Foreword

This standard is developed by Sinopec Engineering Incorporation, China Huanqiu Contracting & Engineering Co., Ltd. in cooperation with other involved organizations according to the requirements of Document JIANBIAO[2013]No.169 issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China(MOHURD)–"Notice on Printing and Distributing 'the Development and Revision Plan of National Engineering Construction Standards in 2014'".

In preparing this standard, the development team made extensive investigations and research, summarized the experiences in actual practices conscientiously, with reference to relevant standards both in China and abroad, on the basis of extensive consultation, developed this standard.

This standard consists of 7 chapters and 4 appendixes, covering: general provisions, terms, basic requirements, delivery basis, delivery content and form, delivery process and delivery platform, etc.

The Ministry of Housing and Urban-Rural Development of the People's Republic of China is in charge of administration of this standard. China Petrochemical Corporation(Sinopec Group)is in charge of its routine management. Sinopec Engineering Incorporation is in charge of explanation of technical specifications. If you have any comments and recommendations when implementing this standard, please contact Sinopec Engineering Incorporation(Address: No.21 Bldg. Anyuan, Anhuibeili, Chaoyang District, Beijing, Postcode: 100101, E-mail: liyf@sei.com.cn)for reference in future revision.

Chief Development Organizations, Co-Development Organizations, Chief Drafters and Chief Reviewers of this standard:

Chief Development Organizations:

Sinopec Engineering Incorporation

China Huanqiu Contracting & Engineering Co., Ltd

Co-Development Organizations:

Sinopec Luoyang Engineering Co., Ltd.

Sinopec Shanghai Engineering Co., Ltd.

Sinopec Ningbo Engineering Co., Ltd.

Sinopec Nanjing Engineering Co., Ltd.

Sinopec Zhenhai Refining & Chemical Company

Petro China Kunlun Contracting & Engineering Corporation

Sinopec Jiujiang Company

Petro-Cyber Works Information Technology Co., Ltd

Chief Drafters:

SUN Lili LI Hao YUAN Zhongxun ZHU Chuntian ZHANG Hua
GAO Liping SHEN Bin ZHANG Suzhi TANG Xuejun SONG Yu
LI Jinguang LI Yongfang XU Shuyang ZOU Tong LI You PENG Ying
CHEN Xingang ZHANG Xiaohong YU Lingju LI Yanjun YUAN Shaoyun
LONG Weihong LI Heng ZHENG Xuepeng JIN Zhaohui SHI Hengtong
WEN Huilun HU Jinwang LIN Ming LIU Xiangyu MA Hongwei

CHEN Maochun ZHANG Jianhua ZHANG Xiaohua XU Song KANG Ping
MA Dongning ZHAO Sizhen CUI Yue ZHOU Tianxu LI Changli
LI Yaning HU Yan XU Yong SUN Yihong ZHANG Yue LI Ming
QIN Yuping LI Yang XIAO Zaifeng WU Xiangdong QI Qing XU Jing
WANG Yong ZONG Yanqin WU Di DU Fei SHEN Jianfeng WU Feng
MO Yulei MA Ming HUO Jianming ZHOU Xiaorong CHENG Ji
PANG Xiuhai LUO Minming LIU Jianbing CHEN Mingjie

Chief Reviewers:

LI Guoqing ZHOU Jiaxiang GONG Xiangyang WANG Xiaolin
WANG Xinping GE Chunyu WANG Wei REN Gang SUN Xinwen
HU Hong LIN Rong ZHANG Yi LIN Hongjun WANG Zhanding
ZHANG Jianhua WU Xi SUN Guihong ZHAO Zhenxiang LIANG Jian
LIU Ping CHEN Xing'an YANG Tierong

Contents

1 General provisions

1.0.1 This standard is prepared with a view to provide the basis for the construction of digital plant and smart plant for oil refining and petrochemical project, standardize management works of digital delivery.

1.0.2 This standard is applicable to the digital delivery in the engineering, procurement, construction and intermediate handover stages for oil refining and petrochemical projects.

1.0.3 The digital delivery for oil refining and petrochemical projects shall comply with current confidentiality regulations of the nation and industry.

1.0.4 In addition to the requirements stipulated in this standard, those stipulated in the current relevant standards of the nation shall be complied with.

2 Terms

2.0.1 Digitalization

The process that transforms the information such as engineering, procurement and construction into structured data and unstructured data with information technology to establish data structure organization and to express, transmit and process by use of computer.

2.0.2 Digital plant

The synthesis that is composed of digital static information generated in the construction stage of the project, digital dynamic information generated in the operation and maintenance stage, correlation based on plant objects and information management platform.

2.0.3 Digital delivery

With the plant object as the core, the work process that digitally creates the static information generated in the construction stage of the engineering project until the handover. It covers information delivery policy development, information delivery basis development, information delivery solution development, information integration and verification, information handover and information acceptance.

2.0.4 Plant object

The engineering entities that constitute the oil refining and petrochemical plant, including equipment, pipeline, instrument, electrical and buildings (structures), with numbers and that can be independently identified.

2.0.5 Plant object class

According to the features of function or structure, the plant objects are classified, and the same class of plant objects have the same attribute definition.

2.0.6 Plant breakdown structure

The tree structure that is organized according to certain classification principles and coding system and established to reflect the plant objects based on the process flow or layout.

2.0.7 Information granularity

It reflects the level of detail for plant object information, which is related to information usage requirements, information collection and processing capacity and cost.

2.0.8 Class library

It describes the information organization structure of plant objects, including plant object class, attribute, unit of measurement (UoM) class, type of discipline and documents and their correlation.

2.0.9 Electronic file

Documents generated in digital equipment and environment, stored in digital form on magnetic tape, disk, optical disk and other carriers, read and processed by digital equipment such as computer, and can be transmitted on the communication network.

2.0.10 Electronic document

The collection of page-oriented text and image data and the electronic representation of their feature attributes that can reproduce their contents on paper or in the form of optical microfilm documents with no loss of key information, referred to as the document.

2.0.11 Information model

With plant objects as the core, the information organization of data, documents, three-dimension (3D)models and their correlation during the digital delivery of the project.

2.0.12 Delivery information

The engineering information, procurement information, construction information and other contents that need to be delivered in the process of project construction, including information model and other information correlated with plant objects.

2.0.13 Deliverables

The electronic file that carries the delivery information to realize the handover.

2.0.14 Delivery platform

The information management system used to carry and manage digital delivery information, and can be integrated with a variety of engineering software and be compatible with a variety of file formats.

2.0.15 Information integrity

The delivery information covers the relevant contents generated in the process of project construction and used for operation and maintenance, including engineering information, procurement information and construction information, referred to as integrity.

2.0.16 Information accuracy

The value and (UoM) of the plant object attribute are accurate, the content of the document is correct, various correlations are correct, referred to as accuracy.

2.0.17 Information consistence

The delivery information is unique in a specific plant or unit and consistent with the physical plant information, referred to as consistence.

2.0.18 Delivery party

The party responsible for handing over the digital delivery information of the project.

2.0.19 Receiving party

The party responsible for receiving the digital delivery information of the project.

2.0.20 Associated document

A delivery document that directly reflects the typical characteristics of the plant object and establishes a correlation with the plant object tag.

3 Basic requirements

3.0.1 The digital delivery of the project should be carried out simultaneously with the project construction.

3.0.2 The delivery information shall meet the quality requirements of integrity, accuracy and consistence, and its content shall be consistent with the corresponding part of the handover documents.

3.0.3 The delivery level shall be set for the delivery information and shall be in accordance with those specified in Table 3.0.3.

Table 3.0.3 Delivery level

Information level	Description	Code
Essential information	Key information required for plant operation and maintenance	ESS
Optional information	General information required for plant operation and maintenance	OPT

3.0.4 Digital delivery platform should be used to store and organize the delivery information.

3.0.5 The delivery information shall be protected as a whole intellectual property.

3.0.6 The receiving party shall provide the digital delivery strategy and delivery basis, coordinate and manage the digital delivery of the project, and accept the delivery information handed over by the delivery party.

3.0.7 The delivery party shall collect and integrate the delivery information according to the requirements of the delivery basis, and shall hand over it according to the deliverables specifications.

4 Delivery basis

4.1 General requirements

4.1.1 The delivery basis shall be developed according to the information delivery strategy of the project.

4.1.2 The delivery basis shall include the plant breakdown structure, class library, plant object tag specification, document naming and numbering specification, deliverables specification and quality audit specification, etc.

4.2 Plant breakdown structure

4.2.1 The plant breakdown structure should be divided according to the process flow and/or layout, and may be divided according to Figure 4.2.1.

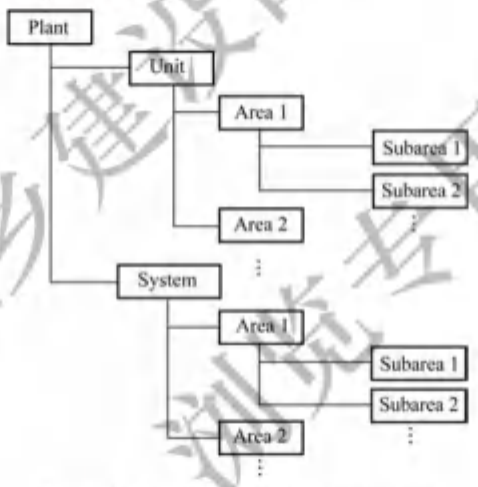

Figure 4.2.1 Plant breakdown structure

4.2.2 Plant objects and documents shall be correlated with the plant breakdown structure. The correlation may be established according to Figure 4.2.2.

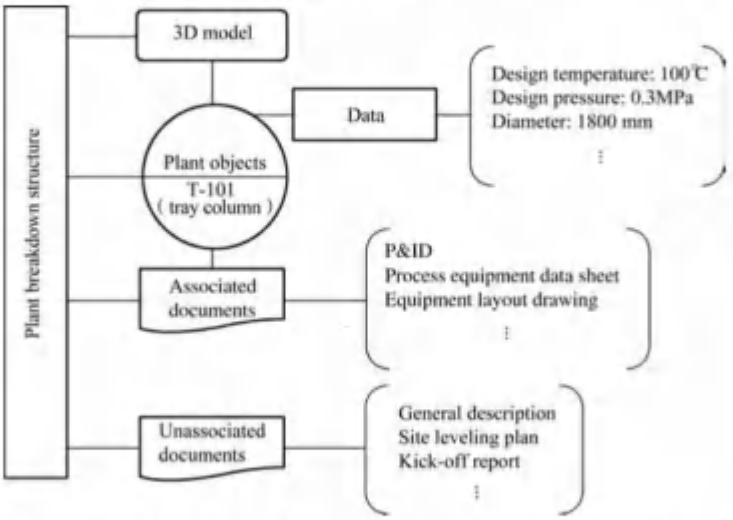

Figure 4.2.2 Correlation of plant objects and documents with plant breakdown structure

4.2.3 The plant breakdown structure and its data structure associated with plant objects and documents may be established in accordance with Appendix A of this standard.

4.3 Class library

4.3.1 The class library shall include information such as plant object class, attribute, UoM class and type of discipline and document as well as their correlation. The logical structure and hierarchy of the class library may be established according to Figure 4.3.1.

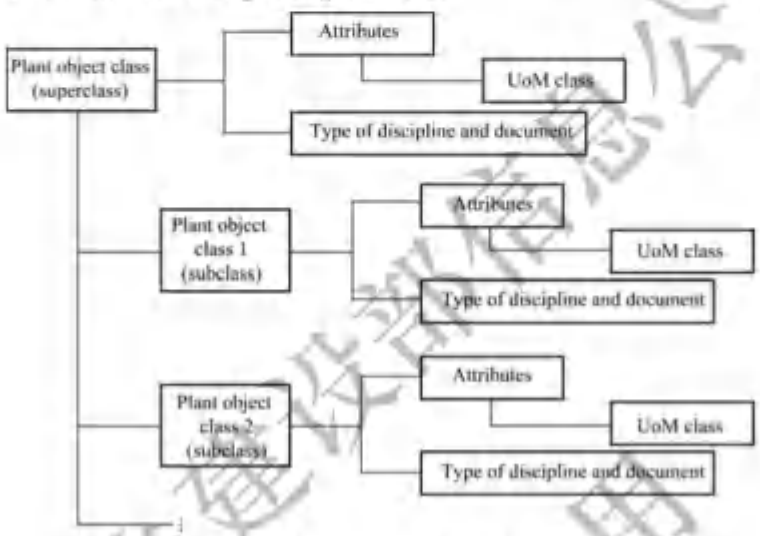

Figure 4.3.1 Logical structure and hierarchy of class library

4.3.2 The establishment of the class library shall be reasonable in structure, clear in level, complete in content and support for expansion, and shall conform with the following provisions:

1 The plant object class shall have inheritance.

2 The names of plant object class, attribute, UoM class and type of discipline and document shall be unique, easy to identify and unambiguous.

