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Australian/New Zealand Standard[®]

Water quality—Sampling

**Part 7: Guidance on sampling of
water and steam in boiler plants**

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 Australian Water and Waste Water Association
 Australian and New Zealand Environment and Conservation Council
 Griffith University, Australia
 Minerals Council of Australia
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV/8, Methods for Examination of Waters. This Standard is identical with and been reproduced from ISO 5667-7:1993, *Water quality—Sampling, Part 7: Guidance on sampling of water and steam in boiler plants*.

This is Part 7 in a series of Standards on the sampling of waters, waste waters, sediments and sludges. The objective of this series of Standards is to provide parties interested in monitoring and sampling with guidance, including guidance on the design of sampling programs, sampling techniques, preservation, handling and transport of samples for the purposes of process control, quality characterization, identification of sources of pollution, compliance with water quality guidelines or standards, and other activities. This Part of the series provides detailed principles to be applied to the sampling of water and steam in boiler plants.

The term 'informative' has been used in this Standard to define the application of the annex to which it applies. An 'informative' annex is only for information and guidance.

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<i>Reference to International Standard</i>		<i>Australian, New Zealand or Australian/New Zealand Standard</i>	
ISO		AS/NZS	
5667	Water quality—Sampling	5667	Water quality—Sampling
5667-1	Part 1: Guidance on the design of sampling programmes	5667.1	Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
5667-2	Part 2: Guidance on sampling techniques		
5667-3	Part 3: Guidance on the preservation and handling of samples		
6107-1	Water quality—Vocabulary—Part 1	—	
6107-2	Water quality—Vocabulary—Part 2	—	
8199	Water quality—General guide to the enumeration of micro-organisms by culture	—	

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AUSTRALIAN/NEW ZEALAND STANDARD

Water quality — Sampling —**Part 7:****Guidance on sampling of water and steam in boiler plants****1 Scope**

This part of ISO 5667 recommends procedures and equipment for sampling water and steam in boiler plants including examples of sampling apparatus, to provide samples for physical and chemical analysis that are representative of the main body of water or steam from which they are taken.

The procedures for sampling water apply to

- raw water;
- make-up water;
- boiler feed water;
- condensate;
- boiler water;
- cooling water.

The procedures for sampling steam cover both saturated and superheated steam.

This part of ISO 5667 does not apply to the sampling of water and steam in nuclear power plants.

Figures 2 to 6 are only given as examples of sampling apparatus.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 5667. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 5667 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO

maintain registers of currently valid International Standards.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes.*

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques.*

ISO 5667-3:1985, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples.*

ISO 6107-1:1986, *Water quality — Vocabulary — Part 1.*

ISO 6107-2:1989, *Water quality — Vocabulary — Part 2.*

ISO 8199:1988, *Water quality — General guide to the enumeration of micro-organisms by culture.*

3 Definitions

For the purposes of this part of ISO 5667, the following definitions apply.

3.1 isokinetic sampling: A technique in which the sample from a water or steam stream passes into the orifice of a sampling probe with a velocity equal to that of the stream in the immediate vicinity of the probe. [ISO 6107-2]

3.2 sampler: A device used to obtain a sample of water or steam, either discretely or continuously, for the purpose of examination of various defined characteristic. [ISO 6107-2]

3.3 sampling point: The precise position within a system from which samples are taken. [ISO 6107-2]

2

3.4 sampling probe: That part of sampling equipment which is inserted into a body of steam or water and into which the sample initially passes. [ISO 6107-2]

3.5 sampling line: The conduit which leads from the sampling probe to the sample delivery point or the analysing equipment. [ISO 6107-2]

3.6 sample delivery point: The end of a sampling line, often remote from the sampling probe, from which a sample is removed, either discretely or continuously, for examination.

3.7 raw water: Water which has received no treatment whatsoever, or water entering a plant for further treatment. [ISO 6107-1]

3.8 make-up water: Water which has to be added to the system in order to make up for losses.

3.9 condensate: Condensed steam from power plants or processes, which is not mixed with any other water.

3.10 boiler water: The water present in a operational boiler.

3.11 feed water: The water consisting of the condensate (3.9) and the make-up water (3.8) and which passes through the feed pump or injector.

3.12 saturated steam: Steam having a temperature equal to the saturation temperature corresponding to its pressure.

3.13 superheated steam: Steam having a temperature above the saturation temperature corresponding to its pressure.

4 Sampling — General aspects

4.1 Introduction

A prerequisite of any sampling system is that it should extract a sample representative of the fluid in the given part of the circuit for subsequent analysis. Problems are most likely to arise when more than one phase is present.

4.2 Sampling system — General information

The sampling system for the collection of samples of water and steam consists of the following parts (see figure 1):

- the sampling probe;

- a sampling line, including valves and fittings;

- a cooler (this can be omitted when the sample temperature is permanently below 50 °C);

- a sample delivery point.

The design of the sampling system and the selection of materials are influenced by

- the analyses to be carried out and the required accuracies;
- the chemical composition of the water or steam to be examined;
- the temperature and pressure at the sampling point;
- the chemical composition of the cooling water.

For most applications, all the parts of sampling equipment in contact with the sample should be made of stainless steel, 18Cr8Ni. In some cases, other materials may be used, for example, copper for sampling from low pressure boilers. It is essential that these are suitable for the use for which they are required, and they should not interact with the constituents of the sample. The various parts of the sampling system are described in more detail in clause 5.

4.3 Sampling points — General guidelines

Sampling points should be positioned in those parts of the circuit where the composition, or changes in the composition, of the water or steam need to be determined.

Figure A.1 shows typical sampling locations in the steam/water circuit.

A sample point for a shell boiler should be located a minimum of 150 mm below the normal working level of the boiler. It is recommended that the sample should be taken during the normal boiler operations, but not when the boiler is being fired.

Whenever possible, samples should be taken from flowing systems. Stagnant areas should be avoided, unless samples are specifically required from such areas (e.g. wet stored boilers).

Where waters of different origin and composition are blended, or chemicals are added, sampling points should be positioned where complete mixing has taken place. In most cases, this can be achieved by sampling downstream of a turbulence promoter such as a valve, pump or pipe bend.