

Australian Standard<sup>®</sup>

**Information technology—Biometric data  
interchange formats**

**Part 5: Face image data**



This Australian Standard® was prepared by Committee IT-032, Biometric and Identification. It was approved on behalf of the Council of Standards Australia on 9 March 2007. This Standard was published on 2 July 2007.

---

The following are represented on Committee IT-032:

- AUSTRROADS
  - Attorney General's Department
  - Australian Business Limited
  - Australian Electrical and Electronic Manufacturers Association
  - Centrelink
  - The Biometric Institute
- 

This Standard was issued in draft form for comment as DR 06673.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

---

### **Keeping Standards up-to-date**

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting [www.standards.org.au](http://www.standards.org.au)

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at [mail@standards.org.au](mailto:mail@standards.org.au), or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

---

STANDARDS AUSTRALIA

---

**RECONFIRMATION**

**OF**

**AS ISO/IEC 19794.5—2007**

**Information technology—Biometric data interchange formats  
Part 5: Face image data**

---

**RECONFIRMATION NOTICE**

Technical Committee IT-032 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 04 June 2017.

The following are represented on Technical Committee IT-032:

Australian Federal Police

Australian Information Industry Association

Australian Retailers Association

Centrelink

Defence Science & Technology Organisation

Department of Foreign Affairs and Trade (Australian Government)

Department of Immigration and Border Protection (Australian Government)

NSW Business Chamber

Photo Marketing Association

## NOTES

Australian Standard<sup>®</sup>

**Information technology—Biometric data  
interchange formats**

**Part 5: Face image data**

First published as AS ISO/IEC 19794.5—2007.

**COPYRIGHT**

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 8265 5

## PREFACE

This Standard was prepared by the Standards Australia Committee IT-032, Biometric and Identification.

The objective of this Standard is to make available to the Australian biometrics community the core ISO SC37 standards published over the last 24 months, specifically the biometric data interchange formats face image data.

This Standard is identical with, and has been reproduced from ISO/IEC 19794-5:2005, *Information technology—Biometric data interchange formats—Part 5: Face image data*.

As this Standard is reproduced from an international standard, the following applies:

- (a) Its number appears on the cover and title page while the international standard number appears only on the cover.
- (b) In the source text ‘this part of ISO/IEC 19794’ should read ‘this Australian Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
ISO/IEC		AS ISO/IEC	
15444	Information technology—JPEG 2000 image coding system	15444	Information technology—JPEG 2000 image coding system
19785	Information technology—Common Biometric Exchange Formats Framework	19785	Information technology—Common Biometric Exchange Formats Framework
19794	Information technology—Biometric data interchange formats	19794	Information technology—Biometric data interchange formats
19794-1	Part 1: Framework	19794.1	Part 1: Framework

Only international references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

The term ‘informative’ has been used in this Standard to define the application of the annex to which it applies. An ‘informative’ annex is only for information and guidance.

## CONTENTS

	<i>Page</i>
1	Scope .....1
2	Compliance.....3
3	Normative references .....3
4	Terms and definitions .....3
5	The face record format .....5
5.1	Overview .....5
5.2	Data Conventions.....7
5.2.1	Byte ordering.....7
5.2.2	Numeric values.....7
5.2.3	Conversion to integer .....7
5.2.4	Unspecified field value .....7
5.2.5	Unknown field value .....7
5.3	The CBEFF Header.....7
5.4	The Facial Record Header .....8
5.4.1	Format Identifier.....8
5.4.2	Version Number .....8
5.4.3	Length of Record .....8
5.4.4	Number of Facial Images.....8
5.5	The Facial Information block.....8
5.5.1	Facial Record Data Length .....9
5.5.2	Number of Feature Points .....9
5.5.3	Gender .....9
5.5.4	Eye Colour .....10
5.5.5	Hair Colour .....10
5.5.6	Property Mask .....12
5.5.7	Expression.....13
5.5.8	Pose Angle .....13
5.5.9	Pose Angle Uncertainty .....15
5.6	The Feature Point Block .....15
5.6.1	Feature Point Type .....15
5.6.2	Feature Point Code .....15
5.6.3	MPEG4 Feature Points.....17
5.6.4	Eye and nostril centre Feature Points .....18
5.7	The Image Information Block .....19
5.7.1	Face Image Type .....19
5.7.2	Image Data Type.....20
5.7.3	Width.....20
5.7.4	Height.....20
5.7.5	Image Colour Space.....20
5.7.6	Source Type .....21
5.7.7	Device Type .....21
5.7.8	Quality.....22
5.8	The Image Data Block.....22
5.8.1	Data structure.....22
6	The Basic Face Image Type .....22
6.1	Inheritance requirements for the Basic Face Image Type .....22
6.2	Image data encoding requirements for the Basic Face Image Type .....22

