

SINGAPORE STANDARD

Code of practice for cleaning and surface repair of buildings

– Part 1 : Cleaning of natural stones, brick, terracotta, concrete and rendered finishes

(Formerly CP 67 : Part 1)

SS 509 : Part 1 : 2005

(ICS 91.040.01)

SINGAPORE STANDARD

Code of practice for cleaning and surface repair of buildings

– Part 1 : Cleaning of natural stones, brick, terracotta, concrete and rendered finishes

All rights reserved. Unless otherwise specified, no part of this Singapore Standard may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from SPRING Singapore at the address below:

Standards
SPRING Singapore
1 Fusionopolis Walk,
#01-02 South Tower, Solaris
Singapore 138628
Email : standards@spring.gov.sg

ISBN 981-4154-03-2

This Singapore Standard was approved by the Building and Construction Standards Committee on behalf of the Standards Council of Singapore on 9 March 2005.

First published, 1997.

First revision, 2005.

The Building and Construction Standards Committee appointed by the Standards Council consists of the following members:

	Name	Capacity
Chairman	: Mr Goh Peng Thong	<i>Member, Standards Council</i>
1st Dy Chairman	: Dr Tam Chat Tim	<i>Member, Standards Council</i>
2nd Dy Chairman	: Mr Tan Tian Chong	<i>Member, Standards Council</i>
Secretary 1	: Mr Kenneth Lim See Khoon	<i>SPRING Singapore</i>
Secretary 2	: Ms Lee Hiok Hoong	<i>SPRING Singapore</i>
Members	: Mr Boo Geok Kwang	<i>Singapore Civil Defence Force</i>
	Mr Chan Kok Way	<i>Individual Capacity</i>
	Dr Jimmy Chen Wie Ying	<i>Individual Capacity</i>
	Mr Chin Jen Chyi	<i>Building and Construction Authority</i>
	Mr Chong Kee Sen	<i>Institution of Engineers, Singapore</i>
	Mr Desmond Hill	<i>Singapore Contractors Association Limited</i>
	Mr Joseph Lai Kuong Kiu	<i>JTC Corporation</i>
	Mr Benedict Lee Khee Chong	<i>Singapore Institute of Architects</i>
	Assoc Prof Leong Eng Choon	<i>Nanyang Technological University</i>
	Mr Lim Bok Ngam	<i>Land Transport Authority</i>
	Mr Larry Ng Lye Hock	<i>Urban Redevelopment Authority</i>
	Assoc Prof Gary Ong Khim Chye	<i>National University of Singapore</i>
	Er. See Sing Kok	<i>Singapore Manufacturers' Federation</i>
	Er. Shum Chee Hoong	<i>Housing & Development Board</i>
	Dr Tan Guan	<i>Association of Consulting Engineers, Singapore</i>

The Technical Committee on Facilities Management appointed by the Building and Construction Standards Committee and responsible for the preparation of this standard consists of representatives from the following organisations:

	Name	Capacity
Chairman	: Mr Joseph Lai	<i>Member, Building Construction Standards Committee</i>
Secretary	: Ms Lee Hiok Hoong	<i>SPRING Singapore</i>
Members	: Mr Abdul Rashid b Ibrahim	<i>Energy Market Authority</i>
	Mr Jeffrey Chua	<i>Association of Property and Facility Managers</i>
	Mr Foo Say Chiang	<i>EM Services Pte Ltd</i>
	Mr Amous Lee Tarn Siong	<i>Singapore Institute of Building Ltd</i>

Mr Ong Chau Tuang	<i>Ngee Ann Polytechnic</i>
Assoc Prof Chandra Sekhar	<i>National University of Singapore</i>
Ms Yvonne Soh Swee Leng	<i>Building and Construction Authority</i>
Mr Sumarni Bin Sarmin	<i>Institution of Engineers, Singapore</i>
Mr Tee Bon Teck	<i>CPG Facilities Management Pte Ltd</i>
Assoc Prof Wong Wai Fan	<i>Nanyang Technological University</i>
Mr Yap Chu Ing	<i>Housing & Development Board</i>

The Working Group appointed by the Technical Committee to assist in the preparation of this standard comprises the following experts who contribute in their *individual capacity*:

	Name
Convenor	: Assoc Prof Wong Wai Fan
Dy Convenor	: Mr Foo Say Chiang
Members	: Mr Chew Bong Koon
	Mr Amous Lee Tarn Siong
	Mr Jeffrey Chua
	Mr Steven Lim Cheng Seng
	Mr Jimmy Tan Gim Tat
	Mr Cedric Yip Yong Yew

The experts of the Working Group are nominated/recommended by the following organisations:

