

NORSOK STANDARD
COMMON REQUIREMENTS

TECHNICAL INFORMATION FLOW REQUIREMENTS

Z-CR-003

Rev. 1, January 1996

Please note that whilst every effort has been made to ensure the accuracy of the NORSOK standards neither OLF nor TBL or any of their members will assume liability for any use thereof.

1 FOREWORD

NORSOK (The competitive standing of the Norwegian offshore sector) is the industry initiative to add value, reduce cost and lead time and remove 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 are jointly issued by OLF (The Norwegian Oil Industry Association) and TBL (The Federation of Norwegian Engineering Industries). NORSOK standards are administered by NTS (Norwegian Technology Standards Institution).

The purpose of this industry standard is to replace the individual oil company specifications for use in existing and future petroleum industry developments, subject to the individual company's review and application.

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 Subject to implementation into international standards, this NORSOK standard will be withdrawn.

The annex is informative.

2 SCOPE

This standard permits cost-effective electronic sharing, interchange and information flow of technical information and data, between all parties and during all phases of an oil and gas production facility's life cycle. It will contribute to the production and use of correct data of a known quality throughout the total life cycle.

It defines precise requirements for use of existing formal standards where these exists. In other areas specific sets of goals are defined which should be regulated by project agreements.

The annex contains information regarding technological trends and developments which may be relevant for future revisions of this standard.

3 NORMATIVE REFERENCES

Z-DP-001	NORSOK standards and data sheets.
Z-CR-001	Documentation for operation.
Z-CR-004	CAD legend.
POSC	Base computer standards, v.2.0.
ISO 8601	Data elements and interchange formats - Information interchange- Representation of dates and times - Technical corrigendum 1: 1991 to ISO 8601:1988.
ISO 8859-1	Information processing - 8-bit single-byte coded graphic character set, Part 1 : Latin alphabet No.1(1987).
ISO 8879	Information processing - Text and office systems - Standard generalised mark-up language (SGML)(1986).
ISO/IEC 9075	Entry SQL levelling rules (SQL92).
ISO 9529-1	Information processing systems (1992). Data interchange on 90mm (3.5in) flexible disk cartridge using modified frequency modulation recordings at 15916 ft/rad, and 80 tracks on each side: Part 1: Dimensional, physical and magnetic characteristics (=EN 29529-1:1991) Part 2: Track format (=EN 29529-2:1991).
ISO 9660	Information processing - Volume and file structure of CD-ROM for information interchange (=EN 29660)(1989).
ISO 10303	Industrial automation systems and integration - Product data representation and exchange (STEP).
- 10303 Part 1	Overview and functional principles.
- 10303 Part 11	Description methods: EXPRESS reference manual.
- 10303 Part 21	Implementation methods: Clear text encoding of the exchange structure.

The release dates indicated are the current editions as of the date when this standard was issued.

4 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Normative references	Shall mean normative in the application of NORSOK standards.
Informative references	Shall mean informative in the application of NORSOK standards.
Shall	Shall is an absolute requirement which shall be followed strictly in order to conform with the standard.
Should	Should is a recommendation. Alternative solutions having the same functionality and quality are acceptable.
May	May indicates a course of action that is permissible within the limits of the standard (a permission).
Can	Can-requirements are conditional and indicates a possibility open to the

	user of the standard.
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 .
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).
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.
Parties	All organisations participating during the life cycle of a production facility.
Participants	Individuals 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.
Revisable documents	Documents such as reports, procedures, user manuals etc. with a long life span (more than three years) and which may be modified .
Vector graphics	The representation of graphics as vectors and/or analytical/mathematical forms.

4.2 Abbreviations

2D CAD	Computer Aided Design - 2 Dimensional.
3D CAD	Computer Aided Design - 3 Dimensional.
CCITT	Comité Consultatif International Télégraphique et Téléphonique (now ITU-T).
CD-ROM	Compact Disc - Read Only Media.
DTD	Document Type Definition.
DXF	Data eXchange Format.
FTP	File Transfer Protocol.
HTML	HyperText Mark-up Language.
IGES	Initial Graphics Exchange Specification.
ISO	International Organisation for Standardisation.
ITU-T	International Telecommunication Union - Technology (previously CCITT).