3 The class library shall support information verification.

4.3.3 The plant object class should be classified according to the function or structure of the plant objects, and should be established by levels.

4.3.4 The attributes shall include typical characteristics of the plant object class, and should be managed in groups with the delivery level set.

4.3.5 The UoM class shall include the classification of measurement units involved in all attributes.

4.3.6 The type of discipline and document shall be determined jointly by the discipline and document category.

4.3.7 The plant object class shall be correlated with attributes and type of discipline and document. Attributes shall be correlated with UoM class.

4.3.8 The class library may be established according to the data structure of Appendix B of this standard. Typical plant object classes and attributes are shown in Appendix C of this standard.

4.4 Plant object numbering specification

4.4.1 The rules on plant object tag shall be specified in the plant object tag specification to meet the requirements of rapid retrieval and location.

4.4.2 The plant object tag shall be unique and meet the requirements of rapid retrieval and location.

4.5 Document naming and numbering specification

4.5.1 The naming and numbering rules for delivery documents shall be developed in the document naming and numbering specification.

4.5.2 The document number shall be unique.

4.5.3 The name and number of the document shall meet the requirements of rapid retrieval and location.

4.5.4 The name of the document should contain alphabet, numbers, characters "_" or "-", and special characters shall not be used.

4.6 Deliverables specification

4.6.1 The information granularity and delivery format of data shall be specified in the deliverables specification.

4.6.2 The contents and specific requirements of the document delivery list, including the title, version, issue description etc., shall be specified in the deliverables specification.

4.6.3 The specific requirements of electronic file, including the name and format, shall be specified in the deliverables specification.

4.6.4 The maximum size of electronic files shall be specified in the deliverables specification.

4.6.5 The delivery format of 3D model shall be specified in the deliverables specification.

4.7 Quality audit specification

4.7.1 Audit rules for the integrity, accuracy and consistence of data, documents and 3D models shall be developed in the quality audit specification.

4.7.2 The template of quality audit report shall be prepared according to the audit rules in the quality audit specification.

5 Delivery content and form

5.1 General requirements

5.1.1 The delivery contents shall include data, documents and 3D models.

5.1.2 The correlation between plant object and data, plant object and document, plant object and 3D model shall be established.

5.1.3 The deliverables list for data, documents and 3D models shall be in accordance with Section 4.6 of this standard.

5.1.4 The delivery contents should include the information such as the information supplier, delivery level, discipline category and document type. The information supplier should meet the requirements of Table 5.1.4-1, the delivery level should meet the requirements of Table 3.0.3, and the document type should meet the requirements of Table 5.1.4-2.

Table 5.1.4-1 The information supplier

Code	Content	Code	Content
O	Owner	C	Construction contractor
E	Engineering contractor	S	Supervision contractor
P	Procurement and supply contractor	T	Testing contractor

Table 5.1.4-2 Document type

Code	Content	Code	Content
DP	Description	SP	Specification
CL	Calculation	ID	Index
DS	Data sheet	DW	Drawing
BM	Bill of material	RE	Record

5.2 Data

5.2.1 The delivered data should include information such as values and UoM of plant object attributes.

5.2.2 The delivered data shall be organized according to the requirements of the class library.

5.2.3 The data contents of plant object should include the basic information of engineering, procurement, construction and other stages.

5.3 Document

5.3.1 The contents of the delivered documents shall be consistent with the original documents and shall comply with the following requirements:

1 The original paper document shall be scanned as an electronic file.

2 When the original document contains more than one file format, it shall be converted to electronic files with uniform format.

5.3.2 Each document shall contain at least one valid electronic file, which shall comply with the following requirements:

1 The electronic files shall not contain any links to other documents.

2 The electronic files shall not be embedded with files of other formats.

3 The electronic files shall not contain encryption protection that affects retrieval.

4 The pictures in electronic files shall meet the requirements of acceptable printing resolution and minimum size.

5 The electronic files shall be in the format supported by the delivery platform.

6 The electronic file itself and its index and attachments shall be a document package.

7 The documents associated with a single plant object only should be submitted as independent electronic files or electronic file collection.

8 The electronic files shall be safe and reliable without computer viruses and Trojan programs.

5.3.3 The quality of documents delivered shall comply with the following requirements:

1 Document number and naming shall conform to the document numbering and naming specifications of the project.

2 The document number shall be consistent with the corresponding document number in the document list.

3 The documents shall be generated based on the document templates of the project.

5.3.4 The typical contents of document delivery should include the contents shown in Appendix D of this standard.

5.4 3D model

5.4.1 The 3D model to be delivered shall meet the requirements of delivery scope, content and level of detail agreed in the information delivery scheme.

5.4.2 The 3D model information to be delivered shall be consistent with the information in other delivered data and documents.

5.4.3 The 3D model to be delivered shall be retrieved and displayed correctly in the delivery platform.

5.4.4 The 3D model to be delivered shall be based on a unified coordinate system and coordinate origin.

5.4.5 The 3D model to be delivered should include a visual volume of interference checking.

5.4.6 The 3D model to be delivered shall not contain information irrelevant to delivery, such as temporary information andtest information.

5.5 Delivery form

5.5.1 Digital delivery should be handed over in the pattern of delivery platform or information model.

5.5.2 The handover pattern of delivery platform shall meet the requirements of platform information organization.

5.5.3 The handover pattern of information model shall conform to the organization rules of information model agreed in the information delivery scheme.

6 Delivery process

6.1 Information delivery policy

6.1.1 The information delivery strategy shall specify the objectives of information delivery and the organizations, work scope and responsibilities of the participants.

6.1.2 The information delivery strategy shall specify the laws, regulations and standards to be followed.

6.1.3 The information delivery strategy shall specify the organization, storage and delivery patterns.

6.1.4 The information delivery strategy shall specify the acceptance criteria.

6.1.5 The information delivery strategy shall include the workflow of information delivery, which should be carried out according to Figure 6.1.5.

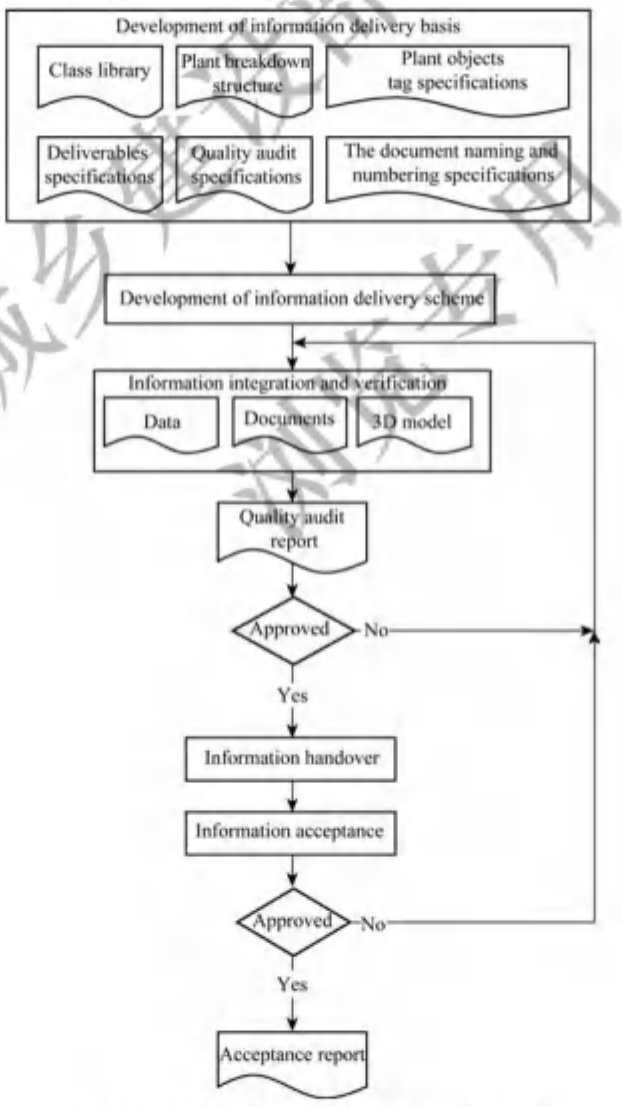

Figure 6.1.5 Workflow of information delivery

6.1.6 The information delivery strategy shall include the quality management scheme.

6.2 Information delivery basis

6.2.1 The information delivery basis shall be established before project bidding, and the contents shall comply with the provisions of Chapter 4 of this standard.

6.2.2 The information delivery basis should adapt to the current informationization level of industry and be operable.

6.3 Information delivery solution

6.3.1 The information delivery scheme shall detail relevant contents according to the information delivery strategy and information delivery basis. The following contents shall be included:

1 Objectives of information delivery.
2 Organization, work scope and responsibilities.
3 Criteria to be followed.
4 Information system adopted.
5 Delivery contents, organization, storage and delivery patterns.
6 Schedule of information delivery.
7 Workflow of information delivery.

6.3.2 The information delivery scheme shall not be implemented until it is approved by the owner.

6.4 Information integration and verification

6.4.1 In the phase of information integration, the data, documents, 3D models and other information of related parties shall be collected, sorted, transformed and correlated according to the organization rules of information model and information delivery scheme.

6.4.2 In the phase of information integration, information verification shall be carried out according to the rules of quality audit.

6.4.3 Information integration and verification shall be completed before information delivery, and a quality audit report shall be developed in accordance with the requirements of Section 4.7 of this standard.

6.5 Information handover

6.5.1 The information handover shall be carried out in accordance with the delivery pattern and schedule agreed in the information delivery scheme.

6.5.2 The electronic file list of delivery information shall be provided during the information handover, and the list shall include file name, format, description, issue date, version, etc.

6.6 Information acceptance

6.6.1 The delivery information acceptance shall be carried out according to the deliverables list of data, documents and 3D models.

6.6.2 The delivery information acceptance shall verify the integrity, accuracy and consistence based on the information delivery basis.

6.6.3 The delivery information acceptance shall include the following items:

1 The plant objects are complete with correct classification.

2 The plant object tag follows the specifications.

3 The attributes of plant objects are complete, and the essential information is not missing.

4 The UoM of attributes is correct with required data type of attribute value.

5 Documents are complete.

6 The document naming and numbering follows the specifications.

7 The correlations between plant objects and plant breakdown structure and between plant objects and documents are correct.

8 The data, documents and 3D models are in accordance with the deliverables specifications.

6.6.4 The acceptance report shall be developed after the delivery information acceptance.

7 Delivery platform

7.1 Function requirements

7.1.1 The delivery platform shall have the functions of configuration based on the information delivery basis, such as the class library, numbering rules and plant breakdown structure.

7.1.2 The delivery platform shall support data, documents and 3D models in common formats.

7.1.3 The delivery platform shall have the functions of establishing and managing the correlation among data, documents and 3D models.

7.1.4 The delivery platform shall support the configuration of verification rules, and have the function of information verification based on the information delivery basis and generating verification reports.

7.1.5 The delivery platform shall have the function of querying the information correlated with plant objects.

7.1.6 The delivery platform shall have the functions of browsing, comprehensive query, retrieval and measurement of 3D visible plant information.

7.1.7 The delivery platform shall have the function of multi-view display and support multiple ways of information organization.

7.1.8 The delivery platform shall have reporting function.

7.1.9 The delivery platform should have the function of protecting the intellectual property of the relevant parties of the project.

7.1.10 The delivery platform shall have system security functions such as authority level management.

7.2 Open requirements

7.2.1 The delivery platform shall have open standard interface and service engine.

7.2.2 The delivery platform shall be compatible with common engineering design software and project management software, and receive data, documents and 3D models from different systems.

7.2.3 The delivery platform should be able to integrate with the operation and maintenance system.

Appendix A Plant breakdown structure and its data structure associated with plant objects and documents

A.0.1 The data elements describing the plant shall meet the requirements of Table A.0.1.

Table A.0.1 Data elements of the plant

Name	Description
Plant code	Unique code used to identify the plant
Plant name	Name of the plant

A.0.2 The data elements describing the process unit shall meet the requirements of Table A.0.2.

Table A.0.2 Data elements of the process unit

Name	Description
Plant code	Code of plant to which the unit belongs
Unit code	Unique code used to identify the unit
Unit name	Name of the unit

A.0.3 The data elements describing the utility and auxiliary facilities shall meet the requirements of Table A.0.3.

