

NORSOK STANDARD

TECHNICAL INFORMATION FLOW REQUIREMENTS

Z-003
Rev. 2, May 1998

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FOREWORD

NORSOK (The competitive standing of the Norwegian offshore sector) is the industry initiative to add value, reduce cost and lead time and eliminate unnecessary activities in offshore field developments and operations.

The NORSOK standards are developed by the Norwegian petroleum industry as a part of the NORSOK initiative and supported by OLF (The Norwegian Oil Industry Association) and TBL (Federation of Norwegian Engineering Industries). NORSOK standards are administered and issued by NTS (Norwegian Technology Standards Institution).

The purpose of NORSOK standards is to contribute to meet the NORSOK goals, e.g. by replacing individual oil company specifications and other industry guidelines and documents for use in existing and future petroleum industry developments.

The NORSOK standards make extensive references to international standards. Where relevant, the contents of a NORSOK standard will be used to provide input to the international standardisation process. Subject to implementation into international standards, the NORSOK standard will be withdrawn.

Annexes A, B and C are informative.

INTRODUCTION

This standard has been renumbered from Z-CR-003 to Z-003, and revision no. 2 is a general update in view of current development of the subject matter. It has a sharper focus on practical implementation. Internet mail is now the preferred email standard, but X400 may also be used.

This standard relies on a number of international and defacto industry standards in rapid development. Therefore, some further background information to the standards and organizations referenced in this NORSOK standard may be found on the NTS/NORSOK Internet website. Ref URL: <http://www.nts.no/stdkom/nts/k114agz5.htm>.

Annex A, which has been extensively revised, includes a lists standards and draft standards under observation that may influence later revisions of this NORSOK standard. Annex B, including the Document Type Definitions, has been added and Annex C includes a summary template of this standard. It may be used for selecting correct standards depending on type of deliverable.

1 SCOPE

This NORSOK standard provides requirements for electronic storage and interchange of technical information and data between all parties and during all phases of an offshore installation's life cycle.

It defines precise requirements for use of formal standards where these exists. In other areas specific recommendations are given.

2 NORMATIVE REFERENCES

The following standards include provisions which, through reference in this text, constitute provisions of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements of the standards referenced below.

ISO 8601	Representation of dates and time.
ISO 8632	Computer Graphics Metafile (CGM).
ISO 8859	8-bit single-byte coded graphic character set.
ISO 8879	Standard generalised mark-up language (SGML).
ISO 9529	Data interchange on 90 mm (3,5 in) flexible disk cartridge using modified frequency modulation recordings at 15916 ft/rad, and 80 tracks on each side.
ISO 9660	Volume and file structure of CD-ROM for information interchange.
ISO 10021	Message-Oriented Text Interchange Systems (MOTIS) (X.400)
ISO 10303	Product data representation and exchange.
ISO 10918	Digital Compression and coding of continuous-tone still images (JPEG).
ISO 11172	Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s (MPEG 1).
ISO 13346	Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange
ISO 13818	Generic coding of moving pictures and associated audio information (MPEG 2).
POSC/Caesar	POSC/Caesar (standard) snapshots
PostScript	De facto standard printer command language (developed by ADOBE, open for free use)

RFC-765	File Transfer Protocol, J. Postel, June 1980
RFC-821	Simple Mail Transfer Protocol, J. Postel, August 1982
RFC-822	Standard for the format of ARPA Internet text messages, D.H. Crocker, August 13, 1982
RFC-1521	MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet Message Bodies , N. Borenstein, N. Freed, Sept. 1993
RFC-1522	MIME (Multipurpose Internet Mail Extensions) Part Two: Message Header Extensions for Non-ASCII Text, K. Moore, Sept. 1993
RFC-1866	Hypertext Markup Language (HTML)

