PREINSPECTION OF CONCRETE STRUCTURES OF NUCLEAR POWER PLANTS

General

The manufacture of concrete structures that specially affect the safety of nuclear power plants must not be commenced until the Institute of Radiation Physics (IRP) has on the basis of a preinspection come to a decision in regard to it.

In this connection both concrete, steel concrete, and prestressed concrete structures are in short called concrete structures. Associated with SFL-guide 1.00.73 general requirements for documents needed in the preinspection are presented here.

Scope

This guide has been prepared for concrete containments. The same principles are also appropriately applied in the preinspection process of other concrete structures particularly affecting safety.

Documents

For preinspection the licensee shall furnish the IRP with following documents in triplicate, concerning the structure in question.

1 Organizational description

2 Standards specification

3 Material specification

4 Quality control programme

5 Design data

6 Dimensioning

7 Drawings

8 Inservice surveillance programme

Measuring units of the SI-system are recommended to be used in the documents. If the applicant wants to present certain documents as common to several concrete structures, or wants otherwise to digress from the document list in accordance with this guide, he shall present an advance scheme over the document entirety.

The documents shall contain an appropriate front fly-leaf regularly used by the firm, indicating the compiler of the document (signature with clarifications), all persons having revised it, and other relevant essential data.

ORGANIZATIONAL DESCRIPTION

Purpose

The primary purpose of the organizational description is to give a picture about how quality assurance is accomplished in the organizations of the applicant, the plant supplier, the construction contractor, and other possible parties concerned.

Contents

The organizational description comprises the organization confirmed by the company management, indicating task definitions, areas of responsibility, competencies, and the arrangement of quality assurance.

The description may be thus compiled that it is mainly founded on the quality assurance manual being at the firm's disposal.

Requirements

The whole organization shall be sufficient in numbers and competencies, appropriate in regard to activities, and clear-cut in responsibility assignment. The activities and the arrangement of quality assurance are given in detail e.g. in the quality assurance manual of the company.

It is important that quality assurance is sufficiently independent of other activities, above all the design performance of construction works.

For each structure a responsible designer, and persons responsible for the supervision of work and quality assurance shall be denominated.

Laws, standards, and recommendations

BY 5
RIL 53 C, 48 b
ANSI N45.2-1971

Literature

INSKO 49-73 Quality assurance of nuclear power plants

STANDARDS SPECIFICATION

Purpose

The standards specification has the purpose of giving an exact picture of available standards, their validity order and limits of application areas.

Contents

The standards specification contains a list of all applied standards, a detailed specification with justifications for the application areas of various standards, as well as statements and justifications regarding deviations.

Requirements

All structures shall meet the requirements of Finnish standards.

When Finnish standards are insufficient, as for example in the case of using accident loads as a dimensioning basis, foreign standards are recommended to be used.

The application of foreign standards shall particularly be strived for when they form an applicable entirety. Depending on different circumstances it may even then be reasonable in regard to certain details to allow deviations from the requirements of the standard.

MATERIAL SPECIFICATION

Purpose	The material specification shall give a clear picture of the properties of the construction materials to be used, and of their applicability to their aimed usage. The material specification constitutes the ground for the quality control plan.
Contents	The document shall specify the materials of various parts. In addition to the characteristics of the materials used as the starting point for design, a short summary of the environmental factors, as e.g. climate, corrosion or missile danger, having effect on the choice of materials, shall also be presented.

QUALITY CONTROL PROGRAMME

Purpose	The quality control programme systematically presents all control measures and acceptance bases in regard to the quality of structure.
Contents	The document specifies control measures to be carried out at the site of concrete manufacturing at the work or in the laboratory, as well as documentation of results and acceptance bases. In addition the document sets forth inspection and control measures to be carried out (e.g. by the manufacturer and at the construction site) for various sorts of steel. The document specifies the roles of different parties in quality control measures.
Requirements	The quality control programme shall meet Finnish regulations. ANSI N45.2-1971 gives guidelines for quality assurance.
Laws, standards and recommendations	BY 5 RIL 53 C, 48 b ANSI N45.2-1971

DESIGN DATA

Purpose	Presentation of basic data needed in the design of the structure.
Contents	Design data comprise a summary of materials used, structure geometry, data of the function of the structure as a part of the nuclear power plant, loading conditions, temperatures, and a general description of constructional methods.
Laws, standards and recommendations	Decision number 763 (1973-10-01) of the ministry of the interior ASME Code Section III, Div. 2 (proposed, 1973) ACI 349

DIMENSIONING

Purpose	The dimensioning document has the purpose of presenting the dimensioning of bearing structures by using the methods of structural mechanics.
Contents	The document shall contain an entirety revealing how the presented dimensions have been arrived at by starting from loading conditions and material properties. The document shall be sufficiently detailed in order to allow the evaluation of the accuracy of the calculation method used, and the conformance of dimensioning with standards.
Requirements	The dimensioning shall fulfill the requirements of the standards entirety presented and accepted in the standards specification. Depending on the structure and the conditions of use, an inspection concerning the stability, fatigue, creep, relaxation, or other properties of the structure, shall be presented when needed. Source literature (or copies) hard to attain shall be made available to the IRP.
Laws, standards, and recommendations	BY 5, 6 RIL 48, 53, 59, 82 ASME Code Section III, Div. 2 (proposed, 1973) ACI 349
Literature	1st and 2nd International Conference on SMiRT, Div. J, European Communities, Luxembourg.

DRAWINGS

Purpose	Description of the structure with drawings so that it may be verified to be in conformance with the dimensioning document.
Laws, standards, and recommendations	RIL 84

INSERVICE SURVEILLANCE PROGRAMME

Purpose	The inservice surveillance programme is presented taking into account the structural solution and the conditions of use.
Contents	The programme contains inspections planned to be carried out periodically during the use of the structure, requirements concerning the performance of inspections, and judgement bases of the inspection results. A preliminary programme shall be presented for pre-inspection. The final programme shall at the latest be presented for approval in connection with the application for operating license.
Laws, standards, and recommendations	ASME Code Section XI