Table A.0.3 Data elements of the utility and auxiliary facilities

Name	Description
Plant code	Code of plant to which the unit belongs
Unit code	Unique code used to identify the unit
Unit name	Name of the unit

A.0.4 The data elements describing the area shall meet the requirements of Table A.0.4.

Table A.0.4 Data elements of the area

Name	Description
Plant code	Code of plant to which the unit belongs
Unit code	Code of unit to which the area belongs
Area code	Unique code to identify the area
Area name	Name of the area

A.0.5 The data elements describing the plant objects shall meet the requirements of Table A.0.5.

Table A.0.5 Data elements of plant objects

Name	Description
Plant object name	Name of the plant object
Description	Describe the functions of plant objects, etc.
Plant code	Code of plant to which the plant object belongs
Unit code	Code of unit to which the plant object belongs
Area code	Code of area to which the plant object belongs
Class name	Name of the plant object class corresponding to the plant object

A.0.6 The data elements describing the document shall meet the requirements of Table A.0.6.

Table A.0.6 Data elements of documents

Name	Description
Document number	–
Document name	–
Document title	A short description for the main contents of the document
Project name	A unique name that identifies a project
Project number	–
Plant code	Code identifying the plant to which the document belongs
Unit code	Code identifying the unit to which the document belongs
Area code	Code identifying the area to which the document belongs
Issue date	Date for official release of the document
Document version	Identification of changes to the document content
Discipline and document type code	Code identifying discipline and document type of the document
Author company	Company of document creator

Appendix B Data structure of class library

B.0.1 The data elements describing the plant object class shall meet the requirements of Table B.0.1.

Table B.0.1 Data elements of plant object class

Name	Description
Name of parent plant object class	The superclass of plant object class for this level, which is used to establish the hierarchy of the plant object class
Plant object class name	Name of plant object class for this level
Description	-

B.0.2 The data elements describing attributes shall meet the requirements of Table B.0.2.

Table B.0.2 Data elements of attributes

Name	Description
Attributes name	The name of the attributes
Description	-
Data type	Data type of attributes, including character type, numeric type, boolean, etc.
UoM classes name	Name of unit of measurement classes

B.0.3 The data elements describing the correlation between plant object class and attributes shall meet the requirements of Table B.0.3.

Table B.0.3 Data elements of correlation between plant object class and attributes

Name	Description
Plant object class name	Name of the plant object class
Attributes name	The name of the attributes belonging to the plant object class
Delivery level	See Table 5.0.3 of this standard
Information supplier	See Table 5.1.4-1 of this standard

B.0.4 The data elements describing the UoM classes shall meet the requirements of Table B.0.4.

Table B.0.4 Data elements of UoM classes

Name	Description
UoM classes name	Name of unit of measurement classes, such as length, temperature, pressure, etc.
Description	-

B.0.5 The data elements describing the units of measurement shall meet the requirements of Table B.0.5.

Table B.0.5 Data elements of UoM

Name	Description
UoM name	Name of the units of measurement, such as meter, millimeter, inch, etc.
Description	-

B.0.6 The data elements describing the correlation between measurement classes and units of measurement shall meet the requirements of Table B.0.6.

Table B.0.6 Data elements of correlation between UoM classes and UoM

Name	Description
UoM classes name	Name of unit of measurement classes
UoM name	Name of the units of measurement

B.0.7 The data elements describing discpline shall meet the requirements of Table B.0.7.

Table B.0.7 Data elements of discpline

Name	Description
Discpline code	Unique code to identify discpline
Discpline name	Name of discpline
Description	-

B.0.8 The data elements describing document type shall meet the requirements of Table B.0.8.

Table B.0.8 Data elements of document type

Name	Description
Document type code	See Table 5.1.4-2 of this standard for the unique code to identify the document category
Document type name	See Table 5.1.4-2 of this standard for the name of document category
Description	-

B.0.9 The data elements describing discpline and document type shall meet the requirements of Table B.0.9.

Table B.0.9 Data elements of discpline document type

Name	Description
Discipline and document type code	Unique code to identify discipline and document type of the document
Description	Description of discipline and document type
Document type code	See Table 5.1.4-2 of this standard for the unique code to identify the document category
Discipline code	Unique code to identify discipline
Information supplier	See Table 5.1.4-1 of this standard

B.0.10 The data elements describing the correlation of plant object class with discipline and document type shall meet the requirements of Table B.0.10.

Table B.0.10 Data elements of correlation of plant object class with discipline and document type

Name	Description
Plant object class name	Name of the plant object class
Discipline and document type code	Unique code to identify discipline and document type of the document

Appendix C Classification and property of typical plant object

C.0.1 The classification of typical plant object class should meet the requirements of Table C.0.1.

Table C.0.1 Classification of typical plant object class

Class			Chinese name	English name	Description	Reference
C01				Equipment	–	–
	C01-01			Vessel	Including agitator,filter,coalescer,spherical tank,etc.	Table C.0.3
	C01-02			Reactor	Including fixed bed reactor, moving bed reactor, fluidized bed reactor, tubular reactor, loop reactor, dryer,adsorber,etc.	–
	C01-03			Column		–
		C01-03-01		Tray column	Including sieve tray column,bubble cap tray column, valve tray column,etc.	Table C.0.4
		C01-03-02		Packed column	–	–
	C01-04			Heat exchanger	–	–
		C01-04-01		Shell and tube heat exchanger	Including floating head heat exchanger, U-tube bundle, fixed tubesheet head heat exchanger, packed floating head heat exchanger,kettle type reboiler,etc.	Table C.0.5
		C01-04-02		Plate heat exchanger	Including plate and frame heat exchanger, semi-welded plate heat exchanger, fully welded plate heat exchanger,etc.	–
		C01-04-03		Plate and shell heat exchanger	–	–
	C01-05			Air cooled exchanger	Including air cooled exchanger, spray type air cooled exchanger,evaporative air cooled exchanger,etc.	Table C.0.6
	C01-06			Electric heater	–	–
	C01-07			Furnace	Including fired heater, cracking furnace, incinerator, etc.	–
	C01-08			Pump	–	–
		C01-08-01		Kinetic pump	Including centrifugal pump, axial pump, regenerative pump,etc.	Table C.0.7
		C01-08-02		Positive displacement pump	Including reciprocating pump ,rotary pump,etc.	–
	C01-09			Compressor	–	–
		C01-09-01		Turbo-compressor	Including centrifugal compressor, axial compressor, etc.	–
		C01-09-02		Positive displacement compressor	Including reciprocating compressor, screw compressor,etc.	Table C.0.8
	C01-10			Fan	–	–
		C01-10-01		Centrifugal fan	–	–
		C01-10-02		Roots blower	–	–
	C01-11			Tank	Including fixed roof storage tank, internal floating roof tank and external floating roof tank	–
	C01-12			Fire fighting equipment	–	–

Table C.0.1(continued)

Class			Chinese name	English name	Description	Reference
		C01-12-01		Fire extinguishing system	Including dry powder extinguishing equipment, gas extinguishing equipment, foam extinguishing equipment, water spray system equipment, etc.	Table C.0.9
		C01-12-02		Fire water appurtenances	Including remote-controlled fire monitor, manual-controlled fire monitor, indoor fire hydrant, outdoor fire hydrant, fire hose reel, etc.	Table C.0.10
	C01-13			Material handling equipment	Including extruder, packaging machine, etc.	–
	C01-14			Lifting and transportation equipment	Including electric hoist, crane, etc.	–
C02				Pipe line	–	Table C.0.11
C03				Piping component	–	–
	C03-01			Safety relief element	Including safety valve, rupture disc, etc.	Table C.0.12
	C03-02			Piping specialty	Including sight glass, nozzle, drain valve, breather valve, etc.	–
	C03-03			Piping accessory	Including silencer, flame arrester, separator, etc.	–
C04				Instrument and control	–	–
	C04-01			Temperature instrument	–	–
		C04-01-01		Local temperature instrument	Including bimetal thermometer, pressure thermometer, etc.	–
		C04-01-02		Remote temperature instrument	Including thermocouple/thermal resistance (with or without temperature transmitter), non-contact thermometer, etc.	–
	C04-02			Pressure instrument	–	–
		C04-02-01		Pressure gauge	Including bourdon tube pressure gauge, diaphragm pressure gauge, capsule pressure gauge, etc.	–
		C04-02-02		Pressure switch	Including mechanical, electronic, etc.	–
	C04-03			Flow instrument	–	–
		C04-03-01		Differential pressure flow element	Including standard throttling device (orifice plate, nozzle and Venturi nozzle, Venturi tube) and non-standard throttling device (restriction orifice plate, eccentric orifice plate, segmental orifice plate, balanced flow meter, differential pressure transmitter, wedge flow meter, avarging velocity tube flow meter, etc.)	–
		C04-03-02		Flow meter	Including vortex flowmeter, mass flowmeter, electromagnetic flowmeter, ultrasonic flowmeter, displacement flowmeter, etc.	–

Table C.0.1(continued)

Class			Chinese name	English name	Description	Reference
	C04-04			Level instrument	–	–
		C04-04-01		Local level instrument	Including glass level gauge, magnetic float level gauge, etc.	–
		C04-04-02		Remote level instrument	Including displacer level transmitter, ultrasonic level instrument, radar level instrument, servo level instrument, internal float level indicator, capacitance level meter, radio frequency admittance level gauge, magnetostrictive level instrument, vibrating liquid level switch, radiation level instrument, etc.	–
	C04-05			Pressure/differential pressure transmitter	Including pneumatic transmitter and transmitter	Table C.0.13
	C04-06			Control valve	–	–
		C04-06-01		Control valve	Including electrical and pneumatic actuators	Table C.0.14
		C04-06-02		On-off valve	Including electrical and pneumatic actuators	–
		C04-06-03		Self-operated regulating valve	Including self-operated temperature regulating valve, self-operated pressure regulating valve, self-operated differential pressure regulating valve, self-operated level regulating valve, self-operated flow regulating valve, etc.	–
	C04-07			Process analyzer	Including analyzer instrument and safety inspection instrument for production process monitoring, such as combustible gas and toxic gas detection, etc.	–
	C04-08			Control system	Including DCS, SIS, FGS, PLC, CCS, etc.	–
	C04-09			Other instruments	Including weighing system, shaft vibration/shaft displacement sensor, sound and light alarm, field indicator, explosion-proof local hand switch, etc.	–
C05				Electrical	–	–
	C05-01			Transformer	–	–
		C05-01-01		Power transformer	Including double winding power transformer, three winding power transformer, excluding special transformers such as autotransformer and rectifier transformer	Table C.0.15
	C05-02			Generator	–	–
		C05-02-01		Diesel generating set	–	
	C05-03			Switchgear and controlgear	–	–
		C05-03-01		LV switchgear and controlgear assemblies	–	–
		C05-03-02		HV switchgear and controlgear assemblies	–	–
	C05-04			Power factor correction	–	–
		C05-04-01		Static reactive power compensation	Complete set of capacitor reactive compensation equipment	–

Table C.0.1(continued)

Class			Chinese name	English name	Description	Reference
	C05-05			Power supply system	-	-
		C05-05-01		Un-interruptible power supply	-	-
		C05-05-02		Emergency power supply system	-	-
		C05-05-03		DC power supply system	-	-
	C05-06			Distribution panel	-	-
		C05-06-01		Explosion proof distribution panel	-	-
	C05-07			Electrical convertor	-	-
		C05-07-01		Variable speed drive system	-	-
C06				Building and structure	-	-
	C06-01			Frame	Including equipment frame, non-equipment frame-bent and foundation	Table C.0.16
	C06-02			Pipe rack	Including pipe rack and foundation	-
	C06-03			Equipment foundation	Including ground dynamic and static equipment foundation	-
	C06-04			Basin	Including basin, non-standard well structure	-
	C06-05			Building	including comprehensive building, office building, changing room, restaurant, central control room, on-site cabinet room, substation, laboratory, extrusion and granulation plant, valves room, pumps room, packaging plant, chemical warehouse, finished product warehouse, maintenance workshop, etc.	Table C.0.17

C.0.2 The general attributes describing the plant object class should meet the requirements of Table C.0.2.

Table C.0.2 General attributes of the plant object class

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Tag number	Plant object number, unique	Character type	-	ESS	E
02		Service	-	Character type	-	OPT	E
03		Description	-	Character type	-	OPT	E
04		Quantity	-	Numeric type	-	ESS	E
05		Physical Location	Installation area or location	Character type	-	OPT	E
06		Type	The type of plant object, such as vertical vessel	Character type	-	OPT	E
07		Model	The model of the plant object, provided by the manufacturer	Character type		OPT	P
08		Vendor	-	Character type		OPT	P
09		Manufacturer	-	Character type	-	OPT	P

C.0.3 The attributes describing the vessel should meet the requirements of Table C.0.3.