MIME	Multipurpose Internet Mail Extension.
PAL	Phase Alternate Line.
PDF	Portable Document Format.
POSC	Petrotechnical Open Software Corporation.
RFC	Request For Comments.
SGML	Standard Generalised Mark-up Language.
SMTP	Simple Mail Transfer Protocol.
SPDL	Standard Page Description Language.
SQL	Structured Query Language.
STEP	STandard for the Exchange of Product model data.
TIFF	Tagged Image File Format.
TCP/IP	Transport Control Protocol/Internet Protocol.
VHS	Video Home System.

5 OBJECTIVES AND PRINCIPLES

This standard has the following objectives:

- To enable electronic information interchange between all parties. Electronic information shall be accepted as an original and treated as such.
- To ensure that electronic information has only one source and responsible owner.

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

6 GENERAL REQUIREMENTS

6.1 Ownership

Ownership of data shall at all times be clearly and precisely defined. The ownership of data may change, or be transferred to other parties.

The owner of data is responsible for defining its contents, making it available and for ensuring its defined quality and security.

Precise agreements shall exist for transfer of data ownership between parties.

The owner of data has the right to specify requirements for how it shall be managed.

All the above shall be regulated by predefined contractual terms.

6.2 Data transfer

All transfer of data between parties in a project shall be carried out in accordance with a predefined plan covering the contents and the formats and methods defined in clauses 8 and 9 below.

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.

The project parties shall agree on common data definitions. These shall be based on the POSC/CAESAR standards when they are available.

6.3 Data quality

All data intended for common use and/or transfer between project parties shall be given a status which describes its quality in relation to an agreed specification. This status shall be established and kept up to date by its owner. The status can f. ex. define the level of completion (version/revision), what it can be used for, who owns it, etc.

7 DATA BASES

7.1 Common data bases

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 in a project. This shall be achieved either by on-line access or by file transfer according to the format and principles defined in clause 8.3.1 below.

7.2 Current proprietary applications

At the present time it is not feasible to exclude from individual applications all the controls and rules necessary to guarantee the consistency, integrity and security of data stored in a common data base. Whenever data has to be created, changed or deleted, this shall be done by means of specific applications provided by the owner of the data base. Data access tools based on standards like SQL92 can only be used for "read-only" tasks. When data base technology permits centralisation of all controls and rules to the data base level, this restriction can be lifted.

7.3 Future developments

When developing new applications organisations shall strive to adopt standards for information structure and format when these are available from the POSC/Caesar and/or ISO/STEP organisations (e.g. Epicentre and/or ISO/STEP application protocols). In the meantime efforts shall be made to ensure that the ability to support concurrent engineering is maximised by other means.

Standard data description languages e.g. EXPRESS shall be used.

8 DATA INTERCHANGE FORMATS

Whenever data is to be transferred between 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.

8.1 Structured revisable text

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

8.1.1 SGML

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

NORSOK DTDs shall be used when these are available.

8.1.2 HTML

Information to be published on Internet's World Wide Web shall be structured according to the HTML format as specified by the World Wide Web consortium.

8.2 Structured CAD

CAD information should be structured and stored using tools enabling further development, maintenance and exchange of the models during the life cycle of the plant.

8.2.1 2D CAD

The IGES format should be used for data to be transferred between different 2D CAD systems. As an option DXF may be used.

8.2.2 3D CAD

For simple 3D geometry models IGES should be used for data exchange between different 3D CAD systems. Other formats may be agreed between the parties.

8.3 Other formats

8.3.1 Transfers from data bases

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

8.3.2 Graphical formats

8.3.2.1 IGES

IGES shall be used for transfer of CAD-related vector geometry where it is essential to preserve the hierarchical graphic structure and as many attributes as possible.

IGES subset definitions shall be used where applicable. It is recommended that the parties involved in transfer of information based on IGES establish project/task specific subsets where such are not already established.