Association of Property and Facility Managers

Centre for Cleaning Technology

EM Services Pte Ltd

Environmental Management Association of Singapore

Jurong Consultants Pte Ltd

Contents

	Page
Foreword _____	5

CLAUSES

0	Introduction _____	6
1	Scope _____	6
2	Normative references _____	7
3	Definitions _____	7
4	Considerations affecting external cleaning decisions _____	8
5	Stonework _____	14
6	Clay and calcium silicate brickwork _____	18
7	Terracotta and faience _____	19
8	Concrete and rendered finishes _____	20
9	Removal of specific deposits _____	20
10	Cleaning methods _____	25
11	Safety _____	33
12	Consolidants for porous building materials _____	34

ANNEXES

A	(informative) Precautions for hand cleaning _____	35
B	(informative) Precautions for water cleaning _____	36
C	(informative) Precautions with abrasive cleaning _____	37
D	(informative) Further information on chemical cleaning _____	38
E	(informative) First aid treatment _____	43

TABLES

1	Factors affecting choice of cleaning method _____	9
2	Geological groups of rocks and examples of building materials _____	15
3	Types of sandstone and their potential resistance to weathering and soiling _____	15
4	Sandstone matrices and their potential resistance to weathering and soiling _____	15
5	Comparison of cleaning methods _____	25
6	Operating pressures _____	28
7	Hardness of abrasives _____	30

Foreword

This Code of Practice was prepared by the Working Group under the direction of the Technical Committee on Facilities Management. The Technical Committee is under the purview of the Building and Construction Standards Committee. SS 509 : Part 1 : 2005 is a revision of CP 67 : Part 1 : 1997.

SS 509 : Parts 1 and 2 will replace CP 67 : Part 1 : 1997 and CP 67 : Part 2 : 1999 respectively. Part 1 covers cleaning methods for natural stones, brick, terracotta, concrete and rendered surfaces, and provides guidance to enable the users to select the most appropriate method while Part 2 covers surface repair of natural stones, brick, terracotta and rendered surfaces.

This Code represents a standard of good practice. It aims to provide building owners, architects, building surveyors, engineers, managing agents, Town Councils, contractors and academics with useful technical information when considering surface cleaning. In all cases, relevant government regulations prevailing at the time, which may apply to surface cleaning and repair works, are to be followed.

The revised Code provides a clear separation of different disciplines to allow users to select from either Cleaning (Part 1) or Repairs (Part 2). With sound methods in place, it is envisaged that there will be more users of the Code by both the private and government sectors in drawing up their standards in cleaning and repairing of natural stones, brick, terracotta, concrete and rendered surfaces.

This standard is an adoption of BS 8221-1:2000 'Code of Practice for cleaning and surface repair of buildings – Part 1 Cleaning of natural stones, brick, terracotta and concrete' and is implemented with the permission of British Standards Publishing Ltd. Acknowledgement is made for the use of information from this standard.

Changes from BS 8221 include the amendment of the title and the addition of :

- (a) Guidelines on 'Comparison of cleaning methods' (Table 5)
- (b) Guidelines on 'Protection of worker and public' (Clause 11.1)
- (c) Information on 'First aid treatment' (Annex E).

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

NOTE

Singapore Standards are subject to periodic review to keep abreast of technological changes and new technical developments. The changes in Singapore Standards are documented through the issue of either amendments or revisions.

Compliance with a Singapore Standard does not exempt users from legal obligations.

Code of practice for cleaning and surface repair of buildings – Part 1 : Cleaning of natural stones, brick terracotta, concrete and rendered finishes

0 Introduction

Buildings are cleaned either to enhance their appearance or to assist maintenance and/or conservation.

Reasons for wanting to enhance appearance include:

- removal of disfigurements (e.g. stains, graffiti);
- revealing the nature, colour or details of a building;
- unification of the appearance of a building that has been altered, extended or repaired.

Reasons for cleaning a building prior to maintenance and/or conservation include:

- removal of harmful or undesirable deposits or applied materials from the fabric in order to arrest decay;
- exposure of concealed defects, where surfaces are very thickly soiled, in order to establish the extent and nature of repairs required;
- preparation of a surface for additional treatments;
- prevention of the spreading of harmful deposits or similar defects from occurring to adjacent fabric;
- fulfilling the terms of a lease that requires periodic cleaning of a building.

Buildings have a variety of surfaces and materials and are subject to various types of soiling. Each should be cleaned using appropriate methods and materials. It is essential to identify, in advance, the type, properties, and condition of masonry (in particular, whether limestone or sandstone) and jointing materials.

NOTE – If features of artistic or historic importance are to be cleaned, specialist guidance should be sought.

Each project should be considered carefully, taking into account previous experience with the building (or similar buildings), available materials and methods. If treatment of one material or surface can harm other materials or surfaces, proper protection should be provided.

1 Scope

This Code provides guidance on removal or partial removal of deposits from the original surface or substrate of a building.

Advice is given on the principal cleaning methods in use and the characteristics of surface deposits. Guidance is given on cleaning natural stones, clay brick, calcium silicate brick, glazed and unglazed terracotta/faience, as-cast concrete and concrete products such as cast stone, concrete brick and concrete blockwork.