3 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

CAD model	CAD data describing a production facility organised in a data base.
Concurrent engineering	The integration and parallel execution of engineering and manufacturing processes, considering all elements of the product life cycle from conception of the design to disposal of the product. (This is also known as simultaneous engineering).
Common data base	A collection of project-related technical, non-commercial data available for use by all parties involved in a project, independent of the physical data structure(s) employed and of the application(s) used to create, update or delete it.
De facto standards	Commonly used supplier-controlled proprietary standards or publicly available specifications .
Electronic signature	A method that gives a person the possibility to mark a connection between a document and the person. If the document is changed, the signature will automatically become obsolete.
Extranet	Project/branch specific Intranets
Formal standards	International, regional and national standards.
Internet	The physical network of computers that conform to the TCP and IP protocols and are managed by the Network Information Centre (NIC).

Intranet	A network with the same functionality as Internet, but with restricted access.
Long life span	Three years or more
May	Verbal form used to indicate a course of action permissible within the limits of the standard.
Ownership	Ownership of data implies the right to create, change and delete data, and to grant rights to create, change, delete and access such data to others. Such grant of rights does not change the owner's responsibilities.
Participants	Individuals participating during the life cycle of a production facility.
Parties	All organisations participating during the life cycle of a production facility.
Raster graphics	The representation of graphics as dots.
Redlining	Commenting of drawings and documents which leaves the original information unchanged.
Shall	Verbal form used to indicate requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted, unless accepted by all involved parties.
Should	Verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
Vector graphics	The representation of graphics as vectors and/or analytical/mathematical forms.

3.2 Abbreviations

2D CAD	Computer Aided Design - 2 Dimensional.
3D CAD	Computer Aided Design - 3 Dimensional.
CALS	Continuous Acquisition and Life Cycle Support. A large scale information management definition project initiated by US Department of Defense. Adopted by several major civilian and military branches of international industries.
CCITT	Comité Consultatif International Télégraphique et Téléphonique (now ITU-T).
CD-ROM	Compact Disc - Read Only Media.
CGM	Computer Graphics Metafile
DTD	Document Type Definition.
DVD	Digital Video Disc / Digital Versatile Disc

FTP	File Transfer Protocol.
HTML	HyperText Mark-up Language.
IESG	Internet Engineering Steering Group
ISO	International Organisation for Standardisation.
ITU-T	International Telecommunication Union - Technology (previously CCITT).
JPEG	Joint Photographic Expert Group
MIME	Multipurpose Internet Mail Extension.
MPEG	Moving Picture Expert Group
OSTA	Optical Storage Technology Association
PAL	Phase Alternate Line.
PDF	Portable Document Format.
POSC/Caesar	Petrotechnical Open Software Corporation/Caesar offshore project
RFC	Request for Comments (Normally issued by IESG)
SGML	Standard Generalised Mark-up Language.
SMTP	Simple Mail Transfer Protocol.
STEP	STandard for the Exchange of Product model data.
TCP/IP	Transport Control Protocol/Internet Protocol.
TIFF	Tagged Image File Format.
UDF	Universal Disc Format
URL	Universal Resource Locator. A unique identifier to a piece of information located on Internet
VHS	Video Home System.
WWW	World Wide Web

4 OBJECTIVES AND PRINCIPLES

This standard has the following objectives:

- To enable cost-effective electronic information interchange between all parties. Electronic information shall be accepted as an original and treated as such.
- To ensure that electronic information at any time has only one source and responsible owner.
- Contribute to the production and use of correct data of a known quality throughout the total life cycle.

The following main principles form the basis for this standard:

- Open, non-proprietary information structures and formats based on formal standards shall be used. De facto standards can be used where formal standards are not available or not supported by vendor implementations. Tools or applications are not proposed in this standard.
- Information structures, data bases and systems that enable concurrent engineering shall be used (i.e. maximise information sharing).

Clause 5 of this document describes the requirements, while the remaining clauses list the selected standards that will enable industry to achieve a cost-effective electronic information flow.

If this standard permits a choice of formats or if no standard format exists, the parties shall agree which format and which version shall be used.

5 GENERAL REQUIREMENTS

5.1 Ownership and Data quality

Ownership of data shall at all times be clearly and precisely defined. The ownership of data may change, or be transferred to other parties. Precise agreements shall exist for such transfer.

The owner of data is responsible for defining its contents, making it available and for ensuring its mutually agreed quality and security. The owner has the right to specify requirements for how the data shall be managed.

All the above shall be regulated by contractual terms.

5.2 Data sharing

Exact requirements and definition of responsibilities for establishing and managing common data bases shall be contractually agreed. Information in common data bases shall be accessed and/or updated as required by all parties.

5.3 Data transfer

All transfer of data between the parties shall be carried out in accordance with a predefined plan covering the contents and the formats and methods defined in clauses 6 and 7 below.

The parties shall agree on common data definitions based on the POSC/Caesar standards. (Currently presented as Snapshots).

5.4 Data security

Each project shall base its data security rules on the participating companies' corporate data security rules. Deviations if relevant shall be agreed. These rules shall be made available to all project participants. All violations or indication of violation of security rules shall be reported to the owner of the data in question. Responsibilities and obligations for data security shall be precisely defined in project contracts.

All transported files shall be virus checked by sender and receiver. Tools and procedures to be agreed.

6 DATA INTERCHANGE AND STORAGE FORMATS

Whenever data is to be transferred between the parties it is vital that common methods and rules for data and format description are implemented by both sender and receiver in order to enable a consistent interpretation of the data.

6.1 Structured revisable text

6.1.1 Text structure

Text should be structured, formatted and stored so as to enable maintenance and interchange in the production facility's lifetime.

6.1.2 Revisable documents

Revisable documents with a long life span, shall be formatted according to the SGML standard, ISO 8879.

NORSOK DTDs for operations and maintenance manuals should be used. Ref. Annex B.

6.1.3 Publishing on World Wide Web

Information to be published on Internet's World Wide Web shall be structured according to the de facto HTML standard as specified by the WWW Consortium.

6.2 Structured CAD

CAD information shall be structured and stored so that further development, maintenance and exchange of the models during the life cycle of the plant, can be achieved using the standard functionality of commercially available tools.

2D CAD information shall be structured according to the NORSOK standard Z-005.

2D and 3D CAD exchange formats are to be agreed between the parties.

6.3 Other formats

6.3.1 Transfers from data bases

When data is exchanged between data bases, the standard mechanism for data transfer supported by the data base vendor may be used.

Transfer from data bases shall be done through sequential files in 8-bit format as defined in ISO 8859-1 (Latin alphabet No. 1). Each data element shall be character delimited. The delimiting character shall be agreed between the parties.

The receiving party shall specify the file content and lay-out. Date format shall be according to ISO 8601.

ISO 10303 (ISO/STEP) Part 21 shall be used when transferring to and from POSC/Caesar data bases.

6.3.2 Non CAD vector graphics

CGM (ISO 8632) shall be used for transfer of vector graphics not covered in clause 6.2 above.

6.3.3 Redlining of read-only documents

PDF can be used for transfer and redlining of read-only documents (for revisable documents refer to 6.1.2).

6.3.4 Page-oriented print images

PostScript shall be used for transfer and storage of page-oriented print images.

6.3.5 Raster

Optically scanned documents or raster plot files shall be transferred and stored in raster format according to TIFF GR4 CCITT. For size up to A2 a resolution of 300 dpi (dots per inch) or better should be used. For size A1 or bigger resolution 200 dpi or better should be used.

6.3.6 Digital Photo and Video

JPEG (ISO 10918) shall be used for storage and retrieval of continuous tone still images.

The MPEG standards should be used for storage, retrieval and transfer of moving picture data (audio and video).

MPEG-1 (ISO 11172) should be used for storage and retrieval on storage media like discs and CD-roms.

MPEG-2 (ISO 13818) should be used for digital television where high bandwidth and resolution are required.