8.3.2.2 DXF

DXF shall be used for transfer of CAD-related vector geometry where it is essential to preserve the hierarchical graphic structure.

8.3.2.3 PDF

PDF can be used for transfer and redlining of read-only documents (for revisable documents ref. 8.1.1).

8.3.2.4 SPDL

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

8.3.2.5 Raster

Optically scanned documents or raster plot files shall be transferred and stored in raster format according to TIFF GR4 CCITT version 6.0. For size up to A2 resolution 300 dpi (dots per inch) or better, size A1 or bigger resolution 200 dpi or better.

8.3.2.6 Video

Video recordings shall be in the PAL-BG VHS system.

9 DATA COMMUNICATIONS

The standards defined in this section describe data communications solutions to be adopted for all parties for whom on-line connection to a project's or other project party's data communications network(s) cannot be justified in terms of cost/benefit.

9.1 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.

9.1.1 X.400

The e-mail standard X.400 (88) should be used when available. The X.400 (84) standard for e-mail can be used.

9.1.2 SMTP

The SMTP standard (RFC-821, RFC-822) with the MIME extensions (RFC-1521, RFC-1522) may be used.

9.2 World Wide Web

World Wide Web can be used for informal information publishing when reliable access to information is not critical.

9.3 File transfer

9.3.1 Direct file transfer

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

9.4 Virus check

All transported files shall be virus checked by sender and receiver.

9.5 Physical media

9.5.1 Information transfer and storage

9.5.1.1 Sequential media

Choice of sequential media such as tape, cartridge or EXABYTE for information transfer and storage shall be agreed upon within the project.

9.5.1.2 Diskette

Diskettes shall be in the IBM-PC 1.44 MB format (ISO- 9529).

9.5.1.3 CD-ROM

All CD-ROMs shall be according to the ISO-9660 standard.

9.6 Labelling of files, diskettes and transport media

All media shall be identified by the following information:

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

9.7 Data compression

The purpose of data compression is to reduce the information volume to allow less use of resources when transferring or storing data.

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

10 Data security

Each project shall base its data security rules on the participating companies' corporate data security rules and regulations. Deviations shall be agreed. These rules and regulations shall be known by all project participants.

The parties shall respect and avoid violation of other companies' data security rules.

All violations or indication of violation of security rules shall be reported to the owner of the data in question.

Electronic connections and information technology solutions shall not be established in such a way that the participating companies' requirements for confidentiality are endangered.

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

Responsibilities and obligations for data security shall be precisely defined in project contracts and agreements.

ANNEX A

A.1 PROPRIETARY SYSTEM SOLUTIONS

It is understood and accepted that many organisations have invested heavily in non-standard, proprietary IT system solutions. These are intended to optimise their contribution to a project phase, and have been based on traditional contractual forms and "sequential engineering". Such proprietary solutions are usually closely integrated with their owners' specific working methods. Other proprietary solutions may have been chosen in restricted areas (e.g. redlining) where no formal or de facto standards exist.

It is also recognised that discarding such proprietary solutions earlier than would otherwise be natural and necessary would in many cases involve their owners in unacceptable increases in their level of costs. This would also be in conflict with the general intentions of the NORSOK initiative.

The requirements and strategies suggested in clauses 6 and 7, attempt to stimulate a migration to "life cycle" system solutions, common data bases, POSC/Caesar/STEP implementations etc. in the shortest possible time-frame. The formats defined in clauses 8 and 9 of this standard are based on a need to maximise the short-term potential for cost reduction by concentrating on traditional interfaces and information interchange needs and on common use of individual applications.

A.2 REDLINING

No formal standards exist yet for electronic redlining of documents and drawings. Project parties with a need to make or evaluate comments on each other's documents or drawings should therefore together select or agree upon an appropriate tool for redlining.

The following guidelines are intended to assist in such a selection:

- Comments should be stored separately from the original, such that the original is still understandable.
- Comments from more than one different source should be able to be consolidated into a single composite "view" without losing sight of their source (i.e. need for "layering", colour-coding or similar facility).
- It should be easy to incorporate comments from several different sources, in whole or in part, into a copy (new version) of the original document or drawing, still without losing sight of their source.
- When a new version of a document or drawing has been approved, it should be possible easily to identify all changes to it since the previous version, and to see whether these were additions, deletions or modifications.