Table C.0.3 Attributes of vessel

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Fluid name	Process name of the storage fluid in the vessel or the name of the main components in the fluid, such as diesel	Character type	–	ESS	E
02		Fluid phase	The phase state of the storage fluid in the container under design conditions, such as gas phase	Character type	–	ESS	E
03		Operating density	Density of fluid at normal operating temperature	Numeric type	Density	OPT	E
04		Toxicity	The toxic hazard degree of the fluid in the column should be classified into Class Ⅰ (extreme), Class Ⅱ (high), Class Ⅲ (medium) and Class Ⅳ (slight)	Character type	–	OPT	E
05		Explosive hazard	Explosive fluid, non-explosive fluid	Character type	–	OPT	E
06		Fire hazard	Fire hazard category of gas should be classified into Class A and Class B. Fire hazard category of liquefied hydrocarbon and flammable liquid should be classified into Class A1, Class A2, Class B1, Class B2, Class C1 and Class C2, etc.	Character type	–	OPT	E
07		Operating temperature	Temperature of the fluid in the vessel under normal operation	Numeric type	Temperature	ESS	E
08		Operating pressure	Maximum pressure at the vessel top under normal operation	Numeric type	Pressure	ESS	E
09		Design temperature	The set metal temperature of the component under normal operation	Numeric type	Temperature	ESS	E
10		Design pressure	The set maximum pressure at the top of the vessel	Numeric type	Pressure	ESS	E
11		Total volume	Total volume of vessel after deducting the volume occupied by internals	Numeric type	Volume	ESS	E
12		Inner diameter	The Inner diameter of the vessel	Numeric type	Length	ESS	E
13		Cylinder tangent length	The distance between the tangents of the heads connected to the two ends or the actual length of the cylinder	Numeric type	Length	ESS	E
14		Shell material	Material grade of vessel shell	Character type	–	ESS	E
15		Corrosion allowance	Corrosion thickness determined by the uniform corrosion rate of fluid to components and the design life of the vessel	Numeric type	Length	ESS	E
16		Pressure vessel category	According to the provisions in TSG 21 *Supervision Regulation on Safety Technology for Stationary Pressure Vessels*, the pressure vessels within the jurisdiction are divided into Class Ⅰ, Ⅱ and Ⅲ, and other vessels are indicated with "N/A"	Character type	–	ESS	E

C.0.4 The attributes describing the tray column should meet the requirements of Table C.0.4.

Table C.0.4 Attributes of tray column

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Fluid name	Fluid name or key components name	Character type	–	ESS	E
02		Key components	Key components of fluid in the column	Character type	–	ESS	E
03		Toxicity	The toxic hazard degree of the fluid in the column should be classified into Class Ⅰ (extreme), Class Ⅱ (high), Class Ⅲ (medium) and Class Ⅳ (slight)	Character type	–	OPT	E
04		Explosive hazard	Explosive fluid, non-explosive fluid	Character type	–	OPT	E
05		Fire hazard	Fire hazard category of gas should be classified into Class A and Class B. Fire hazard category of liquefied hydrocarbon and flammable liquid should be classified into Class A1, Class A2, Class B1, Class B2, Classs C1 and Class C2, etc.	Character type	–	OPT	E
06		Fluid density at column top	Liquid density of column top under normal operating temperature	Numeric type	Density	ESS	E
07		Fluid density at column bottom	Liquid density of column bottom under normal operating temperature	Numeric type	Density	OPT	E
08		Operating temperature at column top	Temperature at column top under normal operation	Numeric type	Temperature	ESS	E
09		Operating temperature at column bottom	Temperature at column bottom under normal operation	Numeric type	Temperature	OPT	E
10		Operating pressure at column top	Maximum pressure at the column top under normal operation	Numeric type	Pressure	ESS	E
11		Operating pressure at column bottom	Normal operating pressure at column bottom	Numeric type	Pressure	OPT	E
12		Dsign temperature	The set metal temperature of the pressure parts under normal service conditions	Numeric type	Temperature	ESS	E
13		Design pressure	The set maximum pressure at the column top under normal operation	Numeric type	Pressure	ESS	E
14		Tray type	Tray type, such as sieve tray, valve tray, bubble cap tray	Character type	–	ESS	E
15		Diameter	Internal diameter of column	Numeric type	Length	ESS	E
16		Cylinder tangent length	Distance between tangent lines of upper and lower heads of column	Numeric type	Length	ESS	E
17		Shell material	Material grade of column shell, such as S30408	Character type	–	ESS	E
18		Tray material	Tray material grade of tray column, such as S30408	Character type	–	ESS	E
19		Quantity of tray	–	Numeric type	–	ESS	E

Table C.0.4(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
20		Shell corrosion allowance	Corrosion thickness determined by the uniform corrosion rate of fluid to components and the design life of the column	Numeric type	Length	ESS	E
21		Design load	Maximum vapor load under normal operation conditions, such as 12000kg/h	Numeric type	Flow	ESS	E
22		Pressure vessel category	According to TSG 21 *Supervision Regulation on Safety Technology for Stationary Pressure Vessel*, the columns within the jurisdiction are classified into category Ⅰ, Ⅱ and Ⅲ. Other vessels are indicated with "N/A"	Character type	–	ESS	E

C.0.5 The attributes describing shell and tube heat exchanger should meet the requirements of Table C.0.5.

Table C.0.5 Attributes of shell and tube heat exchanger

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Effective area per unit	Effective heat transfer area between cold and hot fluids	Numeric type	Area	ESS	E
02		Shell side fluid name	Such as diesel, glycol	Character type	–	ESS	E
03		Tube side fluid name	Such as diesel, glycol	Character type	–	ESS	E
04		Shell side flowrate	Total flowrate of fluid at shell side including gas, liquid, etc.	Numeric type	Flow	ESS	E
05		Tube side flowrate	Total flowrate of fluid at the tube side including gas, liquid, etc.	Numeric type	Flow	ESS	E
06		Shell side inlet pressure	Operating pressure of fluid at the shell side inlet of heat exchanger	Numeric type	Pressure	ESS	E
07		Tube side inlet pressure	Operating pressure of fluid at the tube side inlet of heat exchanger	Numeric type	Pressure	ESS	E
08		Duty	Duty exchanged by heat exchanger required by process	Numeric type	Power	ESS	E
09		Shell side design pressure	–	Numeric type	Pressure	ESS	E
10		Tube side design pressure	–	Numeric type	Pressure	ESS	E
11		Shell side design temperature	–	Numeric type	Temperature	ESS	E
12		Tube side design temperature	–	Numeric type	Temperature	ESS	E
13		Tube passes	Tube passes of heat exchanger, such as 2, 4	Numeric type	–	ESS	E
14		Tube length	Length of tube in the exchanger bundle. For U-tubes, it is the length from end to the tangent point	Numeric type	Length	ESS	E

Table C.0.5(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
15		Tube type	Such as plain tube, fin tube	Character type	–	ESS	E
16		Tube material	Tube material grade, such as S30408	Character type	–	ESS	E
17		Shell inside diameter	–	Numeric type	Length	ESS	E
18		Shell material	Shell material grade of heat exchanger, such as S30408	Character type	–	ESS	E
19		Pressure vessel category	According to TSG 21 *Supervision Regulation on Safety Technology for Stationary Pressure Vessels*, the heat exchangers within the jurisdiction are classified into category Ⅰ, Ⅱ and Ⅲ. Other vessels are indicated with "N/A"	Character type	–	ESS	E
20		Explosive hazard	Explosive fluid, non-explosive fluid	Character type	–	OPT	E
21		Fire hazard	Fire hazard category of gas should be classified into Class A and Class B. Fire hazard category of liquefied hydrocarbon and flammable liquid should be classified into Class A1, Class A2, Class B1, Class B2, Class C1 and Class C2, etc.	Character type	–	OPT	E

C.0.6 The attributes describing air cooled exchanger should meet the requirements of Table C.0.6.

Table C.0.6 Attributes of air cooled exchanger

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Fluid name	Such as diesel	Character type	–	ESS	E
02		Total flowrate	–	Numeric type	Mass flow	ESS	E
03		Inlet pressure	Pressure of fluid at the inlet of air cooled exchanger	Numeric type	Pressure	ESS	E
04		Calculated pressure drop	Pressure drop of fluid at tube side under operating condition	Numeric type	Pressure	OPT	E
05		Total heat duty	Duty exchanged required by process	Numeric type	Power	ESS	E
06		Effective area per bundle	Total effective heat transfer area including fins per bundle.	Numeric type	Area	ESS	E
07		Tube bundle size	Length × width of tube bundle, such as 9000 (mm) × 3000 mm)	Character type	–	ESS	E
08		Tube passes	Tube passes of air cooled exchanger, such as 2, 3, 4	Numeric type	–	ESS	E
09		Tube number	Number of tube in each bundle	Numeric type	–	OPT	E
10		Tube material	Material grade of base tube, such as S30408	Character type	–	ESS	E
11		Tube rows	Number of row in each bundle	Numeric type	–	ESS	E
12		Header material	Header material grade	Character type	–	ESS	
13		Design temperature	–	Numeric type	Temperature	ESS	E
14		Design pressure	–	Numeric type	Pressure	ESS	E
15		Fan model	G-TF36B6-Vs30 Fan model of air cooled exchanger, such as G-TF36B6-Vs30	Character type	–	OPT	P
16		Driver model	Driver model of air cooled exchanger	Character type	–	OPT	P

Table C.0.6(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
17		Spray quantity	The quantity of spray water for wet air cooling	Numeric type	Volume flow	OPT	E
18		Steam flowrate	Steam flowrate with steam heating radiators	Numeric type	Mass flow	ESS	E
19		Heating coil area	Area of heating coil	Numeric type	Area	OPT	E
20		Explosive-proof grade and ingress protection of motor	Such as: ExdIICT4/IP55	Character type	-	ESS	E
21		Louver size	Louver outline dimension, length × width, such as 9000(mm)×3000(mm)	Character type	-	OPT	E

C.0.7 The attributes describing power pumps should meet the requirements of Table C.0.7.

Table C.0.7 Attributes of power pumps(centrifugal pumps)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Pumping fluid		Character type	-	ESS	E
02		Solid content	Mass percentage of solids in the pumping fluid	Numeric type	Percentage	OPT	E
03		Toxicity	-	Character type	-	ESS	E
04		Temperature at inlet	-	Numeric type	Temperature	ESS	E
05		Fluid density at inlet	Fluid density at normal inlet temperature	Numeric type	Density	ESS	E
06		Fluid viscosity at inlet	Fluid viscosity at normal inlet temperature	Numeric type	Viscosity	ESS	E
07		Fluid vaporized pressure at inlet	Fluid vaporized pressure at normal inlet temperature	Numeric type	Pressure	ESS	E
08		Suction pressure	-	Numeric type	Pressure	ESS	E
09		Discharge pressure	-	Numeric type	Pressure	ESS	E
10		Normal capacity	-	Numeric type	Flow	ESS	E
11		Effective power	Fluid energy difference between inlet and outlet of the pump	Numeric type	Power	ESS	P
12		Explosive classification	Such as IIA, IIB, IIC	Character type	-	ESS	E
13		Hazardous area classification	Such as zone 1, zone 2, safety zone	Character type	-	ESS	E
14		Driver type	-	Character type	-	ESS	E
15		Rated power	Shaft power at rated flow	Numeric type	Power	ESS	P
16		Efficiency	Total efficiency of pump after hydraulic efficiency and mechanical efficiency being considered	Numeric type	Percentage	ESS	P
17		Suction specific speed	Function of the flow, speed and NPSH,	Numeric type	-	OPT	P

Table C.0.7(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
18		Max. allowable sound pressure level	–	Numeric type	Noise	OPT	E
19		Material class	–	Character type	–	ESS	E
20		Radial bearing type	Such as rolling bearing, sliding bearing	Character type	–	OPT	P
21		Radial bearing quantity	–	Numeric type	–	OPT	P
22		Thrust bearing type	Such as rolling bearing, sliding bearing	Character type	–	OPT	P
23		Thrust bearing quantity	–	Numeric type	–	OPT	P
24		Lubrication type	Such as self-lubrication and forced lubrication	Character type	–	ESS	E
25		Motor power	–	Numeric type	Power	ESS	P
26		Motor speed	–	Numeric type	Speed	ESS	P
27		Motor voltage	–	Numeric type	Voltage	OPT	E

C.0.8 The attributes describing the positive displacement compressor should meet the requirements of Table C.0.8.

