PREINSPECTION OF SPECIAL PRESSURE VESSELS
(others than those belonging to more exacting security classes)

General

The construction of special pressure vessels which particularly have effect on the safety of nuclear power plants, may be commenced after the Institute of Radiation Physics (IRP) has made a relevant decision on the ground of a preinspection performed by it. Associated with SFL-guide 1.00.73 requirements for documents needed for a preinspection are outlined here. The preinspection will be performed by the IRP.

Scope

This guide has been worked out for special pressure vessels affecting the safety of nuclear power plants, and which the SFL-guide 2.00.73 concerning special pressure vessels is not applied for, but which have been classified as being under the IRP surveillance. Such are e.g. many pressure vessels and pipings of auxiliary systems. Later on will all aforementioned bear the name of pressure vessel.

Documents

For the preinspection the applicant shall provide the authorities in triplicate with following documents associated with the relevant pressure vessel. The documents may also be furnished as one document. Measuring units of the SI system are recommended to be used in the documents.

The document shall have a front flyleaf which shall show the compiler of the document (signature with clarifications), all persons who have audited the document, and other relevant facts.

Reference literature (or copies) hard to attain shall be made available to the IRP.

1 Organizational description

2 Design data

3 Material specification

4 Quality control programme

5 Strength calculations

6 Drawings

7 Any other possible document

Laws, standards, recommendations and literature

SFS dimensioning, material, and welding standards
ANSI N45.2 - 1971
PK 1514-70
INSKO 5-72, 36-72, 25-73, 49-73, 82-73

Abbreviations

SFS	Finnish standard
ANSI	American National Standards Institute
ASME	The American Society of Mechnical Engineers
INSKO	The Post-graduate Education Centre of the Engineering Societies in Finland
NGS	Nordic recommendation (Nordiska gruppen för strålbestämmelser)
PK	Russian standard (PK 1514-70 Guidelines for welding joints and on-weldings of energy producing apparatus of nuclear power plants)

ORGANIZATIONAL DESCRIPTION

Purpose

The primary purpose of the organizational description is to give a picture of the quality control performance within the organization of the pressure vessel manufacturer.

Contents

The organizational description comprises the organization confirmed by the company management, indicating the task assignments, areas of responsibility, and competences of all persons taking part in quality control, as well as the arrangement of quality control.

Requirements

The whole organization shall be adequate in numbers and competences, appropriate in regard to activity, and clear-cut in responsibility sharing.

It is important that the quality control is sufficiently indipendent of other activities, above all design and manufacture.

The chief designer and persons responsible for manufacturing and quality control shall be denominated.

DESIGN DATA

Purpose

Design data have the purpose of clearing up the design bases of the pressure vessel.

Contents

Design data shall comprise

- definition of the purpose of the pressure vessel
- functional scheme and explanation indicating the position of the pressure vessel in the system, whereto it belongs. The explanation shall give the values of process parameters.
- design bases, indicating
  design values, as temperature, pressure, etc.,
  functional requirements, e.g. external and operational circumstances,
  standards, codes, and criteria, which form the design basis, as well as the test class of the component with argumentation and a separate document.
- siting drawings and description of the pressure vessel
- control and safety systems

Requirements

The preinspection document shall contain sufficient description of design data. As far as the IRP already has system descriptions, it is sufficient to refer to these.

MATERIAL SPECIFICATION

Purpose

The purpose of the material specification is to give a picture about the applicability of materials (basic and welding materials) for their intended use.

Contents

The document shall give the materials and material standards of various parts, as well as the scope of the testing of materials, and the mode of certificate.

Requirements

The qualities of the materials shall fulfil the requirements of those norms (national or the manufacturer's standards) after which they have been cited in the cataloque. The materials shall be accepted as pressure vessel materials.

As far as officially approved pressure vessel materials are used (NGS-standards, separate approval by the Pressure Vessel Inspectorate or the IRP), reference to these approvals or standard leafs is sufficient.

Other kinds of steel shall meet the following requirements as pertinent:

I
Quality requirements

1 Non-alloyed and purely alloyed steels
- plates
  pressure vessel steels in accordance with SFS 1100 standard
  structural steels in accordance with SFS 200 and 2033 standards
- pipes
  more requiring quality class DIN 17175
  others DIN 1629 Blatt 3 and 4

2 Austenitic steels
- in accordance with a national or manufacturer's standard (e.g. DIN 17440)

II
Testing of materials

1 Non-alloyed and purely alloyed steels (also NGS materials)
- plates
  in accordance with SFS 1100 or SFS 200 standards

As an additional requirement impact tests shall always be carried out for steels that are in accordance with these standards or equivalent class B steels, in the scope these mentioned standards suggest.
- pipes
  AD-Merkblatt W4 (official West German pressure vessel instruction) points 3 to 5.

2 Austenitic steels (also NGS materials)
- plates and pipes
  AD-Merkblatt W2, points 4 to 6.

When an expert put up by the subscriber has been appointed the supervisor of the certificate of receipt (Certificate C), this may be substituted for an indipendent expert appointed by the supplier factory (Certificate B). Material testing shall, however, always be carried out at least according to the official instructions. Strength tests shall be carried out by the method suggested by SFS standards.

Material specification shall be presented concerning steels that have not been approved officially, indicating, how aforementioned requirements have been fulfilled, and referring to national or supplier country's standards which have to be attached as needed.

QUALITY CONTROL PROGRAMME

Purpose

The purpose of the quality control programme is to present requirements and inspection methods concerning the quality of the pressure vessel.

A procedure test programme has to be presented as needed, the purpose of which is to assure by test works the application of the relevant manufacturing method to production, when special structures and materials are used.

Contents

The document contains procedure sheets and planning charts for inspection presenting what quality control requirements and measures are to be carried out in manufacturing the pressure vessel.

The planning charts for inspection indicate, what quality control measures various parts shall carry out.

Requirements

By using various inspection methods a quality level according to Finnish pressure vessel instructions or nuclear power plant standards accepted in Finland has to be achieved for the pressure vessel.

STRENGTH CALCULATIONS

Purpose

A structure mechanical derivation of the dimensions has to be presented for the pressure vessel.

Contents

The dimensioning calculations are furnished with drawings indicating necessary measures and loads.

Requirements

The dimensioning is carried out in accordance with SFS standards. If dor special reasons other dimensioning standards have to be used, the matter shall be agreed upon with the IRP.

Depending on the structure and operational conditions an inspection concerning the stability, vibration properties, fracture or other qualities of the structure has to be presented as needed.

DRAWINGS

Purpose

The purpose of the drawings is to describe the structure in regard to assembly and details such that the dimensioning, shape, and manufacture of the pressure vessel are sufficiently shown in detail.

Contents and requirements

The drawings shall be unambiguous and clear. They shall show

- measures and shapes used in or derived from strength calculations and stress or other analyses
- type, location, measures, and details of joints
- assembly data with parts lists
- location of various materials in the apparatus and their joining to each other.