Ideally, these facilities should be available irrespective of the format of the original document or drawing.

A.3 ELECTRONIC SIGNATURE

To accept the electronic document as an original, the practice with manual signatures is not acceptable. The purpose of signature depends on the type of document and the reason for signing.

The purpose may be a contractual commitment, an order or inquire, an issue of a document status, information from a sender to a receiver i.e.

EDI-techniques are based on signed agreements and agreed procedures between defined parties to avoid manual signatures. Between external/internal parties in projects manual signature is used to formalise agreements like use of password, pin-codes i.e. for acceptance. Such agreements shall be the project responsibility.

Technological solutions of electronic signature is available, but are formally more strict than manual signature. The juridical part has to be considered, but project documents will not in near future require this technology. NORSOK should suggest standard methods, rules or procedures for how "signatures" shall be handled for different type of relevant documents.

A.4 INTERNET

Internet is a world wide net of linked computers that gives access to information search and retrieval, electronic conferences, electronic mail, file transfer etc.

World Wide Web is a multimedia extension of the traditional Internet. The Web may be called the graphical (e.g., Windows) interface to Internet. WWW allows linking within an application and between applications and computers. It is possible to jump between pages by just clicking on figures and underlined text independently of where the applications and computers are located.

The Web can be accessed by browsers like Netscape and Mosaic. The net file standard is HTML for text (currently version 2.0, 3.0 promised soon) and gif or jpeg for figures and pictures. The Web is not limited to these file standards however. Any file format and even applications like data bases can be put on the net. An example is the NORSOK standards on the net which uses wmf files for CAD generated drawings and a proprietary spreadsheet format for the data sheets.

The use of Internet can in many situations be an alternative to establishing a project or company internal Lotus Notes, or similar, network. It is expected that suppliers will make information and documentation for their products available on the net. Their customers can access the necessary information when and if they need it. The benefits of having supplier updated correct information in one location only are obvious regarding the use of computer resources, maintenance requirements and the quality of the data. The use of Internet and World Wide Web in the oil and gas industry will increase dramatically in the following years.

A.5 POSC/CAESAR - DATA MODEL AND INTERCHANGE FORMATS

POSC is a not-for-profit membership corporation founded in 1990 by BP Exploration, Chevron, Elf Aquitaine, Mobil and Texaco in order to improve the quality and reduce the cost of using their upstream Exploration & Production (E&P) businesses. POSC has currently 100+ member companies world wide and offices in Houston and London with 35 full-time staff.

CAESAR Offshore is a joint industry project initiated in 1993 to reduce the life cycle cost and development time of offshore oil and gas production facilities. The sponsors of the project are Aker, Brown & Root, Det Norske Veritas, Elf Aquitaine, Kvaerner, Norsk Hydro, The Research Council of Norway, Saga and Statoil. The project has 15-20 full-time staff coming from POSC and the sponsors.

The POSC/CAESAR project is a collaboration of Petrotechnical Open Software Corporation (POSC) and the CAESAR Offshore project in order to develop standards to meet requirements for efficient electronic exchange and sharing of oil and gas facility life cycle information.

The project started in January 1995 and will run for two years. It is designed to achieve:

- Useful results within one year.
- Solutions that will meet industry requirements for data sharing as well as for exchange.
- Deliverables that can be maintained by POSC, as part of the POSC software integration platform specifications, after the POSC/CAESAR project is complete.

Three priority areas of work have been identified:

1. Define a generic product model of oil and gas facilities life cycle information, through extending the POSC Epicentre model to meet the product model requirements.
2. Initiate and participate in activities applying the product model in exchange and sharing of specific product data.
3. Define and build a prototype implementation of a standard parts library enabling standardised and unified access and reference to information about supplier standard components.

The project will focus on requirements for technical information used in engineering, construction and operation of upstream oil and gas facilities. This is complementary to the current scope of Epicentre, and will result in significant extensions in the areas of facility development and operations. Provision will also be made to include some cost, administration and planning information where it is required to support technically based life cycle activities.

