

AS ISO 27919.2:2024
ISO 27919-2:2021



STANDARDS
Australia



Carbon dioxide capture

Part 2: Evaluation procedure to assure and maintain stable performance of post-combustion CO₂ capture plant integrated with a power plant



currently in preview, click buy full version

AS ISO 27919.2:2024

This Australian Standard® was prepared by EE-002, Carbon dioxide capture, transportation, and geological storage. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 06 December 2024.

This Standard was published on 20 December 2024.

The following are represented on Committee EE-002:

- Australian Energy Producers
- Australian Industry Group
- Australian National Low Emissions Coal R&D
- Communications, Electrical and Plumbing Union — Electrical Division
- CSIRO
- Department for Energy and Mining (SA)
- Department of Energy, Mines, Industry Regulation and Safety Western Australia
- Engineers Australia
- Geoscience Australia
- Petroleum Exploration Society of Australia (Victorian Branch)
- The Chamber of Minerals and Energy of Western Australia
- The University of Adelaide
- The University of Queensland

This Standard was issued in draft form for comment as DR AS ISO 27919.2: 024.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76139 977 0

Carbon dioxide capture

Part 2: Evaluation procedure to assure and maintain stable performance of post-combustion CO₂ capture plant integrated with a power plant

First published as AS ISO 27919.2:2024.

COPYRIGHT

© ISO 2024 — All rights reserved
© Standards Australia Limited 2024

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Preface

This Standard was prepared by the Standards Australia Committee EE-002, Carbon dioxide capture, transportation, and geological storage.

The objective of this document is to provide definitions, guidelines and supporting information for evaluating and reporting (with respect to the basic design items ongoing, and the operational results of a reference plant or unit as feedback) to ensure the (designed) performance of a PCC plant integrated with a host power plant. The PCC plant separates CO₂ from the power plant flue gas in preparation for subsequent transportation and geological storage. The physical system being addressed is a single power plant, with an optional auxiliary unit to provide thermal energy required for the PCC plant, and a single PCC plant as described in ISO 27919-1.

This document is identical with, and has been reproduced from, ISO 27919-2:2021, *Carbon dioxide capture — Part 2: Evaluation procedure to assure and maintain stable performance of post-combustion CO₂ capture plant integrated with a power plant*.

As this document has been reproduced from an international document, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adaptations of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

Contents

Preface	ii
Foreword	v
Introduction	vi
Section 1 Scope	1
Section 2 Normative references	1
Section 3 Terms, definitions, abbreviated terms and symbols	1
3.1 Terms and definitions	1
3.2 Abbreviated terms	6
3.3 Symbols	7
Section 4 Principles	9
4.1 General	9
4.2 Reliable performance	9
4.3 Ensuring and maintaining reliable performance	9
4.4 Procedure outline	10
4.4.1 Outline of procedure flow	10
4.4.2 Process step 1 to 3 outline — Main part	11
4.4.3 Process step 4 to 6 outline — Evaluations of items peculiar to a PCC plant with some uncertainty	12
4.5 Governing principles	12
Section 5 Availability, reliability and maintainability — basic concepts for a PCC plant	13
5.1 General	13
5.2 Spatial and temporal evaluation boundaries	14
5.3 Evaluation and quantification of availability	14
5.4 Evaluation and quantification of reliability	16
5.5 Evaluation and quantification of maintainability	18
5.6 Combined aspect of availability, reliability and maintainability	18
5.7 Unavailability (three categories)	19
Section 6 Defining reliability, availability and maintainability in the basic design phase	20
6.1 General	20
6.2 PCC plant description	20
6.3 Basic design phase	20
Section 7 Determining reliability and availability in the operational phase	21
7.1 General	21
7.2 Review of operation result	21
7.3 Basic load pattern for evaluation and reporting of operation	21
7.4 Normal operation (transient and steady)	24
7.5 Start-up and shut-down	24
7.6 Emergency operations	25
7.7 Downtime	25
7.8 Plant operator organization and training	26
Section 8 Implications for maintenance	26
8.1 General	26
8.2 Maintainability and downtime	26
8.3 Maintenance strategies	27
Section 9 KPIs of availability for reporting	27
9.1 General	27
9.2 PCC plant capacity availability and product CO ₂ producibility	29
9.3 Schedule compliance	31
9.4 Time availability	32
9.5 On-stream factor	33

Annex A	(informative) Detailed evaluation procedure to assure and maintain stable performance of a post-combustion CO₂ capture plant	35
Annex B	(informative) The reference plant and its component experience	43
Annex C	(informative) Technology Qualification	49
Annex D	(informative) Classification of influences for PCC plant capacity availability and Product CO₂ producibility in Clause 9	50
Annex E	(informative) PCC plant achievability	51
Annex F	(informative) Calculation example of each KPI	53
Annex G	(informative) Map of key issues and items to be checked relating the performance requirement	58
Bibliography	61

Currently in preview, click buy full version.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 265, *Carbon dioxide capture, transportation, and geological storage*.

A list of all parts in the ISO 27919 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Atmospheric carbon dioxide (CO₂) emissions must be reduced to meet climate change mitigation targets. Including carbon dioxide capture and storage (CCS) in current emission reduction approaches increases the probability of meeting these targets at the lowest cost to the global economy. CO₂ capture from gases produced by combustion of carbonaceous fuels is the only technology capable of dealing directly with emissions from power plants and other industrial sectors, such as cement manufacture and fertilizer production.

This document is the second in a series of standards for post-combustion CO₂ capture (PCC) from a power plant using a liquid-based chemical absorption process. Building on ISO 27919-1 on evaluation of key performance indicators (KPIs), this document provides an evaluation procedure to assure and maintain reliable performance of a PCC plant integrated with a power plant. New or revised standards focusing on other CO₂ capture technologies and approaches will be developed later.