6.3	Image data compression requirements for the Basic Face Image Type.....	22
6.4	Format requirements for the Basic Face Image Type .....	22
6.4.1	Facial Header.....	22
6.4.2	Facial Information .....	22
6.4.3	Image Information .....	23
7	The Frontal Face Image Type.....	23
7.1	Inheritance requirements for the Frontal Face Image Type.....	23
7.2	Scene requirements for the Frontal Image Type .....	23
7.2.1	Purpose.....	23
7.2.2	Pose .....	23
7.2.3	Expression.....	23
7.2.4	Assistance in positioning the face .....	24
7.2.5	Shoulders .....	24
7.2.6	Backgrounds .....	24
7.2.7	Subject and scene lighting.....	24
7.2.8	Shadows over the face .....	24
7.2.9	Shadows in eye-sockets.....	24
7.2.10	Hot spots .....	24
7.2.11	Eye glasses .....	24
7.2.12	Eye patches .....	25
7.3	Photographic Requirements for the Frontal Image Type.....	25
7.3.1	Purpose.....	25
7.3.2	No over or under exposure .....	25
7.3.3	Focus and depth of field.....	25
7.3.4	Unnatural colour .....	25
7.3.5	Colour or greyscale enhancement.....	25
7.3.6	Radial distortion of the camera lens.....	25
7.4	Digital requirements for the Frontal Image Type.....	25
7.4.1	Geometry .....	26
7.4.2	Colour profile .....	26
7.4.3	Video interlacing .....	26
7.5	Format requirements for the Frontal Image Type.....	27
7.5.1	Inheritance requirements .....	27
7.5.2	Image Information .....	27
8	The Full Frontal Image Type.....	27
8.1	Inheritance requirements for the Full Frontal Face Image Type .....	27
8.2	Scene requirements for the Full Frontal Face Image Type.....	27
8.3	Photographic requirements for the Full Frontal Face Image Type.....	27
8.3.1	Introduction .....	27
8.3.2	Horizontally centred face.....	28
8.3.3	Vertical position of the face .....	28
8.3.4	Width of head .....	28
8.3.5	Length of head .....	29
8.3.6	Summary of photographic requirements .....	29
8.4	Digital requirements for the Full Frontal Face Image Type.....	29
8.4.1	Resolution .....	29
8.5	Format requirements for the Full Frontal Image Type .....	29
8.5.1	Inheritance requirements .....	29
8.5.2	Image Information .....	29
9	The Token Face Image Type .....	29
9.1	Inheritance requirements for Token Face Image Type.....	29
9.2	Digital requirements for the Token Face Image Type .....	30
9.2.1	Introduction .....	30
9.2.2	Eye positions.....	30
9.2.3	Token image geometric format.....	30
9.2.4	Minimum width Token image .....	31
9.2.5	Padding.....	31
9.3	Format requirements for the Token Face Image Type .....	31
9.3.1	Inheritance requirements .....	31
9.3.2	Image Information .....	31

<b>Annex A (informative) Best practices for Face Images</b> .....	<b>32</b>
<b>A.1 Basic Face Images</b> .....	<b>32</b>
<b>A.1.1 Purpose</b> .....	<b>32</b>
<b>A.1.2 Feature Point determination</b> .....	<b>32</b>
<b>A.2 Frontal Images</b> .....	<b>32</b>
<b>A.2.1 Purpose</b> .....	<b>32</b>
<b>A.2.2 Expression</b> .....	<b>32</b>
<b>A.2.3 Assistance in positioning the face</b> .....	<b>33</b>
<b>A.2.4 Backgrounds</b> .....	<b>33</b>
<b>A.2.5 Focus and depth of field</b> .....	<b>33</b>
<b>A.2.6 No unnatural colour</b> .....	<b>34</b>
<b>A.2.7 Colour calibration</b> .....	<b>34</b>
<b>A.2.8 Radial distortion of the camera lens</b> .....	<b>34</b>
<b>A.3 Full Frontal Images</b> .....	<b>34</b>
<b>A.3.1 Digital attributes of Full Frontal Images</b> .....	<b>34</b>
<b>A.3.2 Best practices for use of Full Frontal Images on travel documents</b> .....	<b>34</b>
<b>A.3.3 Full Frontal Image Compression</b> .....	<b>39</b>
<b>A.3.4 Full Frontal Image compression using region of interest</b> .....	<b>41</b>
<b>A.4 Token Images</b> .....	<b>42</b>
<b>A.4.1 Token image sizes</b> .....	<b>42</b>
<b>A.4.2 Creation of a Token Image</b> .....	<b>43</b>
<b>A.4.3 Best practices for digital attributes of Token Images</b> .....	<b>43</b>
<b>A.4.4 Token Image compression</b> .....	<b>43</b>
<b>A.4.5 Token Image compression using region of interest</b> .....	<b>45</b>
<b>A.4.6 Inner and outer regions for the Token Image for the purpose of compression</b> .....	<b>45</b>
<b>Bibliography</b> .....	<b>47</b>

