ISO 27919-1:2018 (E)

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

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms, definitions and symbols

4 Defining the system boundary

4.1 PCC plant integrated with a host power plant
4.2 Boundary of the PCC plant, host power plant and utilities

5 Definition of basic PCC plant performance

5.1 General
5.2 Input and output streams
5.3 Capture efficiency of the absorber
5.4 Flow rate of the product CO2 stream from a PCC plant
5.5 Properties of product CO2 stream at CO2 compression system outlet
5.5.1 General
5.5.2 Compositions of product CO2 stream
5.5.2.1 Measurement of product CO2 stream
5.5.2.2 Impurities in product CO2 stream
5.5.2.3 Measurement of impurities
5.5.2.4 Determination of composition of the product CO2 stream
5.5.3 CO2 stream compressor system outlet pressure
5.5.4 Others

6 Definition of utilities and consumption calculation

6.1 General
6.2 Low-pressure – medium-pressure steam
6.2.1 Definition of utility
6.2.2 Consumption calculation
6.3 Cooling water
6.3.1 Definition of CW
6.3.2 Consumption calculation
6.4 Electrical energy
6.4.1 Definition of electrical energy consumption evaluation
6.5 Demineralized water and industrial water
6.6 Absorbent and chemical

7 Guiding principles — Basis for PCC plant performance assessment

7.1 General
7.2 Guiding principle of the performance test
7.2.1 General
7.2.2 Power plant and capture unit conditions

8 Instruments and measurement methods

8.1 General requirement
8.1.1 Introduction
8.1.2 Instrument classification
8.1.3 Measurement uncertainty

8.1.4 Calibration of instrument
8.1.5 Permanent plant instrument
8.1.6 Redundant instrument
8.2 Measurement method
8.2.1 Flue gas
8.2.2 Product CO2 stream at the CO2 compressor outlet
8.2.3 Steam and steam condensate
8.2.4 Cooling water
8.2.5 Electric power measurement
8.2.6 Measurement of pressure and temperature
8.2.7 Data collection and handling

9 Evaluation of key performance indicators

9.1 Introduction
9.2 Specific thermal energy consumption (STEC)
9.3 Specific electrical energy consumption (SEC)
9.4 Specific equivalent electrical energy consumption (SEEC)
9.5 Specific reduction in CO2 emissions (SRCE)
9.6 Specific absorbent consumption and specific chemical consumption (SAC and SCC)

Annex A (informative) Summary of streams and equipment nomenclature

A.1 General
A.2 Summary of streams and equipment nomenclature used in this document.

Annex B (informative) Test principles and guidelines

B.1 Emissions and any discharges during the test
B.2 Additional testing
B.3 Duration and number of test runs
B.4 Pre-tests
B.5 Start and stop of the test
B.6 Electrical and thermal consumption line up
B.7 Test conduct and evaluation principle
B.8 Stability criteria for power plant and PCC plant

Annex C (informative) Instruments and measurement methods

C.1 General
C.2 Measurement points diagram
C.3 Instrument classification
C.4 Calibration requirements
C.5 Manual measurement by international standard
C.6 Online measurement by temporary or permanent plant instrumentation
C.7 Flow measurements
C.8 Flue gas and CO2 stream measurements
C.8.1 Flue gas flow rate
C.8.2 Flue gas composition
C.8.3 Treated flue gas composition from PCC plant
C.9 Product CO2 stream before compression
C.10 Steam flow measurement
C.11 Condensate, CW and refrigerant flow measurement
C.12 Electrical power measurement
C.13 Pressure measurement
C.14 Temperature measurement
C.15 Chemical additives and non-fuel sources

Annex D (informative) Additional approaches of performance evaluation for a PCC plant integrated with a power plant

D.1 Incremental fuel use and equivalent electrical energy consumption for PCC
D.2 Approximate calculation of specific equivalent electrical energy consumption
D.3 Specific primary energy consumption for CO2 avoided (SPECCA)
D.4 Specific cooling water duty (SCWD)

Annex E (informative) Reference conditions

E.1 General
E.2 Ambient conditions

E.3 CO2 concentration in the flue gas
E.4 Product CO2 conditions
E.5 Utilities
E.6 CO2 capture efficiency

Annex F (informative) Check list for performance evaluation

Page count: 64