Table C.0.8 Attributes of positive displacement compressor

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Gas components	–	Character type	–	ESS	E
02		Volume flowrate	Volume flowrate in standard state	Numeric type	Flow	ESS	E
03		Temperature at inlet	–	Numeric type	Temperature	ESS	E
04		Suction pressure	–	Numeric type	Pressure	ESS	E
05		Discharge pressure	–	Numeric type	Pressure	ESS	E
06		Explosive classification	Such as IIA, IIB, IIC	Character type	–	ESS	E
07		Hazardous area classification	Such as zone 1, zone 2, safety zone	Character type	–	ESS	E
08		Compressor type	Such as reciprocating, screw type	Character type	–	OPT	E
09		Discharge temperature	–	Numeric type	Temperature	ESS	P
10		Stage	–	Numeric type	–	ESS	P
11		Rated speed	–	Numeric type	Speed	ESS	P
12		Driver type	Such as motor, steam turbine	Character type	–	ESS	E
13		Number of crank	–	Numeric type	–	ESS	P
14		Cylinder number	–	Numeric type	–	ESS	P
15		Total power	Including power lost in belt and gear transmission	Numeric type	Power	ESS	P
16		Liquid injection	Whether liquid injection is adopted or not (only applicable to screw compressor)	Boolean	–	OPT	E
17		Seal type	Such as mechanical seal, dry gas seal, packing seal	Character type	–	ESS	E

C.0.9 The attributes describing fire-fighting equipment should meet the requirements of Table C.0.9.

Table C.0.9 Attributes of fire fighting equipment

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Model	Balanced, pressure and ring pump proportional types	Character type	–	ESS	E
02		Package content	Foam tank, balancing valve, foam pump, control valve, etc.	Character type	–	ESS	E
03		Spraying time	–	Numeric type	Time	ESS	E
04		Operating pressure	–	Numeric type	Pressure	ESS	E
05		Tank volume	Volume of dry powder tank	Numeric type	Volume	ESS	E
06		Quantity of tank	Quantity of dry powder tank	Numeric type	Quantity	ESS	E
07		Nitrogen bottle type	Volume, pressure, maintenance cycle, etc.	Character type	–	ESS	E
08		Quantity of nitrogen bottle	–	Numeric type	Quantity	ESS	E
09		Nozzle type	Rated flow, pressure, spraying angle, K factor, etc.	Character type	–	ESS	E
10		Quantity of nozzle	–	Numeric type	Quantity	ESS	E
11		Equipment weight	Net weight	Numeric type	Weight	ESS	E
12		Foam pump type	Flow, head, power	Character type	–	ESS	E
13		Electrical equipment power	Power of fire water pump, foam pump, foam solution supply pump etc.	Numeric type	Power	ESS	E
14		Protection class for electrical equipment	Protection class for fire water pump, foam pump, foam solution supply pumps etc.	Character type	–	ESS	E
15		Control cabinet size	Outline dimension, length (mm) × width (mm) × height (mm)	Character type	–	ESS	E
16		Voltage	Such as 24V	Numeric type	Voltage	ESS	E
17		Local control and indication	Requirements for local operation and indication of control cabinet	Character type	–	ESS	E
18		Display function	Display function requirements of control cabinet	Character type	–	ESS	E

C.0.10 The attributes describing the facilities of fire water system should meet the requirements of Table C.0.10.

Table C.0.10 Attributes of the facilities for fire water system

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Contents of the fire water system equipment	Manual/electric fire water monitor, indoor/outdoor fire hydrant, fire hose reel, etc	Character type	–	ESS	E
02		Rated flow	Rated flow(water output)of fire equipment	Numeric type	Flow	ESS	E
03		Rated pressure	Such as 1.0MPa	Numeric type	Pressure	ESS	E
04		Horizontal range	Such as 50m	Numeric type	Length	ESS	E
05		Vertical range	Such as 40m	Numeric type	Length	ESS	E
06		Operating performance	Such as 360° rotation, self draining	Character type	–	ESS	E

Table C.0.10(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
07		Operating pressure	Such as 1.0MPa	Numeric type	Pressure	ESS	E
08		Flow range	Such as 15L/s–20L/s	Character type	–	ESS	E
09		Range of regulating pressure	Pressure regulating range of fire hydrant	Character type	–	ESS	E
10		Vertical pitching angle	Vertical pitching angle of fire water monitor	Numeric type	Angle	ESS	E
11		Horizontal rotation angle	Horizontal rotation angle of fire water monitor	Numeric type	Angle	ESS	E
12		Direct current/ spray mist	Water flow form at the outlet of fire monitor	Character type	–	ESS	E
13		Connection type	Size and specification of fire hydrant connection	Character type	–	ESS	E
14		Pressure grade	Such as PN10, PN16	Character type	–	ESS	E
15		Materials	Such as carbon steel, stainless steel	Character type		ESS	E
16		Driver type	Driving form of fire water monitor	Character type		ESS	E
17		Control cabinet size	Outline dimension of cabinet of remote-controlled fire monitor, length (mm) × width(mm) × height(mm)	Character type		ESS	E
18		Voltage	Such as 24V	Numeric type	Voltage	ESS	E
19		Local control and indication	Requirements for local operation and indication of control cabinet	Character type		ESS	E
20		Display function	Display function requirements of control cabinet	Character type	–	ESS	E

C.0.11 The attributes describing the piping should meet the requirements of Table C.0.11.

Table C.0.11 Attributes of piping

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Nominal diameter	Such as *DN*250	Character type	–	ESS	E
02		Piping material class	Material class of piping, such as A1A, B1A	Character type	–	ESS	E
03		Fliud code	Such as P, CWS, CWR	Character type	–	ESS	E
04		Fliud phase	Such as gas phase	Character type	–	ESS	E
05		Operating temperature	–	Numeric type	Temperature	ESS	E
06		Operating pressure	–	Numeric type	Pressure	ESS	E
07		Design temperature	–	Numeric type	Temperature	ESS	E
08		Design pressure	–	Numeric type	Pressure	ESS	E
09		Name of test fluid	–	Character type	–	ESS	E
10		Test pressure	–	Numeric type	Pressure	ESS	E
11		Purge	Whether the piping needs to be purged	Boolean	–	ESS	E

C.0.12 The attributes describing the safety relieving elements should meet the requirements of Table C.0.12.

Table C.0.12 Attributes of safety relieving elements

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Set pressure	Inlet pressure at start of relieving under operating conditions	Numeric type	Pressure	ESS	E
02		Percentage of over pressure	The ratio of the difference between the relieving pressure and the set pressure to the set pressure, expressed as percentage	Numeric type	Percentage	ESS	E
03		Relieving pressure	Inlet pressure at specified lift	Numeric type	Pressure	ESS	E
04		Inlet norminal diameter	Such as *DN*100	Character type	–	ESS	E
05		Inlet rating	Such as Class 300	Character type	–	ESS	E
06		Outlet norminal diameter	Such as *DN*150	Character type	–	ESS	E
07		Outlet rating	Such as Class 150	Character type	–	ESS	P
08		Required discharge area	Theoretical cross-sectional area of fluid channel during discharging	Numeric type	Area	ESS	E
09		Actual discharge area	Actual cross-sectional area of fluid channel during discharging	Numeric type	Area	ESS	P
10		Relieving temperature	Temperature of fluid during discharge	Numeric type	Temperature	ESS	E

C.0.13 The attributes describing pressure/differential pressure transmitter should meet the requirements of Table C.0.13.

Table C.0.13 Attributes of pressure/differential pressure transmitter

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Fluid name	Such as gasoline, steam	Character type	–	ESS	E
02		Operating pressure	–	Numeric type	Pressure	ESS	E
03		Design pressure	–	Numeric type	Pressure	ESS	E
04		Differential pressure	Applicable to differential pressure transmitter only	Numeric type	Pressure	OPT	E
05		Operating temperature	–	Numeric type	Temperature	ESS	E
06		Design temperature	–	Numeric type	Temperature	ESS	E
07		Calibration range	Corresponding to the range of output signal, such as 0–25kPa	Character type	–	ESS	E
08		Measuring range	Available range of transmitter, such as –100kPa–100kPa	Character type	–	OPT	P
09		Output signal	Such as 4mA–20mA, 4mA–20mA + HART	Character type	–	ESS	E
10		Power supply	Such as 24V DC, 220V AC	Character type	–	ESS	E

Table C.0.13(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
11		Electrical connection	Such as M20×1.5,1/2"NPT(F)	Character type	–	ESS	E
12		Explosion proof class	Such as ia Ⅱ CT6,d Ⅱ CT4	Character type	–	ESS	E
13		Element material	Such as 316LSS	Character type	–	ESS	E
14		Max. static pressure	Such as 10.0MPa	Numeric type	Pressure	OPT	P
15		Process connection style	Such as 1/4"NPT(F)	Character type	–	ESS	E
16		Seal type	Such as flat flange, plug-in flange, remote flange	Character type	–	OPT	E
17		Diaphragm material	Such as 316LSS	Character type	–	OPT	E
18		Manifold type	Such as two valve manifolds, three valve manifolds and five valve manifolds	Character type	–	ESS	E
19		Surge protection device	With or without surge protection device	Character type	–	ESS	E
20		Distance between upper/lower nozzles	Applicable to differential pressure transmitter only	Numeric type	Length	OPT	E

C.0.14 The attributes describing control valve should meet the requirements of Table C.0.14.

Table C.0.14 Attributes of control valve

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Fluid name	Such as steam, hydrogen	Character type	–	ESS	E
02		Fluid phase	Such as gas, liquid, steam	Character type	–	ESS	E
03		Operating pressure	–	Numeric type	Pressure	ESS	E
04		Design pressure	–	Numeric type	Pressure	ESS	E
05		Operating temperature	–	Numeric type	Temperature	ESS	E
06		Design temperature	–	Numeric type	Temperature	ESS	E
07		Max. shut-off differential pressure	–	Numeric type	Pressure	ESS	E
08		Max. flow	–	Numeric type	Flow	ESS	E
09		Normal flow	–	Numeric type	Flow	ESS	E
10		Min. flow	–	Numeric type	Flow	ESS	E
11		Pressure drop at max. flow	–	Numeric type	Pressure	ESS	E

Table C.0.14(continued)

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
12		Pressure drop at normal flow	–	Numeric type	Pressure	ESS	E
13		Pressure drop at min. flow	–	Numeric type	Pressure	ESS	E
14		Rated Cv	Rated Cv or Kv	Numeric type	–	ESS	P
15		Nominal diameter	Such as *DN*100	Character type	–	ESS	E
16		In/out connection size	Such as ASME B16.5 Class 300 RF	Character type	–	ESS	E
17		Pressure rating	Such as PN64, ASME B16.5 Class 300	Character type	–	ESS	E
18		Body & bonnet material	Such as ASTM A216 WCB, ASTM A351 CF8M	Character type	–	ESS	E
19		Trim type	Such as standard, multi-stage trim, multi-stage sleeve, tri-eccentric valve	Character type	–	ESS	P
20		Trim diameter	–	Character type	–	ESS	P
21		Plug/ball/disk material	Such as 316SS, 316SS + stellite surfacing	Character type	–	ESS	P
22		Seat material	Such as 316SS, 316SS + stellite surfacing	Character type	–	ESS	P
23		Flow characteristics	Such as linear, equal percentage	Character type	–	ESS	P
24		Leakage class	Such as Ⅳ, Ⅴ	Character type	–	ESS	E
25		Actuator model	Fill in according to the actual model	Character type	–	ESS	P
26		Actuator type	Such as pneumatic diaphragm, electric	Character type	–	ESS	E
27		Failure position	Applicable to pneumatic actuator only, such as FO, FC	Character type	–	ESS	E
28		Positioner model	Applicable to pneumatic actuator only, fill in according to the actual model	Character type	–	ESS	P
29		Positioner electrical connection	Applicable to pneumatic actuator only, such as M20×1.5, 1/2"NPT(F)	Character type	–	ESS	E
30		Positioner explosion proof class	Applicable to pneumatic actuator only, such as ⅱ CT6, d Ⅱ CT4	Character type	–	ESS	E
31		Air-set model	Applicable to pneumatic actuator only, fill in according to the actual model	Character type	–	ESS	P
32		Electric actuator power supply	Applicable to electric actuator only, such as 220V AC, 380V AC	Character type	–	ESS	P
33		Electric actuator electrical connection	Applicable to electric actuator only, such as 1/2" NPT(F)×3	Character type	–	ESS	E
34		Electric actuator explosion proof class	Applicable to electric actuator only, such as d Ⅱ CT4	Character type	–	ESS	E
35		Surge protection device	With or without surge protection device	Character type	–	ESS	E

C.0.15 The attributes describing the power transformer should meet the requirements of Table C.0.15.

