

NEMA Standards Publication IIC 1 v03

*Digital Imaging and Communications in Security (DICOS)
Information Object Definitions (IODs)*

A DICOS® Publication

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Foreword

The Digital Imaging and Communications in Security (DICOS) standard, this standards publication, is formally designated as NEMA IIC 1 v03. NEMA IIC 1 v03 is inspired by and relies heavily on elements of Digital Imaging and Communications in Medicine (DICOM). NEMA IIC 1 v03 adapts DICOM as necessary for security screening applications. While NEMA IIC 1 v03 was retained as the formal standard designation, NEMA IIC 1 v03 is referenced informally as DICOS v03.

DICOS v03 revises, corrects, and clarifies the predecessor standard, DICOS v02a, reflecting “lessons learned” as a result of TSA implementation of the predecessor version of DICOS v03. Because significant functionality was not added or removed, the designation DICOS v03 was selected.

The predecessor of DICOS v03, designated as DICOS v02a, was published in 2019.

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The council utilized three technical working groups (TWG). Technical Working Group 1 focused on Legacy and ML algorithms, modality enhancements for X-Ray and AIT, modality for air cargo, and other new modalities. Technical Working Group 2 focused on SDI/CDI and streaming. Technical Working Group 3 focused on addressing issues from OEMs, third-party developers, and vendors.

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Section 1 Scope

The Digital Imaging and Communications in Security (DICOS) standard, designated as NEMA IIC 1 v03, provides a data interchange protocol and an interoperable, extensible file format to facilitate data information interchange (e.g., demographic information, X-Ray radiographs, CT images, material-specific information, trace detection signatures, threat assessment) of objects of inspection (e.g., checked luggage, carry-on luggage, parcels, and personnel) for security screening applications.

NEMA IIC 1 v03 is inspired by and relies heavily on elements of Digital Imaging and Communications in Medicine (DICOM). NEMA IIC 1 v03 adapts DICOM as necessary for security screening applications. NEMA IIC 1 v03 includes many references to elements in the DICOM standard. In text, these references take the general form, see DICOM PS X.Y. Other elements of NEMA IIC 1 v03, while initially inspired by DICOM, were updated for airport security screening applications. NEMA IIC 1 v03 reflects these adaptations.

Note: From this point forward, while NEMA IIC 1 v03 is retained as the formal standard designation, NEMA IIC 1 v03 is referenced as its informal designation, DICOS v03.

DICOS v03 expanded upon DICOS v02A with the enhancements of the Threat Detection Report (TDR), Aggregate TDR, TIP images, additional modalities, and screening devices. In order not to be redundant, new screening devices were referenced back to existing IODs. DICOS v03 has established a bug report and a NEMA share site that provides support documents that help explain and provide further details to some of the additions.

DICOS v03 has added threat updates to the Threat Detection Report (TDR), developed a method for the generation of same modality Aggregate TDR, added X-Ray Diffraction (XRD) and Differential Phase Contrast (DPC) and its derivatives to the CT IOD, added additional modalities of Explosive Trace Detection (ETD), enhanced the Threat Image Projection (TIP), added the ability to obtain data from Sensor Data Interface (SDI) and the Corrected Data Interface (CDI), and added the ability to report additional screening devices such as shoe scanner and air cargo and the ability to obtain raw and corrected data from the X-Ray detectors.

DICOS v03 has ensured that it covers 85% of the image and meta data format requirements for High-Definition (HD) AIT (Advanced Imaging Technology) and Walk-Through AIT. The remaining 15% will be addressed by the AIT OEMs in DICOS v04. In an attempt to have unity between the standards, NEMA is working with the IEEE Committee on AIT image quality to ensure agreement in ordering formats and data. DICOS v03 has added a proposed appendix, Section 18, for the purpose of encoding of DICOS v03 data. NEMA welcomes comments and suggestions from the DICOS implementation community and other interested parties on this appendix.

For DICOS v03, NEMA has established a website with supplementary documents that will aid the implementor for items like the Modality Aggregated TDR, Multiple Bounding Boxes, and ROIs solutions and other related documents. These are supplementary documents, and for any differences between these documents and the DICOS standard, the standard will prevail.

1.1 References

The following standards (normative references) contain provisions that, through reference in this text, constitute provisions of DICOS v03. Additional documents and standards (other references) are referenced that might provide a complete understanding. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on DICOS v03 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.