## INTRODUCTION

Face images, also commonly referred to as displayed portraits, have been used for many decades to verify identity of persons. In recent years, digital face images are used in many applications including human examination as well as computer automated face recognition. Although photographic formats have been standardized in some cases such as passport and driver license, it is also demanded to define a standard data format of digital face images to allow interoperability among vendors.

This part of ISO/IEC 19794 is intended to provide a Face Image Format for face recognition applications requiring exchange of face image data. The typical applications are:

- 1) human examination of facial images with sufficient resolution to allow a human examiner to ascertain small features such as moles and scars that might be used to verify identity;
- 2) human verification of identify by comparison of persons against facial images;
- 3) computer automated face identification (one-to-many searching);
- 4) computer automated face verification (one-to-one matching).

To enable many applications on variety of devices, including devices that have the limited resources required for data storage, and to improve face recognition accuracy, this part of ISO/IEC 19794 specifies not only a data format, but also scene constraints (lighting, pose, expression etc), photographic properties (positioning, camera focus etc), digital image attributes (image resolution, image size etc).

Several image types are introduced to define categories that satisfy requirements of some applications. Each requirement is specified for each image type.

The record format specified in this part of ISO/IEC 19794 is designed to be embedded in a CBEFF-compliant structure specified in ISO/IEC 19785. The embedment in the CBEFF structure is described in ISO/IEC 19794-1.

## AUSTRALIAN STANDARD

**Information technology — Biometric data interchange formats —****Part 5:  
Face image data****1 Scope**

This part of ISO/IEC 19794

- specifies a record format for storing, recording, and transmitting the information from one or more facial images within a CBEFF data structure,
- specifies scene constraints of the facial images,
- specifies photographic properties of the facial images,
- specifies digital image attributes of the facial images.

Each requirement is specified for the following Face Image Types, respectively.

- **Basic:** This is the fundamental Face Image Type that specifies a record format including header and image data. All Face Image Types adhere to the properties of this type. No mandatory scene, photographic and digital requirements are specified for this image type.
- **Frontal:** A Basic Face Image Type that adheres to additional requirements appropriate for frontal face recognition and/or human examination. Two types of Frontal Face Image Types are defined in this document, Full Frontal and Token Frontal (or simply Token).
- **Full Frontal:** A Face Image Type that specifies frontal images with sufficient resolution for human examination as well as reliable computer face recognition. This type of Face Image Type includes the full head with all hair in most cases, as well as neck and shoulders. This image type is suitable for permanent storage of the face information, and it is applicable to portraits for passport, driver license, and “mugshot” images.
- **Token Frontal:** A Face Image Type that specifies frontal images with a specific geometric size and eye positioning based on the width and height of the image. This image type is suitable for minimizing the storage requirements for computer face recognition tasks such as verification while still offering vendor independence and human verification (versus human examination which requires more detail) capabilities.

Table 1 shows the relationships between Face Image Types using the notion of inheritance. For example, Frontal inherits properties from Basic, which means that all normative clauses that apply to Basic also apply to Frontal.

**Table 1 – Inheritance of Face Image Types**

Face Image Type	Inherits from	Normative clauses	Informative clauses
Basic	None	1, 2, 3, 4, 5, 6	A.1
Frontal	Basic	7	A.2
Full Frontal	Frontal	8	A.3
Token	Frontal	9	A.4

Figure 1 gives a general overview of the scene, photographic, digitization, and format requirements for the face image types specified in this part of ISO/IEC 19794.