The project is international in scope and will use the POSC open process to ascertain requirements and agree the necessary standards. The project will develop demonstration implementations based on the standards and provide support to organisations involved in take up and implementation. The main technological basis for the project will be the relevant parts of ISO/STEP, (in particular Part 11, Part 21, AP221 and AP227), the EPISTLE Core Model, and the POSC Epicentre data modelling methodology. The project results will be harmonised with ongoing efforts in both these areas.

A.6 SQL 92

The SQL language is the common language of database management; it provides the basis for system interoperability, application portability, client/server operation, distributed databases and more. SQL provides a vehicle for the portability of database definitions and compilation units between conforming implementations. It also provides a vehicle for interconnecting conforming implementations.

SQL-92 (or SQL-2) specifies three conformance levels:

- Entry, which closely approximates SQL-89.
- Intermediate, whose features most vendors should be able to provide at relatively low cost.
- Full.

The SQL standard specifies the syntax and the semantics of the logical data structures and the basic operations for a SQL database. It provides functional capability for designing, creating, accessing, maintaining, controlling and protecting a database. It does not cover the operation of a database or the mapping of database objects onto operating system entities..

Implementations conforming to the standard may exist in environment which support these.

The most important facilities of SQL92 are:

- More data types (e.g. time support).
- Vendor defined character sets and bit string data type.
- Connection management (different servers through RDA).
- Integrity constraints, including referential actions and defined checking).
- Error handling mechanism.
- Information schema (SQL views to objects available).
- Extended authorisation support.

We are now in a period of transition to the new standard "Full" implementation is not common from all major vendors.

Work on SQL-3 is ongoing in ISO JTC 1/SC21.

Some of the facilities most likely to be included are; user-defined abstract data types, objects, inheritance, roles, save-points, external procedures, primary key inheritance and recursive table derivation (for tree-structures)

SQL-3 is unlikely to appear as a standard before 1997 +.

A.7 OBJECT-ORIENTED METHODS AND TOOLS

The oil field development branch had expected considerable benefits from using object- oriented methods and tools, but so far only a few applications have appeared.

As object-oriented concepts become more easily available through inclusion in standard tools (SQL language extensions, C++), and as object-oriented standards become more mature, these methods and tools are expected to be increasingly applied in system development.

POSC also recognises the trend toward object-oriented programming and its value to industry.

A.8 SGML/HTML/DTD/ODA

The ISO-architecture ODA (Open Document Architecture) including the document exchange format ODIF (Open Document Interchange Format), was during the 80s considered the most promising solution to the problem of exchanging documents between various different word processing and document production tools.

The expectations from ODA were great, in particular within research and scientific circles. Today the interest for ODA/ODIF seems to be minimal. Internet's operation and development organisation, IETF, established in 1989 an interest group to study the ODA/ODIF technology and consider its use in Internet. Due to lack of interest this group was terminated in 1993.

SGML (Standard Generalised Mark-up Language) is less ambitious than ODA. SGML concentrates on representation and manipulation of written documents following a strict logical and predefined structure.

This gives SGML the potential for application within limited areas of document production, but at the same time the limited scope for SGML is probably the main reason for its success over the last three to four years. Before SGML can be used, a Document Type Definition (DTD) describing the logical structure of the document must be established.

To gain the full benefit from using SGML, tools must be used that support SGML in the complete text production process. SGML-conscious word-processing tools can load the DTD together with the document being worked on, and ensure conformity to the structure defined in the DTD. SGML add-ons have recently appeared with popular word processing tools like Microsoft Word and Framemaker, but today's versions of these are not recommended since the interaction with the DTD is performed in batch mode, and not interactively during typing or editing. Today SGML is best suited for use where SGML properties can be fully considered, and during the complete production and maintenance process of the document. SGML is well suited for the production and exchange of documents with exact requirements for precision and logical correctness, e.g. technical documentation and catalogues. SGML is not suited for sporadic and ad hoc production of documents like letters, memos, brief reports etc. and where access to graphical layout elements are important e.g. production of brochures, newsletters, etc. Within the oil and gas field development SGML should be used for complex and voluminous documents such as user manuals which are updated throughout the operational phase. For minor documents HTML (Hypertext Mark-up Language) could also be an alternative.

HTML is understood by browsing programs that read the Internet's World Wide Web, and has gained enormous popularity through its ability to link any other document or element on the Web creating a hypertext application. For example if a technical term is mentioned, a link can be made to a page describing the term, or even to an image of a piece of equipment that uses the technology.

A.9 INFORMATIVE REFERENCES

ISO (the International Organisation for Standardisation) and IEC (the International Electrotechnical Commission) form the specialised system for world-wide standardisation. National bodies that are member of ISO or IEC participate in the development of International Standards through technical committees established by the respective organisation to deal with particular fields of technical activity. ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75% of the national bodies casting a vote.

International Standard ISO/IEC 10021-9 was prepared by ITU-T (as CCITT Recommendation X.435) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, Information technology, in parallel with its approval by national bodies of ISO and IEC.

ISO/IEC 10021, Information Technology - Message Handling System (MHS):

- Part 1 System and service overview.
- Part 2 Overall architecture.
- Part 3 Abstract service definition conventions.
- Part 4 Message transfer system: Abstract service definition and procedures.
- Part 5 Message store: Abstract service definition.
- Part 6 Protocol specification.
- Part 7 Interpersonal messaging system.
- Part 8 Electronic data interchange messaging service.
- Part 9 Electronic data interchange messaging system.

Note: Be aware that there are often major amendments and corrigenda to the referred standards.

ISO/IEC 8632, Information Technology. Computer graphics, Metafile for the storage and transfer of picture description information:

- Part 1 Functional specification.
- Part 2 Character encoding.
- Part 3 Binary encoding.
- Part 4 Clear text encoding.

ISO/IEC 10646-1:1993, Information Technology - Universal multi-octet - Coded character set (UCS):

- Part 1 Architecture and basic multilingual plane.

ISO/IEC 10918-1:1994, Information Technology - Digital compression and coding of continuous-tone still images:

- Requirements and guidelines.

ISO/IEC 11172:1993, Information Technology - Coding of moving pictures and associated audio for digital storage media up to about 1.5MBit/s (MPEG-1):

- Part 1 Systems.
- Part 2 Video.
- Part 3 Audio.
- Part 4 Conformance testing.
- Part 5 Software simulation.

ISO/IEC 11544:1993, Information Technology - Coded representation of picture and audio information - Progressive bi-level compression.

ISO13818, Information Technology - Coding of moving pictures and associated audio information (MPEG-2):

Part 1 Systems.

Part 2 Video.

Part 3 Audio.

Part 4 Conformance testing.

Part 5 Software simulation.

Part 6 Digital storage media command and control extensions.

A.10 OLE4DM AND CORBA

OLE for Design and Modelling

OLE for design and Modelling is a new OLE Industry Solution - a specification that extends OLE to handle spatial arrangements of graphical objects.

With OLE for Design and Modelling, users can create 2D and 3D objects and relationships typically modelled in CAD/CAM/CAE and GIS applications. OLE for Design and Modelling provides the framework that allows a variety of applications to be integrated in the same desktop environment. Using OLE for Design and Modelling, technical application developers can embrace component software technology. This technology enables end users to mix and match products to create best-of-class solution tailored to their specific needs. Each component can interoperate with other components that support OLE for Design and Modelling interfaces. Regardless of a component's creator or its internal data format, it can be displayed in a real world setting while maintaining correct geometric relationships with other components. This means that OLE applications allow users to combine data from a variety of applications into a single model.

CORBA (Common Object Request Broker Architecture) is an architecture that allows distributed execution of objects (applications) in a network. It establishes an interface standard that allows both hardware and software independence. CORBA is part of a standardisation effort by OMG (Object Management Group). OMG is a non-profit international organisation dedicated to creating object-oriented standards for the integration of distributed applications. Among the members of OMG are: HP, SUN, AT&T, DIGITAL etc.