7 DATA COMMUNICATIONS

Establishment and administration of access control e.g. firewalls, to protect and monitor external access to data is the responsibility of the owner of each particular local network segment to be accessed.

No connection to any data communication network shall be performed without the acceptance of the network owner.

7.1 Electronic mail

Electronic mail (e-mail) shall be available to participants in a project organisation so that they can send and receive messages and data. Confidential information should be encrypted. The SMTP standard (RFC-821, RFC-822) with the MIME extensions (RFC-1521, RFC-1522) should be used.

The e-mail standard X.400 (88 or newer) may be used when available (ISO 10021).

7.2 World Wide Web

The WWW on the internet can be used for information publishing and exchange. If the information is regarded sensitive by the parties, a project or Industry Branch network is recommended (Intranet/Extranet) (RFC-1866).

7.3 File transfer

File transfer shall be done by FTP (Internet TCP/IP FTP (RFC 765)).

7.4 Physical media

Choice of sequential media for information transfer and storage shall be agreed upon between the parties.

Diskettes shall be in the IBM-PC 1,44 MB format according to the ISO 9529 standard.
CD-ROMs shall be according to the ISO 9660 standard.

7.5 Labeling of files and transport media

The following information shall be given when applicable:

- Originating organisation.
- Contact person.
- Date according to ISO 8601.
- Media format.
- Operating system and version.
- File format.
- Compression algorithm when applicable.
- Encryption type when applicable.
- Description.
- Sequence no.
- Volume id.
- Virus check : Tool and version.

7.6 Data compression

Sender and receiver of files shall decide on which standard and data compression/decompression tool to use.

ANNEX A

STANDARDS AND DRAFT STANDARDS UNDER OBSERVATION (INFORMATIVE)

CONTENTS

- A.1 Emerging CAD standards
- A.2 POSC/Caesar
- A.3 Internet and Intranet
- A.4 HyperText Mark-up Language (HTML)
- A.5 Standard Generalised Mark-up Language (SGML)
- A.6 Virtual Reality Markup Language (VRML)
- A.7 Digital Video
- A.8 Physical Media for Information Transfer and Storage
- A.9 Electronic Signature and Encryption

A.1 Emerging CAD standards

The ISO 10303 standard is also called STEP. This standard includes a number of standards and draft standards addressing exchange of product model data. NORSOK intends to embrace these standards when they are issued. Applications supporting these standards will be preferred.

The following parts are expected to have relevance to data interchange in the near future:

ISO 10303-21 Implementation Methods: Clear text encoding of the exchange structure.

This part specifies the syntax for data exchange of files (STEP file).

ISO 10303-22 Implementation Methods: Standard data access interface.

This part of ISO 10303 specifies the standard data access interface (SDAI) to data defined using ISO 10303-11 (Express).

ISO 10303-221 Application Protocol: Functional data and their schematic representation for process plant.

This part specifies an application protocol for functional data and their schematic representation for process plant). It addresses the objects (system and equipment) within a process plant, their identification, classification, connectivity, composition and properties. It also addresses representation of the objects as a piping and instrument diagram (P&ID).

ISO 10303-227 Application Protocol : Plant spatial configuration

This part specifies an application protocol for the exchange of the spatial configuration of process plants. This information includes the shape and spatial arrangement characteristics of piping for plant systems.

A.2 POSC/Caesar

The scope of POSC/Caesar is to:

1. Produce agreed standards for digital descriptions of facility products.
2. Understand and facilitate the use of available technology for implementation of the standards.
3. Encourage and assist take-up of the standards and technology by the industry.

POSC/Caesar has described its current results in a publicly available documents (snapshot C/D issued February 97). One new snapshot (E) is planned for issue 2nd quarter 98, based on comments received. Discussions are also ongoing with ISO/STEP for combining the POSC/Caesar reference data and ISO 10303-221.