PCC is applicable to all combustion-based thermal power plants. A simplified block diagram illustrating the PCC process is shown in [Figure 1](#).

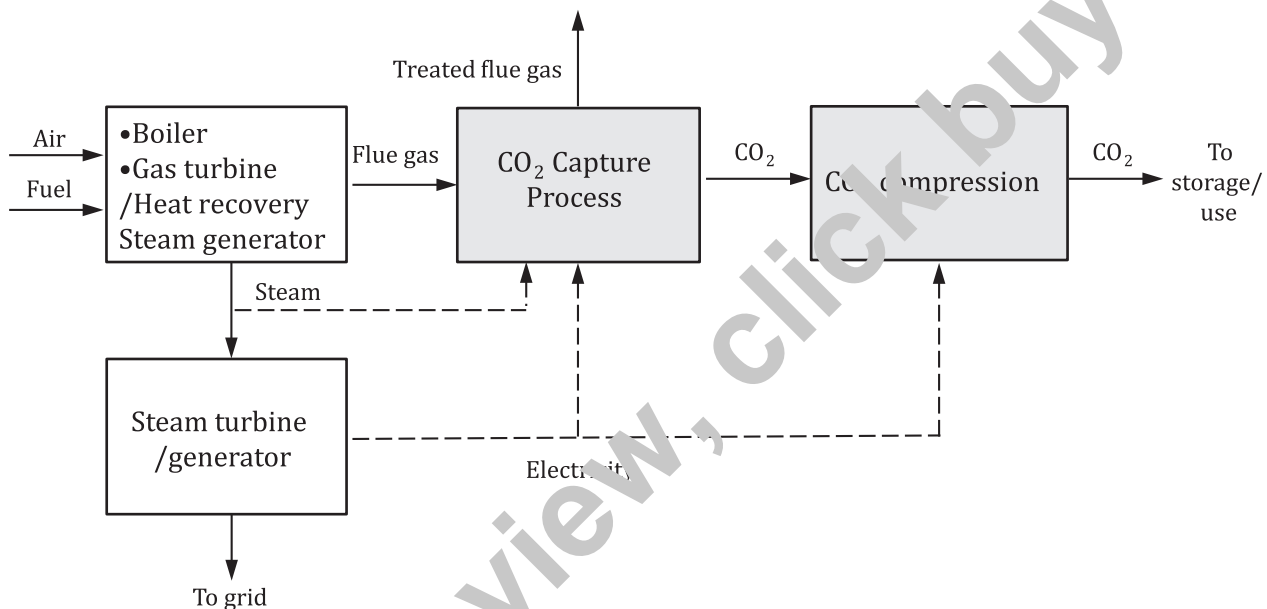


Figure 1 – Simplified block diagram of PCC

In a typical power generation facility, carbonaceous fuel (e.g. coal, oil, gas, biomass) is combusted with air in a boiler to raise steam. The steam drives a turbine or generator to produce power. In a gas-turbine combined-cycle system, the combustion in the gas turbine drives power generation, while steam generated through a heat-recovery steam generator produces additional power. Flue gas from the boiler or gas turbine consists mostly of N₂, CO₂, H₂O and O₂, with smaller amounts of other compounds depending on the fuel used. The PCC process is located downstream of conventional pollutant controls. Chemical-absorption-based PCC usually requires steam to be extracted from the power plant's steam cycle or the use of lower-grade heat sources for absorption liquid regeneration, depending on the absorption liquid and process employed.

The economic and environmental value of a PCC plant is determined by its technical performance, as well as its ability to achieve and maintain stable operation as required by its owners/stakeholders, as follows:

- The owner of the flue gas source has an interest in sustained CO₂-emission reductions.
- The owner of the CO₂-product has an interest being able to supply CO₂ at the desired rate regardless of external conditions.

The CO₂ receiver has an interest in CO₂-product availability for its own operations.

Thus, this document describes a procedure that combines technology item evaluation procedure with reliability, availability, and in some cases maintainability evaluation methods.

Currently in preview, click buy full version

NOTES

Currently in preview, click buy full version

Australian Standard®

Carbon dioxide capture

Part 2: Evaluation procedure to assure and maintain stable performance of post-combustion CO₂ capture plant integrated with a power plant

Section 1 Scope

This document provides definitions, guidelines and supporting information for evaluating and reporting (with respect to the basic design items ongoing, and the operational results of a reference plant or unit as feedback) to ensure the (designed) performance of a PCC plant integrated with a host power plant. The PCC plant separates CO₂ from the power plant flue gas in preparation for subsequent transportation and geological storage. The physical system being addressed is a single power plant, with an optional auxiliary unit to provide thermal energy required for the PCC plant, and a single PCC plant as described in ISO 27919-1.

The formulas and methods to assure and maintain reliable performance, presented in this document, describe issues addressed during the design and construction phases and practices that document reliability and availability during routine operation. These practices would also guide ongoing maintenance programmes.

This document does not provide guidelines for benchmark, comparison or assessment studies for PCC plant operations using different capture technologies (i.e. absorbents), nor does it specify appropriate operating conditions such as temperature etc.

Section 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 27919-1, *Carbon dioxide capture — Part 1: Performance evaluation methods for post-combustion CO₂ capture integrated with a power plant*

Section 3 Terms, definitions, abbreviated terms and symbols

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Terms and definitions

3.1.1

administrative delay

delay to maintenance incurred for administrative reasons

[SOURCE: IEC 60050-192 (192-7-12), modified — “maintenance action” was changed to “maintenance”]

3.1.2

availability

ability of a *PCC plant* (3.1.20) integrated with the power plant to be in a state to perform as required under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided