

SINGAPORE STANDARD

**Code of practice for digital conversion of
16 mm/35 mm microfilm and 105 mm
microfiche – Operating procedures**



Published by

Enterprise
Singapore

SS 606 : 2015
(ICS 37.080)

SINGAPORE STANDARD

**Code of practice for digital conversion of 16 mm/35 mm
microfilm and 105 mm microfiche – Operating procedures**

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 978-981-4557-96-2

This Singapore Standard was approved by the Chemical Standards Committee on behalf of the Singapore Standards Council on 30 June 2015.

First published, 2015.

The Chemical Standards Committee, appointed by the Standards Council, consists of the following members:

	Name	Capacity
Chairman	: Dr Keith Carpenter	<i>Member, Standards Council</i>
Deputy Chairman	: Dr Tay Kin Bee	<i>Individual Capacity</i>
Secretary 1	: Ms Elane Ng	<i>Standards Development Organisation@Singapore Chemical Industry Council</i>
Secretary 2	: Ms Jillian Chin	<i>Standards Development Organisation@Singapore Chemical Industry Council</i>
Members	: Mr Goh Tiak Boon	<i>Individual Capacity</i>
	Prof Andy Hor	<i>Individual Capacity</i>
	Mr Khong Beng Wee	<i>Individual Capacity</i>
	Mr Koh Min Ee	<i>National Environment Agency</i>
	Mr Terence Koh	<i>Singapore Chemical Industry Council Limited</i>
	Prof Lee Hian Kee	<i>National University of Singapore</i>
	Ms Lee Hiok Hoong	<i>SPRING Singapore</i>
	Dr Lee Tong Kooi	<i>Chemical Metrology Division, Health Sciences Authority</i>
	Mr Leong Kwai Yin	<i>Individual Capacity</i>
	Prof Leung Pak Hing	<i>Nanyang Technological University</i>
	Mr Lim Eng Kiat	<i>Individual Capacity</i>
	Mr Lim Kian Chye / Mr Ng Eng Fu	<i>Housing & Development Board</i>
	Dr Lim Mong Hoo	<i>Individual Capacity</i>
	Dr Jerry Liu Jian Lin	<i>Singapore Water Association</i>
	Dr Loh Wah Sing	<i>Individual Capacity</i>
	Dr Ng Sek Yeo	<i>Singapore Polytechnic</i>
	Dr Parry Oei	<i>Maritime and Port Authority of Singapore</i>
	Ms Pamela Phua	<i>Singapore Paint Industry Association</i>
	Mr Seah Khen Hee	<i>Individual Capacity</i>
	Mr Tan Nguan Sen / Dr Lim Mong Hoo	<i>PUB, the National Water Agency</i>
Co-opted Members	: Assoc Prof Thomas Liew	<i>Individual Capacity</i>
	Mr Nee Pai How	<i>Individual Capacity</i>
	Mr Pitt Kuan Wah	<i>Individual Capacity</i>

The Technical Committee on Microfilming, appointed by the Chemical Standards Committee and responsible for the preparation of this standard, consists of representatives from the following organisations:

	Name	Capacity
Chairman	: Mr Pitt Kuan Wah	<i>Individual Capacity</i>
Secretary	: Ms Jillian Chin	<i>Standards Development Organisation@Singapore Chemical Industry Council</i>
Members	: Mr Thomas Foo Saik Main	<i>Microimage Systems Pte Ltd</i>
	Mrs Kwek-Chew Kim Gek	<i>National Archives of Singapore</i>
	Mrs Lam-Teo Suan Khim	<i>Land Transport Authority</i>
	Mr Vincent Tan	<i>CD Imaging Pte Ltd</i>
	Mr Sebastian Yeo	<i>novaC2R Pte Ltd</i>

(blank page)

Contents

	Page
Foreword _____	6
1 Scope _____	8
2 Normative references _____	8
3 Terms and definitions _____	9
4 Digitisation as a migration strategy for media refreshment and online access _____	13
5 Specifications related to digital conversion options _____	14
6 Steps in digital conversion of microfilm _____	17

Tables

1 Theoretical calculation of microfilm reduction ratios and expected minimum resolutions _____	16
2 General trouble-shooting guide for microfilm scanning _____	25

Figures

1 Example of cellulose acetate/triacetate (acetate-based) microfilm _____	9
2 Cine and comic filming modes _____	10
3 Illustration of microfilm inspection station _____	11
4 Positive microfilm _____	11
5 Negative microfilm _____	11
6 Examples of redox _____	12
7 Examples of deformation of silver halide microfilms _____	14
8 Operator wearing lint-free and anti-static gloves during inspection _____	17
9 Example of a static dissipative cleaner _____	18
10 Example of a strip of mirror images _____	18
11 Spools _____	19
12 Screen capture of typical software displaying scan set-up _____	20
13 Loading of film onto microfilm scanner _____	20
14 Preview of scan images on screen _____	21
15 Illustration of incomplete images captured during scanning _____	22
16 Post-scan processing _____	23
17 Counter checking on source microfilm _____	24

Foreword

This Singapore Standard was prepared by the Technical Committee on Microfilming under the direction of the Chemical Standards Committee.

Microfilms produced between 1950s and 1980s are made of acetate film which is not as durable as polyester film of the 1990s and beyond [for details, see 3.1 on Cellulose diacetate/triacetate (acetate-based) microfilm]. Scanning of acetate-based microfilm and writing back to polyester-based microfilm that has a longer media life expectancy is part of the media refreshment strategy for archival information. Furthermore, digitised microfilm images are more readily accessible than the conventional microfilm reel.

As there is no ISO standard on microfilm scanning and the concept of digitising microfilm and the associated technology are relatively new, this standard is developed based on the expertise of the Technical Committee members.

Preservation of digital data (text, graphics etc) for long term access depends on two factors: durability of the information/record file format and durability of the record storage media, i.e. the physical carrier. Even as cloud computing/storage is being explored, there is still a need to address recordkeeping issues particularly relating to 3rd-party reliability and trustworthiness. Furthermore the choice of digital file format continues to impact on the long term accessibility of the recorded information.

For this SS, the recommendations would focus on the selection of open access standards already available in the ISO – such as PDF/A-1 for text based documents, PDF-E for technical drawing documents, TIFF & JPEG 2000 for photographic images etc. For the selection of digital storage media, it is more to protect the data from being altered without detection, i.e. media that allows “write-once-read many” which would stand a better chance in meeting short to mid-term information storage and protection needs.

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

1. American National Standard for Imaging media/association for information and image management – Inspection of stored silver gelatin microforms for evidence of deterioration. ANSI/AIIM MS 45–1990.
2. Recommendations for the evaluation of digital images produced from photographic, microphotographic, and various paper formats (<http://lcweb2.loc.gov/ammem/lpireprt.pdf>)
3. Technical guidelines for digitizing cultural heritage materials: Creation of raster image master files (http://www.digitizationguidelines.gov/guidelines/FADGI_Still_Image-Tech_Guidelines_2010-08-24.pdf)
4. A project on preservation of digital data (<http://worldcat.org/arcviewer/1/OCC/2007/08/08/0000070513/viewer/file2118.html#faq>)
5. McCamy, C.S. et al and R.I.T College of Imaging Arts and Sciences
https://www.imagepermanenceinstitute.org/webfm_send/519
6. A survey of blemishes on processed microfilm (Vol. 73A) – McCamy, C.S; Wiley, S.R.; Speckman, J.A
(<https://archive.org/details/jresv73An1p79>)

The figures in this standard are reproduced with permission from CD Imaging Pte Ltd and ISEAS Library, ISEAS-Yusof Ishak Institute.

Acknowledgement is made for the use of information/materials from the above sources.

At the time of publication, this standard is expected to be used by agencies who have microfilm collection with the intention to digitise for online access as well as migration from older generation of microfilm.

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

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.*

Code of practice for digital conversion of 16 mm/35 mm microfilm and 105 mm microfiche – Operating procedures

1 Scope

This Singapore Standard specifies the operating procedures for digital conversion of 16 mm/35 mm microfilm and 105 mm microfiche (camera and COM).

This Singapore Standard does not cover the following:

- 105 mm microfiche in roll format;
- Aperture card (35 mm);
- Colour microfilm (16 mm/35 mm);
- X-ray film; and
- Photographic film (positive and negative).

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SS 520	Code of practice for microfilming of documents on 16 mm black and white, silver-gelatin type microfilm/planetary and rotary camera filming – Operating procedures
SS 522	Code of practice for quality control inspection of 16 mm and 35 mm black and white, silver-gelatin type microfilm
SS 596	Code of practice for imaging and writing of digital text and drawing documents on 16 mm and 35 mm black and white, silver-gelatin type microfilm for long term preservation – Operating procedures
ISO 9923	Micrographics – Transparent A6 microfiche – Image arrangements
ISO 11506	Document management applications – Archiving of electronic data – Computer output microform (COM)/Computer output laser disc (COLD)
ISO 12653-1	Electronic imaging – Test target for the black-and-white scanning of office documents – Part 1: Characteristics
ISO 12653-2	Electronic imaging – Test target for the black-and-white scanning of office documents – Part 2: Methods of use
ISO/TR 13028 : 2010	Information and documentation – Implementation guidelines for digitization of records
ISO 18901 : 2010	Imaging materials – Processed silver-gelatin-type black-and-white films – Specifications for stability
ISO 29861 : 2009	Documentation management applications – Quality control for scanning office documents in colour