

TR 102:2022
(ICS 91.140.30)

TECHNICAL REFERENCE

**Code of practice for passive displacement
cooling (PDC) system for air-conditioning
application**

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Contents

	Page
Foreword _____	4
0 Introduction _____	5
1 Scope _____	5
2 Normative references _____	5
3 Terms and definitions _____	6
4 Abbreviations _____	7
5 Fundamentals of PDC _____	7
6 Designing PDC systems _____	11
7 PDCC types _____	16
8 Performance metrics _____	21
9 Coil and fall duct manufacturing process and materials _____	22
10 Installation, piping, testing and commissioning _____	23
11 Operations and maintenance _____	27
 Annexes	
A Performance testing _____	30
B Performance test sheet record _____	31
 Tables	
1 Environmental conditions for human comfort _____	12
2 Types of maintenance for PDCC _____	28
3 Areas of inspection during maintenance _____	29
 Figures	
1 Cross section of a HPDCC unit _____	8
2 Schematic diagram of a typical PDC system _____	9
3 Layout drawing for typical full height PDC system _____	9
4 Layout drawing for typical half-height side throw PDC system _____	10
5 Layout drawing for typical half-height ceiling throw PDC system _____	10
6 Flow of air from outdoors to an indoor space using PDC _____	15
7 Illustration of a PDSCC (single tube fin coil) _____	16
8 Illustration of a PDDCC (dual tube fin coils) _____	17
9 Example of a PDDCC unit control configuration _____	18
10 Wall type HPDCC system with a cross-flow fan inside the PDCC unit _____	19
11 Example of HPDCC zone control configuration _____	20

		Page
12	Example of computation to evaluate performance based on capacity over footprint _____	21
13	Example schematic diagram of an individual PDDCC unit control installation _____	23
14	Example schematic diagram of a PDDCC unit integrated with MEP installation _____	24
15	Example schematic diagram of a PDC reverse return piping system _____	25
16	Example schematic diagram of a PDC direct return piping system _____	25
17	Example schematic diagram of a system with PDCC and PDDCC units _____	26
18	Example schematic diagram for a HPDCC system _____	26
19	Correct and incorrect configurations for fall ducts _____	27
A.1	Example diagram of a mock-up site _____	30

Foreword

This Technical Reference (TR) was prepared by the Working Group on Passive Displacement Cooling (PDC) System for Air-Conditioning Application set up by the Technical Committee on Building Maintenance and Management under the purview of the Building and Construction Standards Committee (BCSC).

This TR introduces the use of passive displacement cooling (PDC) as an energy-efficient air-conditioning and mechanical ventilation (ACMV) system. PDC systems utilise displacement ventilation as an effective method for directing cool air into a target space at a relatively low velocity. With little or no need for mechanical fans to propel cooled air into the target area, PDC relies on natural convection to deliver cooled air, thereby reducing energy consumption from mechanical fans and also enabling higher chilled water temperature set points.

This TR is a provisional standard made available for application over a period of three years. The aim is to use the experience gained to update the TR so that it can be adopted as a Singapore Standard. Users of the TR are invited to provide feedback on its technical content, clarity and ease of use. Feedback can be submitted using the form provided in the TR. At the end of the three years, the TR will be reviewed, taking into account any feedback or other considerations, to further its development into a Singapore Standard if found suitable.

In preparing this TR, reference was made to the Code of Practice for Fire Precautions in Buildings. Acknowledgement is made for the use of information from the Code.

Attention is drawn to the possibility that some of the elements of this TR may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent right.

NOTE

- 1. Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as "mature standards". Mature standards will not be subject to further review unless there are requests to review such standards.*
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Code of practice for passive displacement cooling (PDC) system for air-conditioning application

0 Introduction

PDC employs a buoyancy-driven cooling process to provide energy and space efficient solutions for cooling enclosed spaces. As an emerging technology in Singapore, there are currently no local standards on PDC systems, particularly in relation to its expected performance in achieving thermal comfort in a space in tropical climates. As a result, PDC system suppliers rely on their own technical specifications and expected performance metrics based on their respective experience, know-how and/or overseas manufacturers' specifications.

This TR aims to encourage best practices on the use of PDC systems in our tropical climate to maximise their cost and sustainability potential while addressing challenges in designing, operating and maintaining the systems.

1 Scope

This TR sets out provisions to instil a common methodology for specifying, verifying and evaluating PDC systems in order to encourage designers and users to adopt PDC systems and to accelerate their adoption in the industry.

This TR provides users with information on the application, operation and maintenance of PDC systems and their value as an alternative means to air-conditioning.

2 Normative references

The following referenced documents are indispensable for the application 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.

AHRI 410	Forced-circulation air-heating and air-cooling coils
ASHRAE 55	Thermal environmental conditions for human occupancy
ASHRAE 62.1	Ventilation for acceptable indoor air quality
ISO 7730	Ergonomics of the thermal environment — Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
SS 530	Code of practice for energy efficiency standard for building services and equipment
SS 553	Code of practice for air-conditioning and mechanical ventilations in buildings
SS 554	Code of practice for indoor air quality for air-conditioned buildings