

SINGAPORE STANDARD

**Code of practice for the installation of
master antennae television systems for
the reception of VHF and UHF sound and
television broadcasting transmission
operating between 5 MHz and 824 MHz**

Confirmed 2012

Published by

Enterprise
Singapore

CP 39 : 1994 (2012)
(ICS 33.160.25)

SINGAPORE STANDARD

Code of practice for the installation of master antennae television systems for the reception of VHF and UHF sound and television broadcasting transmission operating between 5 MHz and 824 MHz

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 Enterprise Singapore. Request for permission can be sent to: standards@enterprisesg.gov.sg.

ISBN 9971-67-288-X

CP 39 : 1994

This Singapore Standard having been approved by the Electrical Industry Practice Committee was endorsed by the Standards Council on 5 July 1994.

First published, 1987.
First revision, 1994.

The Electrical Industry Practice Committee appointed by the Standards Council consists of the following members:

	Name	Organization
Chairman	Mr Ng Nam Wah	Standards Council
Secretary	Mr Tan Hoe Heng	Singapore Institute of Standards and Industrial Research
Members	Dr David Chia Cheng Song	Association of Consulting Engineers, Singapore
	Mr Foo Kong Deen	Singapore Electrical Trades Association
	Mr Goh Kok Chan	Port of Singapore Authority
	Mr Ho Fui Chan	Housing and Development Board
	Er N. P. Karthigayan	Institution of Engineers, Singapore
	Mr Koh Chai Kee	Singapore Telecommunications Private Limited
	Dr Lock Kai Sang	National University of Singapore
	Mr Samuel Ong	Singapore Electrical Contractors' Association
	Mr Tan Sing Ong	Jurong Town Corporation
	Mr Dominic Tay Chye Aik	Public Works Department
	Mr Tay Tien Seng	Singapore Mass Rapid Transit
	Assoc Prof Teo Cheng Yu	Nanyang Technological University
	Mr Wan Fook Sing	Singapore Contractors' Association Limited
	Mr Yeo Yek Seng	Public Utilities Board

The Technical Committee appointed by the Electrical Industry Practice Committee and responsible for the preparation of this standard consists of representatives from the following organizations:

	Name	Organization
Chairman	Mr Liew Ter Kwang	Singapore Broadcasting Corporation
Secretary	Mr Tan Hoe Heng	Singapore Institute of Standards and Industrial Research
Member	Mr Leong Kok Yeong	Association of Consulting Engineers, Singapore
	Mr Leong Ngai Weng	Institution of Engineers, Singapore
	Mr Ng Ooi Meng	Singapore Manufacturers' Association
	Mr Seow Eng Chong	Singapore Telecommunications Private Limited
	Mr Sun Chong Hong	Housing and Development Board
	Dr Yeo Swee Ping	National University of Singapore
Co-opted Member	Mr Adrian Lim Meng Yan	Telecommunication Authority of Singapore

CONTENTS

	Page
Foreword - - - - -	5
1. Scope - - - - -	6
2. Definitions - - - - -	6
3. Performance requirements for systems operating between 5 MHz and 824 MHz - - - - -	12
4. Antennae and installation - - - - -	17
5. Network topology - - - - -	18
6. Cables - - - - -	19
7. Equipment specifications - - - - -	20
8. Safety - - - - -	23
9. Installation practices and procedures - - - - -	24
10. Workmanship - - - - -	25
11. Commissioning test procedures - - - - -	25
12. Methods of measurements - - - - -	25
13. Documentation - - - - -	27
14. Space and other provisions in buildings for the construction of MATV system - - - - -	27

APPENDICES

A. Recommendations for maintenance of systems - - - - -	29
B. Recommended design details for a MATV system - - - - -	30
C. Measurement of echo rating - - - - -	31
D. Measurement of echoes - - - - -	34
E. Electro chemical potential - - - - -	36
F. Wiring arrangement in front of residential units - - - - -	37
G. Source port locations - - - - -	40

TABLES

1.	Carrier signal levels at system outlets	-	-	-	-	-	12
2.	Maximum level difference at each system outlet between distributed television channels	-	-	-	-	-	13
3.	Minimum carrier to noise ratio for TV and FM systems at system outlets	-	-	-	-	-	14
4.	Differential gain and phase in television channels	-	-	-	-	-	15
5.	Minimum requirements of antennae	-	-	-	-	-	17
6.	Electro chemical potential of some materials	-	-	-	-	-	36