Table C.0.15 Attributes of power transformer

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Phase	Single phase or three-phase, such as 1,3	Numeric type	–	ESS	E
02		Quantity of winding	Double winding or three winding, such as 2,3	Numeric type	–	ESS	E
03		Insulation type	Such as dry, oil immersed	Character type	–	ESS	E
04		Vector group symbol	Explain winding wiring, such as Dyn11	Character type	–	ESS	E
05		Rated capacity	Three winding transformer shall indicate the capacity of each winding, such as 100/50/50MV·A	Character type	–	ESS	E
06		Rated frequency	–	Numeric type	Frequency	ESS	E
07		High-voltage winding rated voltage	–	Numeric type	Voltage	ESS	E
08		Medium-voltage winding rated voltage	No need to mark if there is no medium voltage side	Numeric type	Voltage	OPT	E
09		Low-voltage winding rated voltage	–	Numeric type	Voltage	ESS	E
10		Tap-changer type	The form and gear of tap voltage regulation can be described, such as on load voltage regulation ±4×1.25% or no excitation voltage regulation ±2×2.5%	Character type	–	OPT	E
11		Percentage of impedance voltage	Such as 8%	Numeric type	Percentage	OPT	E
12		Cooling type	Such as natural air cooling, ONAN	Character type	–	OPT	E
13		Winding conductor material	Such as copper, aluminum	Character type	–	OPT	E

C.0.16 The attributes describing the frame should meet the requirements of Table C.0.16.

Table C.0.16 Attributes of frame

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Material	Steel material or concrete strength grade	Character type	–	ESS	E
02		Type of foundation	Natural foundation or pile foundation	Character type	–	ESS	E
03		Height of fire	Fire height range	Character type	–	OPT	E

C.0.17 The attributes describing buildings should meet the requirements of Table C.0.17.

Table C.0.17 Attributes of buildings

No.	Chinese name	English name	Description or example	Data type	Measurement	Delivery level	Information supplier
01		Classification of fire hazards	Such as Class A, Class B, Class C, Class D, Class E, not applicable	Character type	-	ESS	E
02		Fire resistance class	Such as Level 1, Level 2 and Level 3	Character type	-	ESS	E
03		Type of building structure	Such as masonry structure, reinforced concrete frame structure, reinforced concrete bent structure, reinforced concrete frame-shear wall structure, reinforced concrete frame blast wall structure, steel structure, light weight steel structure	Character type	-	ESS	E
04		Building height	-	Numeric type	Length	ESS	E
05		Building storey	-	Numeric type	-	ESS	E
06		Building floor	-	Numeric type	Area	ESS	E
07		Building area	-	Numeric type	Area	ESS	E
08		Floor height	-	Character type	-	OPT	E

Appendix D Typical delivery contents of documents

D.0.1 The delivery list of general engineering (AA) documents should meet the requirements of Table D.0.1.

Table D.0.1 The delivery list of general engineering (AA) documents

No.	Name of document	Category of document	Information supplier
1	General description of the whole plant project	DP	E
2	Description of each volume of the whole plant project	DP	E
3	General description of multi-unit project	DP	E
4	Description of each volume of multi-unit project	DP	E
5	General description of single unit (system) project (or design description of the main discipline)	DP	E
6	Description of each volume of single unit project (or design description of the other disciplines)	DP	E
7	General description of process design package	DP	E
8	Description of each volume of process design package	DP	E
9	Specifications	DP	E
10	Special part on design of environmental protection and approval report	DP	E/O
11	Special part on design of fire fighting and approval report	DP	E/O
12	Special part on design of energy saving and approval report	DP	E/O
13	Special part on design of seismic fortification and approval report	DP	E/O
14	Special part on design of occupational health and approval report	DP	E/O
15	Special part on design of safety facilities and approval report	DP	E/O
16	Main item table	ID	E
17	Staffing table of each unit	ID	E
18	Main technical and economic indicators	ID	E
19	Hazardous chemicals data sheet	ID	E
20	Document list	ID	E

D.0.2 The delivery list of process design (AB) documents should meet the requirements of Table D.0.2.

Table D.0.2 The delivery list requirements of process design (AB) documents

No.	Name of document	Category of document	Information supplier
1	Process specification	DP	E
2	Data sheet or specification of process equipment	DS	E
3	Data sheet or specification of safety valve and rupture disc	DS	E
4	Sized equipment list	ID	E
5	Battery limittable	ID	E
6	Line list	ID	E
7	List of classified process equipment	ID	E
8	List of safety valve and rupture disc	ID	E
9	Document list	ID	E
10	Process flow diagram(PFD)	DW	E
11	Utility flow diagram(UFD)	DW	E
12	Process piping and instrumentation diagrams(P & ID)	DW	E
13	Utility piping and instrumentation diagrams(U & ID)	DW	E

D.0.3 The delivery list of static equipment design(AC)documents should meet the requirements of Table D.0.3.

Table D.0.3 The delivery list of static equipment design(AC)documents

No.	Name of document	Category of document	Information supplier
1	Design description of static equipment	DP	E
2	Design specifications of static equipment	DP	E
3	Technical requirements	DP	E/P
4	Unit design specification	DP	E
5	Individual equipment specification(if necessary)	DP	E/P
6	Risk assessment report(class Ⅲ pressure vessel only)	DP	E/P
7	Calculation	CL	E/P
8	Data sheet of static equipment	DS	E/P
9	Summary of vessel	ID	E
10	Summary of heat exchanger	ID	E
11	Document list	ID	E/P
12	Engineering drawing(if necessary)	DW	E/P
13	Assembly drawing(general drawing)	DW	E/P
14	Component drawing	DW	E/P
15	Parts drawing	DW	E/P
16	Pre-welded parts drawing(if necessary)	DW	E/P
17	Nozzle orientation drawing(if necessary)	DW	E/P

D.0.4 The delivery list of rotary equipment design(AD)documents should meet the requirements of Table D.0.4.

Table D.0.4 The delivery list of rotary equipment design(AD)documents

No.	Name of document	Category of document	Information supplier
1	Design specification of rotary equipment	DP	E
2	Design description of rotary equipment	DP	E
3	Data sheet or specification of rotary equipment	DS	E
4	Summary of pumps	ID	E
5	Summary of machinery	ID	E
6	Summary of rotary equipment	ID	E
7	Document list	ID	E
8	Installation drawing of mechanical equipment(if necessary)	DW	E/P
9	Design condition drawing of foundation engineering(if necessary)	DW	E/P
10	Auxiliary flow diagram of machinery	DW	E/P
11	Instrument interlocking logic diagram of machinery	DW	E/P

D.0.5 The delivery list of industrial furnace design(AE)documents should meet the requirements of Table D.0.5.

Table D.0.5 The delivery list of industrial furnace design(AE)documents

No.	Name of document	Category of document	Information supplier
1	Design specification of industrial furnace	DP	E
2	Design description of industrial furnace	DP	E
3	Data sheet or specification of industrial furnace	DS	E
4	Fan data sheet(if necessary)	DS	E/P
5	Equipment/material specifications	BM	E

Table D.0.5(continued)

No.	Name of document	Category of document	Information supplier
6	Document list	ID	E
7	Mechnical design documents for furnace	DW	E/P
8	Air preheat system(if necessary)	DW	E/P
9	Independent steel stacks(if necessary)	DW	E/P
10	Ladder & platform drawing(if necessary)	DW	E/P

D.0.6 The delivery list of general plan and transportation design(AF)documentsshould meet the requirements of Table D.0.6.

Table D.0.6 The delivery list of general plan and transportation design(AF)documents

No.	Name of document	Category of document	Information supplier
1	Design specifications of general plan and transportation design	DP	E
2	Design description of general plan and transportation design	DP	E
3	Bill of quantities or material list	BM	E
4	Equipment material specifications	ID	E
5	List of transportation and loading/unloading equipment	ID	E
6	Document list	ID	E
7	Geographical location	DW	E
8	Regional location	DW	E
9	Process unit location plan	DW	E
10	Site preliminary preparation plan(if necessary)	DW	E
11	Standard section of road(if necessary)	DW	E
12	General layout	DW	E
13	Vertical layout	DW	E
14	Site preparation plan	DW	E
15	Road and ditch drainage layout plan	DW	E
16	Layout of fence, gate and guard room	DW	E
17	Combined layout of pipelines(if necessary)	DW	E
18	Greening layout and detail plan(if necessary)	DW	E
19	Railway layout and detail plan	DW	E
20	Vertical layout of process unit	DW	E
21	Layout and details plan for outside roads	DW	E
22	Retaining wall and slope plan	DW	E
23	Flood drainage trench layout and detail plan	DW	E

D.0.7 The delivery list of piping design(AG)documents should meet the requirements of Table D.0.7.

Table D.0.7 The delivery list of piping design(AG)documents

No.	Name of document	Category of document	Information supplier
1	Unit layout description	DP	E
2	Unit layout specification	DP	E
3	Piping design specification	DP	E
4	Piping stress analysis specification	DP	E
5	Piping material specification	DP	E
6	Insulation specification	DP	E
7	Painting specification	DP	E
8	Piping design description	DP	E
9	Piping material take-off	BM	E

Table D.0.7(continued)

No.	Name of document	Category of document	Information supplier
10	Valve datasheet	SP	E
11	Speciaties datasheet	SP	E
12	Speciaties list	ID	E
13	Pipe supports and hangers material take-off	ID	E
14	Spring supports and hangers list	ID	E
15	Index of isometric drawing	ID	E
16	Index of tracing	ID	E
17	Document list	ID	E
18	Unit plot plan	DW	E
19	Equipment layout	DW	E
20	Vertical layout	DW	E
21	Tie-in layout	DW	E
22	Piping study drawing	DW	E
23	Piping layout	DW	E
24	Piping layout details	DW	E
25	Isometric drawings	DW	E
26	Tracing diagram or tracing layout	DW	E
27	Pipe support and hanger details	DW	E
28	Piping speciaties details	DW	E
29	Piping lightning protection and grounding plan	DW	E
30	Piping demolition drawing	DW	E

D.0.8 The delivery list of instrument design(AH)documents should meet the requirements of Table D.0.8.

Table D.0.8 The delivery list of instrument design(AH)documents

No.	Name of document	Category of document	Information supplier
1	Instrument design specificationss	DP	E
2	Instrument design description	DP	E
3	Summary of instruments and main material take-off	BM	E
4	Instrument specification	SP	E
5	Instrument panel(cabinet)specification	SP	E
6	Specification for process analyzer system and analyzer house	SP	E
7	Specification for distributed control system(DCS)	SP	E
8	SIS specification	SP	E
9	Specifications for compressor control system(CCS)	SP	E
10	Specification for programmable logic controller(PLC)	SP	E
11	Specification for combustible and toxic gas detection system(GDS)	SP	E
12	Specification for supervisory control and data acquisition(SCADA)	SP	E
13	Instrument index	ID	E
14	I/O index(including DCS,SCADA,CCS,SIS,GDS,etc.)	ID	E
15	Summary of alarm and interlock settings	ID	E
16	Cable list	ID	E
17	Document list	ID	E
18	Layout drawing of control room	DW	E
19	Layout drawing of cabinet room	DW	E
20	Instrument cable layout diagram of control room and site cabinet room(if necessary)	DW	E

Table D.0.8(continued)

No.	Name of document	Category of document	Information supplier
21	Optical fiber cable routing from central control room to site cabinet room(if necessary)	DW	E
22	Instrument cable layout diagram of control room	DW	E
23	Layout diagram or routing diagram of main instrument cable tray	DW	E
24	Layout drawing of combustible and toxic gas detector	DW	E
25	Logic block diagram(or cause effect diagram)of safety instrumented system	DW	E
26	Logic block diagram(or sequence diagram)of sequence system	DW	E
27	Complex control loop diagram or narratives	DW	E
28	Instrument loop diagram(if necessary)	DW	E
29	Instrument piping and wiring plan drawing	DW	E
30	Instrument air supply distribution drawing	DW	E
31	Layout plan of instrument tracing, flushing and isolation system	DW	E
32	Instrument hook-up drawing	DW	E
33	Diagram of instrument insulation and tracing	DW	E
34	System configuration diagram(or network structure diagram)(including DCS, SCADA, CCS, SIS, etc.)	DW	E
35	Instrument power supply system diagram	DW	E
36	Instrument grounding system diagram	DW	E
37	Layout of instrument panel(cabinet)(if necessary)	DW	E
38	Wiring diagram of instrument panel(cabinet)(if necessary)	DW	E

D.0.9 The delivery list of electrical design (AJ) documents should meet the requirements of Table D.0.9.

