3.1 Nuclear power plant pressure vessels construction plan. (Safety Classes 1 and 2)
YVL 3.2 Preinspection of special pressure vessels (not including vessels of higher Safety Classes)
YVL 3.9 Nuclear power plant pressure vessels. Materials and filler metals
YVL 5.3 Inspection of nuclear power plant valves
YVL 5.4 Inspection of nuclear power plant safety valves
YVL 5.7 Inspection of nuclear power plant pumps
SFS 2223 (2nd ed) Welding of pressure vessels. General rules for fabrication