Note: On POSC/Caesar initiative, ISO/TC 184/SC 4 has accepted a New Work Item Proposal for an ISO standard 15926 on: Integration of life-cycle data for oil and gas production facilities.

Further information about POSC/Caesar can be found at Web site: <http://www.posc.org>.

A.3 Internet and Intranet

Internet and Intranet based services will have great impact on the way information is shared, exchanged and accessed during the life-cycle stages of an oil and gas production facility.

The current use of Internet and Intranet based services in the oil and gas industry is fairly limited due to lack of experience, lack of security mechanisms/protocols, etc. When these factors are no longer an obstacle, it is recommended that Internet and Intranet based services are used for information sharing, exchange or access.

A.4 HyperText Mark-up Language (HTML)

HTML is under constant development and is currently not a formal international standard. HTML should not be chosen as source format for revisable documents with long life span.

A.5 Standard Generalised Mark-up Language (SGML)

DTDs and tools for cost effective information handling according to the SGML standard, ISO 8879, is expected to be developed both within and outside the CALS environment.

A.6 Virtual Reality Markup Language (VRML)

Virtual Reality Markup Language (VRML) is a de facto industry standard evolving rapidly. VRML is currently used for interactive viewing of simple 3D CAD models on the Internet. Parties involved in a project will be able to access 3D CAD VRML models through Internet. Several of the commonly used CAD applications can today demonstrate export of VRML formatted models. The CAD software developers signal that VRML will be further developed and incorporated in their products in the near future.

A.7 Digital photo and Video

The number of digital video data formats, technologies and standards is growing quickly and without coordination it is creating a lot of confusion in the market. The use of digital video is on the rise and standards established five years ago are now entering into popular use. Digital video standards have developed based on the needs of specific applications. There is some flexibility based on frame size, frame rate, robustness in the face of channel noise or delays and data-transfer rates. Fundamentally though, digital video data formats are based on the applications that use them. The principal digital video formats that clearly will continue to have an impact over the next three to five years are JPEG and MPEG.

JPEG is a general purpose compression standard (ISO) for continuous tone still images that supports both lossy (whereby data is lost) and lossless encoding of still-images.

M-JPEG is application of JPEG to digital video. With M-JPEG each video frame is individually encoded based on the JPEG standard. The main weakness of M-JPEG is that it is not an ISO standard.

MPEG is a series of related ISO standards for moving pictures with audio. MPEG-1 and MPEG-2 are approved standards, while MPEG-4 and MPEG-7 are emerging standards.

MPEG-1 is a standard for storage and retrieval of moving picture and audio on storage media, and was designed for delivery of digital video data at a transfer rate of 1,5 Mb/s - the nominal rate of single-speed CD-ROMs.

MPEG-2 is a standard for digital television and supports a broad range of frame sizes up to and including HDTV resolutions.

MPEG-4 is a not yet approved standard for multimedia applications.

MPEG-7 is a not yet approved content representation standard for information search.

A.8 Physical Media for Information Transfer and Storage

The 1,44 MB 3,5 inch diskette (ISO 9529) and the 650 MB CD-ROM (ISO 9660) are "old" in the sense that newer, more compact and higher capacity versions are available in the market. There is no single standard to monitor in this area, since separate ISO standards are published for each new format. None of the newer formats, however, have penetrated the marketplace enough to warrant a standard position, while equipment for the "old" formats is abundant and will continue to be for a number of years.