Table D.0.9 The delivery list of electrical design(AJ)documents

No.	Name of document	Category of document	Information supplier
1	Electrical design specification	DP	E
2	Electrical design description	DP	E
3	Electrical calculation sheet	CL	E
4	Electrical equipment and material take-off list	BM	E
5	Electrical equipment specification	SP	E
6	Electrical load list	ID	E
7	Protection relay setting schedule	ID	E
8	Cable list	ID	E
9	Document list	ID	E
10	External cable route map of plant power supply	DW	E
11	Electrical single line diagram	DW	E
12	Typical logic diagram or circuit diagram	DW	E
13	Network topology and configuration diagram of automation system	DW	E
14	Layout plan and section of substation	DW	E
15	Hazardous area classification drawing	DW	E
16	Plan and section of cable tray(cable trench)	DW	E
17	Lightning protection and grounding layout	DW	E
18	High(medium)voltage scheme diagram	DW	E
19	Schematic diagram of high(medium)voltage control	DW	E
20	DC power supply scheme diagram(if necessary)	DW	E
21	Low voltage scheme diagram	DW	E
22	Schematic diagram of low voltage control	DW	E
23	Network topology and configuration diagram of automation system	DW	E

Table D.0.9(continued)

No.	Name of document	Category of document	Information supplier
24	Configuration of secondary bus of high(medium)voltage distribution device	DW	E
25	Interconnection wiring diagram(if necessary)	DW	E
26	Power distribution layout	DW	E
27	Lighting layout	DW	E
28	Power(lighting)distribution board scheme	DW	E
29	Terminal cabinet wiring diagram or table	DW	E
30	Detail assembly drawing	DW	E

D.0.10 The delivery list of telecommunication design(AK)documents should meet the requirements of Table D.0.10.

Table D.0.10 The delivery list of telecommunication design(AK)documents

No.	Name of document	Category of document	Information supplier
1	Telecommunication design specifications	DP	E
2	Telecommunication design description	DP	E
3	Telecommunication equipment and material list	BM	E
4	Technical specifications for telecommunication equipment	SP	E
5	Telecommunication user list	ID	E
6	Document list	ID	E
7	Access control(access control management)system diagram	DW	E
8	Intruder alarm system diagram	DW	E
9	Early warning command system diagram of system integration and safety management	DW	E
10	System diagram and wiring diagram of administrative telephone, dispatching telephone and direct telephone, wireless communication, automatic fire alarm, TV monitoring, loudspeaker telecommunication system	DW	E
11	Integrated wiring system diagram(if necessary)	DW	E
12	Telecommunication(equipment wiring)layout of each building(indoor)	DW	E
13	Outdoor telecommunication layout	DW	E
14	Telecommunication equipment layout	DW	E
15	Cable tray(cable trench)routing layout	DW	E
16	Cable list (if necessary)	DW	E
17	Typical installation drawing	DW	E

D.0.11 The delivery list of architectural design(AL)documents should meet the requirements of Table D.0.11.

Table D.0.11 The delivery list of architectural design(AL)documents

No.	Name of document	Category of document	Information supplier
1	Architectural design specifications	DP	E
2	Architectural design description	DP	E
3	Individual design description	DP	E
4	Bill of materials(if necessary)	BM	E
5	Building list	ID	E
6	Document list	ID	E
7	Plan of main buildings	DW	E
8	Elevations	DW	E
9	Sections	DW	E
10	Details	DW	E

D.0.12 The delivery list of structural design (AM) documents should meet the requirements of Table D.0.12.

Table D.0.12 The delivery list of structural design(AM)documents

No.	Name of document	Category of document	Information supplier
1	Structural design specifications	DP	E
2	Structural design description	DP	E
3	Material list	BM	E
4	List of main buildings(structures)	ID	E
5	Document list	ID	E
6	Pile foundation drawing(including pile location plan and pile details)	DW	E
7	Artificial foundation treatment drawing (including composite foundation construction drawing, dynamic compaction construction drawing, etc.)	DW	E
8	General layout of foundation	DW	E
9	Single foundation drawing(including foundation layout plan and foundation details)	DW	E
10	Equipment foundation drawing(including layout and details)	DW	E
11	Drawings of reinforced concrete basin (including formwork drawing, reinforcement drawing, section drawing, details of embedded parts, etc.)	DW	E
12	Special structure details	DW	E
13	Reinforced concrete structure drawing	DW	E
14	Steel structure drawing(including structure layout plan, elevation layout and joint details)	DW	E

D.0.13 The delivery list of HVAC design (AN) documents should meet the requirements of Table D.0.13.

Table D.0.13 The delivery list of HVAC design(AN)documents

No.	Name of document	Category of document	Information supplier
1	HVAC design specifications	DP	E
2	HVAC design description	DP	E
3	Material take-off	BM	E
4	HVAC equipment list	ID	E
5	Document list	ID	E
6	Refrigeration and heating system flow diagram	DW	E
7	Ventilation, air conditioning and dust removal system flow diagram	DW	E
8	Heating plan	DW	E
9	Heating system axonometric diagram	DW	E
10	Ventilation(air conditioning, dust removal)plan	DW	E
11	Ventilation(air conditioning, dust removal)section	DW	E
12	Ventilation(air conditioning, dust removal)system axonometric diagram	DW	E
13	Piping layout of machine room	DW	E
14	Equipment layout of machine room	DW	E
15	Detail drawing	DW	E

D.0.14 The delivery list of laboratory analysis and measurement design(AP)documents should meet the requirements of Table D.0.14.

Table D.0.14 The delivery list of laboratory analysis and measurement design(AP)documents

No.	Name of document	Category of document	Information supplier
1	Laboratory design description	DP	E
2	Comprehensive material list	BM	E
3	Laboratory analytical item list	ID	E
4	Laboratory equipment list	ID	E
5	Document list	ID	E
6	Piping flow diagram of analysis laboratory	DW	E
7	Layout plan of analysis laboratory	DW	E
8	Piping layout plan of analysis laboratory	DW	E
9	Piping layout detail drawing of analysis laboratory	DW	E

D. 0.15 The delivery list of water supply and drainage design (AQ) documents should meet the requirements of Table D.0.15.

Table D.0.15 The delivery list of water supply and drainage design(AQ)documents

No.	Name of document	Category of document	Information supplier
1	Water supply and drainage design specifications	DP	E
2	Water supply and drainage design description	DP	E
3	Description of system division(water supply and drainage network of the whole plant)	DP	E
4	Data sheet of main process equipment(if necessary)	DS	E
5	Bulk material list	BM	E
6	Water consumption table	ID	E
7	Battery limit table	ID	E
8	Equipment list(if necessary)	ID	E
9	Document list	ID	E
10	System flow diagram	DW	E
11	Elevation diagram(if necessary)	DW	E
12	Layout plan of buildings and structures	DW	E
13	P & ID for water supply and drainage	DW	E
14	Layout plan of water supply and drainage pipeline(or equipment)	DW	E
15	Water supply and drainage pipeline (or equipment) installation details and well table drawing	DW	E
16	Plan and section of structure(or special well chamber)	DW	E
17	Tie-in orientation drawing of pipe at battery limit	DW	E

D.0.16 The delivery list of fire fighting design(AR)documents should meet the requirements of Table D.0.16.

Table D.0.16 The delivery list of fire fighting design(AR)documents

No.	Name of document	Category of document	Information supplier
1	Fire fighting design description	DP	E
2	Bulk material list	BM	E
3	Fire fighting equipment list	ID	E
4	Fire truck data sheet	ID	E
5	Data sheet of main auxiliary equipment	ID	E
6	Document list	ID	E

Table D.0.16(continued)

No.	Name of document	Category of document	Information supplier
7	P&ID of fire fighting water system	DW	E
8	P&ID of fire fighting foam system	DW	E
9	P&ID of other automatic fire fighting system(sprinkler, spray, gas, dry powder)	DW	E
10	Piping plan of fire fighting system	DW	E
11	Layout of fire fighting facilities	DW	E
12	Legends & symbols of fire fighting system	DW	E
13	Installation details of fire pipelines(equipment)	DW	E
14	Layout of fire pump station	DW	E
15	Layout of fire extinguisher	DW	E

D.0.17 The delivery list of prefabricated steel structure procurement(BA)documents should meet the requirements of Table D.0.17.

Table D.0.17 The delivery list of prefabricated steel structure procurement(BA)documents

No.	Name of document	Category of document	Information supplier
1	Installation and operation instructions(if necessary)	DP	P
2	Material quality certificate/material list	DP	P
3	Product certificate/quality certificate	DP	P
4	Material re-inspection report(if necessary)	DP	P
5	Product drawing	DW	P

D.0.18 The delivery list of static equipment procurement(BB)documents should meet the requirements of Table D.0.18.

Table D.0.18 The delivery list of static equipment procurement(BB)documents

No.	Name of document	Category of document	Information supplier
1	Pressure vessel manufacture license	DP	P
2	Pressure vessel inspection certificate	DP	P
3	Product certificate/quality certificate	DP	P
4	Material quality certificate/material list	DP	P
5	Material re-inspection report(if necessary)	DP	P
6	NDT report(RT/UT/MT/PT)	DP	P
7	Heat treatment report	DP	P
8	Pressure test report	DP	P
9	Copy of nameplate	DP	P
10	List of spare parts	ID	P
11	As-built drawing	DW	P

D.0.19 The delivery list of rotary equipment procurement(BC)documents should meet the requirements of Table D.0.19.

Table D.0.19 The delivery list of rotary equipment procurement(BC)documents

No.	Name of document	Category of document	Information supplier
1	Installation and operation instructions	DP	P
2	Product certificate/quality certificate	DP	P
3	Material quality certificate/material list	DP	P
4	Mechanical running test report	DP	P
5	Performance test report	DP	P

Table D.0.19(continued)

No.	Name of document	Category of document	Information supplier
6	Motor test report	DP	P
7	Product data sheet	DS	P
8	Lubricating oil(grease)table	ID	P
9	List of spare parts	ID	P
10	List of special tools	ID	P
11	Product drawing	DW	P

D.0.20 The delivery list of pipeline procurement (BD) documents should meet the requirements of Table D.0.20.

Table D.0.20 The delivery list of pipeline procurement(BD)documents

No.	Name of document	Category of document	Information supplier
1	Installation and operation instructions	DP	P
2	Material quality certificate/material list	DP	P
3	Product certificate/quality certificate	DP	P
4	Material re-inspection report(if necessary)	DP	P
5	NDT report	DP	P
6	Heat treatment report	DP	P
7	Product drawing	DW	P

D.0.21 The delivery list of instrument procurement (BE) documents should meet the requirements of Table D.0.21.

Table D.0.21 The delivery list of instrument procurement(BE)documents

No.	Name of document	Category of document	Information supplier
1	Installation and operation instructions	DP	P
2	Packaging,transportation and storage procedures	DP	P
3	Product factory test report	DP	P
4	Material quality certificate/material list	DP	P
5	Product certificate/quality certificate	DP	P
6	Instrument specifications	SP	P
7	Product drawing	DW	P

D.0.22 The delivery list of electrical procurement (BF) documents should meet the requirements of Table D.0.22.

Table D.0.22 The delivery list of electrical procurement(BF)documents

No.	Name of document	Category of document	Information supplier
1	Installation and operation instructions	DP	P
2	Product factory test report	DP	P
3	Material quality certificate/material list	DP	P
4	Product certificate/quality certificate	DP	P
5	Component inspection report(if necessary)	DP	P
6	Component certificate	DP	P
7	Explosion proof certificate(if necessary)	DP	P
8	Product drawing	DW	P

D.0.23 The delivery list of comprehensive construction(CA)documents should meet the requirements of Table D.0.23.

Table D.0.23 The delivery list of comprehensive construction(CA)documents

No.	Name of document	Document type	Information supplier
1	General description on handover technical documents	DP	C
2	Description on handover technical documents	DP	C
3	Construction organization design and approval documents	DP	C
4	Construction commencement report	ID	C
5	Master index of handover technical documents	ID	C
6	Index of handover technical documents	ID	C
7	Interim handover certificate	ID	C
8	Handover and acceptance certificate	DP	C
9	Transfer certificate of handover technical documents	DP	C
10	Major quality accident handling report	DP	C
11	List of engineering changes	DP	C
12	Concealed work acceptance inspection record	RE	C
13	Design change or engineering liaison sheet	RE	E/C
14	Qualified welder registration form	RE	C
15	NDE personnel registration form	RE	C
16	Unpacking inspection record	RE	C
17	Painting quality inspection acceptance record	RE	C
18	Insulation quality inspection acceptance record	RE	C
19	Ground resistance measurement record	RE	C
20	Safety valve adjustment and test record	RE	C
21	Safety attachment installation inspection record	RE	C
22	Confirmation form of radiographic test results	RE	C
23	Radiographic test report	RE	C
24	Weld ultrasonic test report	RE	C
25	Material ultrasonic test report	RE	C
26	Ultrasonic thickness measurement report	RE	C
27	Magnetic particle test report	RE	C
28	Penetration test report	RE	C
29	Chemical composition analysis and inspection report of metal materials	RE	C
30	Hardness test report	RE	C
31	Shim concealment record	RE	C
32	Summary of quality certificates of equipment/materials	RE	C

D.0.24 The delivery list of civil construction (CB) documents should meet the requirements of Table D.0.24.