FIGURES

1.	Principal items of equipment employed in wired distribution systems	-	-	-	-	-	11
2.	Carrier to single-frequency interference protection ratio for 625-line PAL systems B and G. C.W. interference with no special control	-	-	-	-	-	28
3.	Arrangement of test equipment for measurement of echo rating	-	-	-	-	-	32
4.	E rating graticule	-	-	-	-	-	33
5.	Limits for echo amplitude for 625-line channels	-	-	-	-	-	35
6.	Example A of wiring arrangement in front of residential units	-	-	-	-	-	37
7.	Example B of wiring arrangement in front of residential units	-	-	-	-	-	38
8.	Example C of wiring arrangement of a MATV system in a 14 storey high building	-	-	-	-	-	39
9.	Source port locations	-	-	-	-	-	40

SINGAPORE STANDARD

**CODE OF PRACTICE FOR THE INSTALLATION OF
MASTER ANTENNAE TELEVISION SYSTEMS FOR THE RECEPTION OF
VHF AND UHF SOUND AND TELEVISION BROADCAST TRANSMISSION
OPERATING BETWEEN 5 MHz AND 824 MHz**

FOREWORD

This Code of Practice is a revision of the 1987 edition. It was prepared by the Technical Committee for the Installation of Master Antennae Television Systems for the Reception of VHF and UHF Sound and Television Broadcast Transmission Operating Between 5 MHz and 824 MHz under the direction of the Electrical Industry Practice Committee.

The objective of this Code of Practice is to define the features relating to the installation, safety and performance of Master Antennae Systems in new buildings. In this revision, amendments were made and new clauses added to minimise the degradation of system performance due to corrosion and system degradation. The broadcast transmission frequency has also been amended to include the frequency for reverse path transmission envisaged for CATV distribution as well as to bring the Code in line with TAS's requirement for mobile communications operating above 824 MHz.

In preparing this Code, reference was made to the following publications:

1. IEC 728-1 : Part 1 : 1986 Cabled distribution systems
Part 1 - Systems primarily intended for sound and television signals operating between 30 MHz and 1 GHz
2. MATV wiring specifications for compatible CATV operation
3. pr EN 50083 : Part 2 : 1992 Cabled distribution systems for television and sound signals
Part 2 - Electromagnetic compatibility for components and systems
4. NCTA recommended practices for measurements on cable TV systems, 2nd Edition

Acknowledgement is made for the use of information from the above publications.

Reference was also made to SS 143 : 1988 - Safety requirements for mains operated electronic and related equipment for domestic and similar general use.

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.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

1. SCOPE

This Code of Practice covers recommendations for the erection, cabling, performance and safety requirements of the Master Antennae Television Systems (MATV) for the reception of VHF and UHF Sound and Television Broadcast Transmission operating between 5 MHz and 824 MHz.

The recommendations have included, as far as possible, certain aspects of Cable TV (CATV) distribution. The MATV system so wired will result in minimum changes on introduction of new services such as CATV or multipoint microwave distribution services.

When it is converted for CATV operation, there will be no major system wiring change. However, the installation of additional passive and active devices such as filters, decoders, reverse signal path amplifiers, interdiction equipment etc. may be required. Minor adjustments of the signal levels at various distribution points may also be required. There will be no change to the subscribers' feeders.

NOTE. Compliance with the recommendations given in this Code does not counter immunity from relevant legal requirements, such as regulations issued by the Telecommunication Authority of Singapore, Ministry of Information and the Arts, and the Public Utilities Board.

2. DEFINITIONS

Reference may be made to Figure 1.

2.1 Master Antennae Television System (MATV). A wired (cabled) system for the distribution of television signals received by a common receiving antenna installation from off-air broadcasts to one or more outlets in one or more buildings, which may provide an output at one of its outlets for distributing the same received television signals to low-rise buildings or a group of terrace houses and/or bungalows located in its neighbourhood.

2.2 Cable Television System (CATV). A wide-area, wired (cabled) system of coaxial and fibre optic cables interconnecting a large number of networks installed in the buildings for distributing broadcast as well as other television and electronic signals from one or more CATV programme origination sources. The term "network" refers to the wiring within a building.

2.3 Active Equipment Stations

2.3.1 Head end. Equipment which is connected between receiving antennae or other signal sources and the remainder of the cabled distribution system to process the signals to be distributed.

NOTE. The head end may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

2.3.2 Local head end. A head end which is directly connected to the system trunk feeders or to a short haul "trunk feeder replacement" link.

2.3.3 Hub head end. A subsidiary head end usually located at the centre of its service area, with inputs from a local head end, and possibly other sources.

2.3.4 Remote head end. A head end from which signals are delivered to a local head end via a long distance terrestrial or satellite link.

2.3.5 Distribution point. A point where signals are taken from the trunk feeder to energize branch and/or spur feeders.

NOTE. In some cases a distribution point may be directly connected to the head end.