International Standard 7385

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Nuclear power plants — Guidelines to ensure quality of collected data on reliability

Centrales nucléaires — Principes directeurs pour assurer la qualité des données de fiabilité recueillies

First edition — 1983-08-01

UDC 621.039.577 : 519.248 **Ref. No. ISO 7385-1983 (E)**

Descriptors : nuclear power plants, quality control, information, reliability, rules (instructions).

Price based on 3 pages

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7385 was developed by Technical Committee ISO/TC 85, *Nuclear energy*, and was circulated to the member bodies in February 1982.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania
Austria	Italy	South Africa, Rep. of
Belgium	Japan	Spain
Czechoslovakia	Korea, Rep. of	Sweden
Egypt, Arab Rep. of	Mexico	Switzerland
Finland	Netherlands	Turkey
France	Poland	USA

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada
United Kingdom

Printed in Switzerland

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0 Introduction

Confidence in the output of a data collection system is strongly dependent on the quality of the information collected. Before starting such a system it is necessary to clearly define the following main points

- the overall goal;
- the suppliers of field data;
- the users of processed data;
- the terms and expressions used;
- the means used to collect data and to treat them;
- the questions to be answered by field data;
- field data needed.

1 Scope and field of application

This International Standard gives a comprehensive guidance to ensure quality of availability and reliability data collected in nuclear power plants.

2 Reference

ISO 6527, *Reliability data exchange.*

3 Main goals of the data collection system

The purpose of collecting data is to provide a basis for failure analysis information and to allow inference on reliability parameters of components and systems used in nuclear power plants.

This information could be used during design, construction and operation stage for :

- nuclear power plant design improvement;
- nuclear power plant safety evaluation;
- nuclear power plant availability improvement;
- a process of reducing doses on maintenance personnel;
- optimization of spare parts;
- optimization of frequency of testing;
- optimization of maintenance planning;
- optimization of economic efficiency.

In order to achieve these objectives, a clear definition of the sample covered (components, systems) is needed. For each of these items, it is necessary to have :

a) an engineering report with sample definition (main characteristic);

b) a failure report and/or an unavailability report for all relevant failures. [Relevant failures should be explained in the instructions 4.1 d) and in compliance with failure definitions in ISO 6527.];

c) operating reports.

The content of these forms is described in sub-clause 4.2.

The failure report is to be written as close to the source as possible, which means it is to be written at site and by the plant personnel and preferably not by external personnel, i.e., contractors.

Instructions including requirements on information should be written and revised with due consideration to experiences of collection, treatment, processing and usage of the data. Feed back is essential for keeping the quality of data.

4 Means to be used

4.1 Organization needed for collecting field data

In order to achieve the objectives, and to guarantee the quality of information collected in a nuclear power plant, written procedures are necessary. They shall specify at least :

a) qualification, responsibility, place of work, management position of the people in charge of information collection;

b) document necessary to gather information;

c) means whereby information is collected;

d) instructions to be followed by personnel for completion of documents in order to guarantee consistency of the information provided by different plants. (This consistency is needed for the processing of the data and for interpretation).

The method adopted should be an integral part of the organization of the plant. Original failure reports as filled in by operation and maintenance personnel will constitute the basis for the data collection.

People in charge of completion of the formalized documents are required to :

a) have a good knowledge of plant operation, and plant maintenance;

b) have the ability to participate in discussions with people in charge of plant operation and maintenance;

c) have access to documents allowing an adequate check and a good validation of written information on the formalized documents.

4.2 Documentation

These documents shall be defined and adapted to the specific objectives of the system.

It is essential that only information needed to fulfill the defined main points for the actual system is required. A too ambitious data collection in relation to available resources and real need may lead to poor data quality.

The reports should contain sufficient information in plain language for each data and should not be given in codified form only.

All reports and reported data shall be treated and interpreted with due consideration to the purpose for which they have been collected.

Three of the main documents are as follows.

4.2.1 Engineering data reports

For each unit/system/component covered by the data collection system an engineering report (see ISO 6527) has to be filled in with at least the following information :

a) for a unit : location, utility, architect engineer, Nuclear Steam System Supplier, main characteristics;

b) for a system : identification code function(s), degree of redundancy, quality level, operating conditions, environment, frequency and kind of preventive maintenance performed;

c) for a component : identification in the system, location, manufacture, serial or model number by manufacturer, main manufacturing characteristics, operating conditions. Frequency and type of preventive maintenance performed should be indicated and updated according to the history of the plant.

Engineering data should preferably be taken from the ordinary maintenance information system. This should be taken into account when the maintenance information system of a plant is developed.

Maintenance programme information is difficult to get as design data because the maintenance may change with time. Such information may not be required in engineering reports or voluntarily.

4.2.2 Failure and/or unavailability reports

For each failure and/or unavailability of a system or component included in the data collection system, a report shall be prepared. The following points have to be addressed :

a) for a system : identification, status of unit and system at the time of failure, date and hour for the beginning and the end of the failure, means of detecting the failure, mode and cause of the failure, description of the failure and corrective actions undertaken, and of the failure consequences;

b) for a component : as above; component repair time and radiation exposure received by personnel could be included.

"Cause of failure" has proved difficult or impossible to establish in practice for most failures and such information may therefore be voluntary although it is desirable.

"Means of detecting the failure" is an example of data not needed for statistical reliability data and this information may have a lower priority.

It is also essential that sufficient manual review and treatment of the failure reports are made by qualified personnel before the data processing.

4.2.3 Operating reports

Before treatment of the failure reports in order to obtain the main reliability parameters, cumulative operating hours and number of demands shall be collected on each system and component. These operating reports include the following

— system and component identification;

— cumulative operating hours and number of demands on the system and component;

— date of operating report completion.

4.3 Insertion of these data into a computerized system

The information contained in the documents defined above should be inserted into a computerized system. For this insertion, several rules must be followed and specific procedures have to be written in particular to define

a) qualification, responsibility, place of work, management position of the personnel in charge of insertion of these data into the computerized system;

b) system process (card, tape, display...);

c) checking procedures to ensure validity of the information inserted.

It is recommended to place into service a system which allows plant personnel to retrieve easily information on its own plant.

4.4 Data processing and presentation

Two kinds of treatment are considered

4.4.1 Periodic treatments

These treatments shall be defined in a procedure with special attention to

a) type of treatment performed;

b) frequency of treatment;

c) output of the treatment (statistical data, failure rate, repair time, component or system involved, confidence level...);

d) distribution.

4.4.2 Special treatments

Special treatments are treatments performed only on demand. A document shall describe all the possible treatments that the system can perform on demand and the procedure to follow in order to obtain these types of treatments.

In addition, a procedure should define how to obtain *ad hoc* treatments to meet specific needs for which a processing method has not been set up.