Table D. 0.24 The delivery list of civil construction(CB)documents

No.	Name of document	Category of document	Information supplier
1	Foundation trench(pit)inspection record	RE	C
2	Foundation treatment record	RE	C
3	Project location survey record	RE	C
4	Equipment foundation retest record	RE	C
5	Block type equipment foundation allowable deviation item remeasurement record	RE	C
6	Frame type equipment foundation allowable deviation item remeasurement record	RE	C
7	Storage tank foundation allowable deviation item remeasurement record	RE	C
8	Spherical tank foundation allowable deviation item remeasurement record	RE	C
9	Foundation settlement observation record	RE	C
10	Water basin impoundment test record	RE	C

D.0.25 The delivery list of equipment construction(CC)documents should meet the requirements of Table D.0.25.

Table D.0.25 The delivery list of equipment construction(CC)documents

No.	Name of document	Category of document	Information supplier
1	Machine installation inspection record	RE	C
2	Shaft alignment record	RE	C
3	Unit shaft alignment record	RE	C
4	Air-cooled heat exchanger fan installation inspection record	RE	C
5	Quality confirmation record of machine assembly	RE	C
6	Machine stand-alone test record	RE	C
7	Confirmation record of unit test run conditions	RE	C
8	Test record of reciprocating compressor	RE	C
9	Test record of centrifugal compressor	RE	C
10	Test record of steam turbine/gas turbine	RE	C
11	Motor test record	RE	C
12	Transmission test record	RE	C
13	Kettle equipment installation inspection record	RE	C
14	Installation inspection record of vertical equipment	RE	C
15	Installation inspection record of horizontal equipment	RE	C
16	Tray installation inspection record	RE	C
17	Equipment filling inspection record	RE	C
18	Assembly quality inspection record of vertical cylindrical storage tank	RE	C
19	Test record of vertical cylindrical storage tank	RE	C
20	Wet gas cabinet assembly quality inspection record	RE	C
21	Wet gas cabinet test record	RE	C
22	Dry gas cabinet assembly quality inspection record	RE	C
23	Dry gas cabinet test record	RE	C
24	Flare stack and tube installation inspection records	RE	C
25	Quality inspection record of refractory lining	RE	C
26	Pressure and tightness test record of heat exchanging equipment	RE	C
27	Equipment pressure/tightness test record	RE	C
28	Atmospheric equipment heat treatment report	RE	C
29	Steel structure installation inspection record of tubular furnace	RE	C
30	Inspection record of installation quality of tubular furnace accessories	RE	C
31	Inspection record of furnace lining	RE	C

D.0.26 The delivery list of pipeline construction(CD)documents should meet the requirements of Table D.0.26.

Table D.0.26 The delivery list of pipeline construction(CD)documents

No.	Name of document	Category of document	Information supplier
1	Piping components verification inspection & additional inspection record	RE	C
2	Valve test confirmation form	RE	C
3	Spring support/hanger installation inspection record	RE	C
4	Sliding/fixed pipe shoe installation inspection record	RE	C
5	Pipe compensator installation inspection record	RE	C
6	Piping system pressure test condition confirmation record	RE	C
7	Piping system leak/vacuum test condition confirmation and test record	RE	C
8	Piping purging/cleaning inspection record	RE	C

Table D.0.26(continued)

No.	Name of document	Category of document	Information supplier
9	Water supply & drainage(pressure flow)piping pressure test condition confirmation and test record	RE	C
10	Water supply & drainage(non-pressure)piping closed water test condition confirmation and test record	RE	C
11	Piping welded joint heat treatment report	RE	C
12	Piping welded joint radiographic testing ratio confirmation form	RE	C
13	Piping static earthing test record	RE	C
14	Summary of piping material distribution	RE	C

D.0.27 The delivery list of electrical construction(CE)documents should meet the requirements of Table D.0.27.

Table D.0.27 The delivery list of electrical construction(CE)documents

No.	Name of document	Category of document	Information supplier
1	Confirmation table of electrical equipment test items	RE	C
2	Installation inspection and no-load operation record of AC motor	RE	C
3	Transformer installation inspection record	RE	C
4	Installation inspection record of high/low voltage switchgear	RE	C
5	Installation inspection record of protection relay/control panel	RE	C
6	Installation inspection record of DC system/UPS	RE	C
7	Cable laying and insulation test record	RE	C
8	Installation inspection record of automatic fire alarm system	RE	C

D.0.28 The delivery list of instrument construction(CF)documents should meet the requirements of Table D.0.28.

Table D.0.28 The delivery list of instrument construction(CF)documents

No.	Name of document	Category of document	Information supplier
1	Installation inspection record of DCS cabinet/instrument panel/console	RE	C
2	Basic function test record of integrated control system	RE	C
3	Commissioning records of alarm/interlocking system and programmable control system	RE	C
4	Confirmation table of DCS/SIS power on condition	RE	C
5	Confirmation table of instrument equipment calibration items	RE	C
6	Confirmation table of joint calibration and test conditions	RE	C
7	Joint calibration and commissioning record	RE	C
8	Pressure/tightness test record of instrument tube	RE	C
9	Confirmation and test record of leakage/vacuum test conditions of instrument tube	RE	C

D.0.29 The correlation between plant object class and document should meet the requirements of Table D.0.29.

Table D.0.29 The correlation between plant object class and document

Category	Name	Discipline and document type
C01-01	Vessel	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(AQ)4,8,13-15;(AR)3,7-8,11,14;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14-15,27
C01-02	Reactor	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14
C01-03	Column	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14,16-17

Table D.0.29(continued)

Category	Name	Discipline and document type
C01-04	Heat exchanger	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(AQ)4,8,13-15;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14-15,26
C01-05	Air cooler	(AB)2,7,10-13;(AC)10;(AG)6-7,19-20;(AJ)15;(AM)10;(BB)1-11;(CA)12,16;(CC)4
C01-06	Industrial furnace	(AB)2,7,10-13;(AE)1-10;(AG)6-7,19-20;(AM)10;(BB)5-8;(CC)29-31
C01-07	Pump	(AB)2,7,10-13;(AD)1-11;(AG)6-7,19-20;(AJ)15;(AM)10;(AQ)4,8,13-15;(AR)3,7-8,11,14;(BC)1-11;(CA)12,16;(CB)5;(CC)1-2,6
C01-08	Compressor	(AB)2,7,10-13;(AD)1-11;(AG)6-7,19-20;(AJ)15;(AL)7;(AM)10;(BC)1-11;(CA)12,16;(CB)5-6;(CC)1-3,5-12,14-15,26-27
C01-9	Fan	(AB)2,7,10-13;(AD)1-11;(AG)6-7,19-20;(AJ)15;(AM)10;(BC)1-11;(CA)12,16;(CB)5;(CC)1-2,6
C01-10	Storage tank	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(AR)3,7-8,11,14;(BB)1-11;(CA)17-18,21;(CB)7-9;(CC)18-23,27
C01-11	Fire fighting equipment	(AR)1-15
C01-12	Mechanical equipment	(AB)2,7,10-13;(AD)1-11;(AG)6-7,19-20;(AJ)15;(AM)10;(BC)1-11;(CA)12,16;(CB)5-6;(CC)1-2,6
C01-13	Lifting and transportation equipment	(AD)8;(AF)5;(BC)1-11
C02	Pipeline	(AB)5-6,12-13;(AC)13,17;(AD)8,10;(AE)7-9;(AF)12-13,17,20;(AG)1-30;(AJ)15;(AQ)5,7,10-17;(AR)2,7-15;(BD)1-7;(CA)11-16,23,28;(CB)1-3;(CD)1-14
C03	Pipe components	(AB)12-13;(AG)9-14,23,27-28;(AQ)5,13-14;(AR)2,7-10;(BD)1-7;(CA)16,20-21
C04-01	Temperature instrument	(AB)2,12-13;(AC)13,17;(AD)3,8,10-11;(AE)3,7-9;(AG)23-25;(AH)1-38;(AJ)15;(AQ)4,13-15;(AR)7-10;(BE)1-7;(CA)12,16,32;(CF)5-7
C04-02	Pressure instrument	(AB)2,12-13;(AC)13,17;(AD)3,8,10-11;(AE)3,7-9;(AG)23-25;(AH)1-38;(AJ)15;(AQ)4,13-15;(AR)7-10;(BE)-7;(CA)12,14,16,32;(CF)5-9
C04-03	Flow meter	(AB)12-13;(AD)3,8,10-11;(AG)23-25;(AH)1-38;(AJ)15;(AQ)13-15;(AR)7-10;(BE)1-7;(CA)12,14,16,32;(CF)5-9
C04-04	Level meter	(AB)2,12-13;(AC)13,17;(AD)3,8,10-11;(AH)1-38;(AJ)15;(AQ)4,13;(AR)7-9;(BE)1-7;(CA)12,14,16,32;(CF)5-9
C04-05	Pressure/differential pressure transmitter	(AB)2,12-13;(AC)13,17;(AD)3,8,10-11;(AE)3,7-9;(AG)23-25;(AH)1-38;(AJ)15;(AQ)4,13-15;(AR)7-10;(BE)1-7;(CA)12,14,16,32;(CF)5-9
C04-06	Control valve	(AB)12-13;(AD)3,8,10-11;(AG)23-25;(AH)1-38;(AJ)15;(AQ)13-15;(AR)7-10;(BE)1-7;(CA)12,16,32;(CF)5-8
C04-07	On line process analyzer	(AB)2,12-13;(AC)13,17;(AG)23-25;(AH)1-38;(AJ)15;(AQ)4,13-15;(BE)1-7;(CA)12,14,16,32;(CF)5-9
C04-08	Control system	(AB)2,12-13;(AD)3,10-11;(AH)1-38;(BE)1-7;(CA)19;(CF)1-4
C05-01	Transformer	(AJ)1-30;(BF)1-8;(CA)14,16,32;(CE)3,7
C05-02	Generator	(AJ)1-30;(BF)1-8;(CA)12,14,16,32;(CE)2,7
C05-03	Switchgear and control equipment	(AJ)1-30;(BF)1-8;(CA)14,16,32;(CE)4-5,7
C05-04	Power factor compensation device	(AJ)1-30;(BF)1-8
C05-05	Power supply device	(AJ)1-30;(BF)1-8;(CA)14,16,32;(CE)6-7
C05-06	Power distribution box	(AJ)1-30;(BF)P8;(CA)12,14,16,32;(CE)2,7
C05-07	Converter	(AJ)1-30;(BF)1-8
C06-01	Frame	(AF)12-13,20;(AM)1-14;(BA)1-5;(CA)11-13;(CB)1-3

Table D.0.29(continued)

Category	Name	Discpline and document type
C06-02	Pipe rack	(AF)12-13,20;(AM)1-14;(BA)1-5;(CA)11-13;(CB)1-3
C06-03	Equipment foundation	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(AQ)4,8,13-15;(AR)3,7-8,11,14;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14-15,27
C06-04	Basin structure	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AM)10;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14
C06-05	Building	(AB)2,7,10-13;(AC)1-17;(AG)6-7,19-20;(AJ)15;(AL)1-10;(BB)1-11;(CA)17-18,21;(CB)4-5;(CC)14,16-17

Explanation of wording in this standard

1 Words used for different degrees of strictness are explained as follows in order to mark the differences in implementing the requirements of this standard.

1) Words denoting a very strict or mandatory requirement:

"Must" is used for affirmation, "must not" for negation.

2) Words denoting a strict requirement under normal conditions:

"Shall" is used for affirmation, "shall not" for negation.

3) Words denoting a permission of a slight choice or an indication of the most suitable choice when conditions permit:

"Should" is used for affirmation, "should not" for negation.

4) "May" is used to express the option available, sometimes with the conditional permit.

2 "Shall comply with..." or "Shall meet the requirements of..." is used in this standard to indicate that it is necessary to comply with the requirements stipulated in other relative standards and codes.