INTERNATIONAL STANDARD

ISO/IEC 18181-1

First edition
2022-03

Information technology — JPEG XL image coding system —

Part 1: Core coding system

Technologies de l'information — Système de codage d'images JPEG XL —

Partie 1: Système de codage de noyau

This document is a preview generated by EVS

Reference number
ISO/IEC 18181-1:2022(E)

© ISO/IEC 2022

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO/IEC 2022 – All rights reserved

Contents

Page

Foreword ... **v**
Introduction ... **vi**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
3.1 Data storage ... 2
3.2 Inputs ... 2
3.3 Processes ... 3
3.4 Image organization ... 4
3.5 DCT ... 5
4 Abbreviated terms ... **6**
5 Conventions ... **6**
5.1 Mathematical symbols ... 6
5.2 Functions ... 6
5.3 Operators ... 7
5.4 Pseudocode ... 7
6 Functional concepts ... **8**
6.1 Image organization ... 8
6.2 Group splitting ... 8
6.3 Codestream and bitstream ... 9
6.4 Multiple frames ... 10
6.5 Mirroring ... 10
7 Encoder requirements ... **10**
8 Decoder requirements ... **10**
9 Codestream ... **10**
9.1 Syntax ... 10
9.1.1 Reading a field ... 11
9.1.2 Initializing a field ... 11
9.2 Field types ... 11
9.2.1 u(n) ... 11
9.2.2 U32(d0, d1, d2, d3) ... 11
9.2.3 U64() ... 11
9.2.4 Varint() ... 12
9.2.5 U8() ... 12
9.2.6 F16() ... 12
9.2.7 Bool() ... 12
9.2.8 Enum(`EnumTable`) ... 12
9.2.9 ZeroPadToByte() ... 13
9.3 Structure ... 13
10 Decoding process ... **13**
Annex A (normative) **Headers** ... **15**
Annex B (normative) **ICC profile** ... **25**
Annex C (normative) **Frames** ... **32**
Annex D (normative) **Entropy decoding** ... **58**
Annex E (normative) **Weighted predictor** ... **67**
Annex F (normative) **Adaptive quantization** ... **70**
Annex G (normative) **Chroma from luma** ... **71**

This document is a preview generated by EVS

© ISO/IEC 2022 – All rights reserved

Annex H (normative) **Extensions** **72**
Annex I (normative) **Integral transforms** **73**
Annex J (normative) **Restoration filters** **84**
Annex K (normative) **Image features** **87**
Annex L (normative) **Colour transforms** **92**
Annex M (informative) **Encoder overview** **98**
Bibliography **101**

This document is a preview generated by EVS

© ISO/IEC 2022 – All rights reserved

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see https://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

A list of all parts in the ISO/IEC 18181 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

This document is a preview generated by EVS

© ISO/IEC 2022 – All rights reserved

Introduction

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. Information may be obtained from the patent database available at www.iso.org/patents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

This document is a preview generated by EVS

© ISO/IEC 2022 – All rights reserved

Information technology — JPEG XL image coding system —

Part 1:
Core coding system

This document is a preview generated by EVS

1 Scope

This document defines a set of compression methods for coding one or more images of bi-level, continuous-tone greyscale, or continuous-tone colour, or multichannel digital samples.

This document:

— specifies decoding processes for converting compressed image data to reconstructed image data;

— specifies a codestream syntax containing information for interpreting the compressed image data;

— provides guidance on encoding processes for converting source image data to compressed image data.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 15076-1:2010, *Image technology colour management — Architecture, profile format and data structure — Part 1: Based on ICC.1:2010*

ISO/IEC 60559, *Information technology — Microprocessor Systems — Floating-Point arithmetic*

IEC 61966-2-1, *Multimedia systems and equipment — Colour measurement and management — Part 2-1: Colour management — Default RGB colour space — sRGB*

Rec. ITU-R BT.2100-2, *Image parameter values for high dynamic range television for use in production and international programme exchange*

Rec. ITU-R BT.709-6, *Parameter values for the HDTV standards for production and international programme exchange*

SMPTE ST 428-1, *D-Cinema distribution master — Image characteristics*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

© ISO/IEC 2022 – All rights reserved