However, two important developments in the market are worth attention:

1. The CD-ROM format is supplemented with a CD-R and a CD-RW-format. These formats are conformant with the Universal Disk Format specification (UDF) developed by the Optical Storage Technology Association (OSTA), and is a subset of ISO 13346. The formats secure backward compatibility with the CD-Audio and CD-ROM formats. Both formats have got the necessary market penetration to become "low risk" formats, and is about to replace a whole series of "old" CD-formats that have not got the necessary market acceptance.
2. The new high capacity optical disc format called DVD is based on media with the same physical sizes as the CD and the mini-disc (120 mm and 80 mm). DVD aims to encompass home entertainment, computers, and business information with a single digital format, eventually replacing audio CD, videotape, laser disc, CD-ROM, and video game cartridges. DVD has widespread support from all major electronic companies, all major hardware companies, and about half of the major movie and music studios, which is unprecedented, and says much for its changes of success. The DVD format (OSTA UDF) separates the physical characteristics of the media from the logical file. Specification work is going on for a series of sub-formats, like DVD-Audio, DVD-Video, DVD-ROM, DVD-R and DVD-RAM. The DVD-ROM standard is now well accepted, and offers capacities ranging from 2,1 to 17 GB, with speed that is able to support even HDTV. The great capacity-range is due to the two sizes, and the fact that the information is written in one or two layers on one or both sides of the disc.

The insecurity in this area has 3 sources:

- 1: Multimedia requires a combination of text, pictures, multi-channel audio, and video. Although the overall file structure is defined, all details regarding the standards for representing the different types of information is not yet stabilized. This influences the DVD-Audio and DVD-Video-formats.

- 2: There is not yet technology in place to implement the specifications. Therefore a gradual release of equipment with increasing sophistication and capacity is brought into the market. In this process, not all vendors are loyal to the original specifications, resulting in incompatible sub-versions of the standard. This influences the DVD-Video, DVD-R and DVD-RAM formats.
- 3: Backward compatibility with the "old" CD-formats has been part of the DVD specification effort. This has up to recently been a great technological problem due to limitations in laser technology, but is now reported to be solved. Backward compatibility with CD-Audio, CD-ROM, CD-R and CD-RW should therefore be expected.

Summary: The DVD is the coming standard for optical discs. The DVD-ROM standard is well accepted, and single layer, single sided disks are accessible across all vendors' equipment. Equipment supporting all the other formats is now brought into the market, but some incompatibilities are reported. It will however take several years before the industry has solved all the technological problems, and the market have accepted the full range of standards.

A.9 Electronic Signature and Encryption

The uses of electronic documents as originals is promoted. This requires security mechanisms as e.g. encryption or electronic signature. Standards and tools to be used must be agreed between the parties.

ANNEX B

DOCUMENT TYPE DEFINITION (INFORMATIVE)

This set of Document Type Definitions (DTD) is developed with the defined design goal: Provide one single, well defined standard to which all documentation relevant to offshore equipment operations and maintenance shall conform.

This DTD contains the following files which may be downloaded from the NTS/NORSOK website (URL: <http://www.nts.no/norsok>):

<i>OPDOC.DTC</i>	a description of the template for text documents
<i>DRWDOC.DTC</i>	a description of the template for drawings
<i>SML.DCL</i>	the SGML declaration

A guide for those who shall use this DTD is also provided: Authors Guide. This is an Adobe Acrobat type file which may be downloaded from the same NTS/NORSOK website.

ANNEX C DECISION MATRIX (INFORMATIVE)**(summary of the NORSOK standard Z-003)**

<i>Information type</i>	<i>Information carrier</i>	<i>Properties</i>		<i>Format</i>	
Text	Structured document	Revisable	Long life span	SGML	Shall
			Publish	HTML	Shall
	Non structured documents	Read-only	Read- only/redlining	PDF	Can
			Page oriented print images	Postscript	Shall
			Scanned	TIFF Gr4 CCITT	Shall
Vector graphics	2D CAD	Revisable		TBA	Shall
	3D CAD	Revisable		TBA	Shall
	Non CAD	Revisable		CGM	Shall
Databases	POSC/CAESAR	File transfer	Sequential files	ISO 10303-p21	Shall
	Traditional db	File transfer	Sequential files	8 bit ASCII	Shall
Video	Digital		Continuous tone still images	JPEG	Should
			Moving picture data	MPEG	Should

Shall = absolute requirement

Should = recommendation

Can = conditional

TBA = To Be Agreed

May = permissible