ENGINEERING STANDARD

FOR

NUMBERING SYSTEM

ORIGINAL EDITION

MAR. 1996

This standard specification is reviewed and updated by the relevant technical committee on June 2003. The approved modifications are included in the present issue of IPS.

CONTENTS : PAGE No.

0. INTRODUCTION 3
1. SCOPE 4
2. REFERENCES 4
3. DEFINITIONS AND TERMINOLOGY 4
4. SYMBOLS AND ABBREVIATIONS 5
5. UNITS 5
6. ASSIGNMENT AND APPLICATION OF EQUIPMENT AND MATERIAL NUMBER 5
6.1 Assignment of Equipment and Material Number 5
6.2 Application of Equipment and Material Number 5
7. EQUIPMENT NUMBERING SYSTEM 6
7.1 Main Equipment & Package Unit 6
7.2 Drivers for Main Equipment 6
7.3 Auxiliary Equipment of Package Units 7
8. INSTRUMENT AND CONTROL EQUIPMENT NUMBERING SYSTEM 7
8.1 Instrument and Control Equipment 7
8.2 Instrument Accessories and Locations 8
8.3 Gage Glasses Designation 9
9. ELECTRICAL EQUIPMENT NUMBERING SYSTEM 10
9.1 Numbering for Main Electrical Equipment 10
9.2 Numbering for Other Electrical Equipment 10
10. COMMUNICATION EQUIPMENT NUMBERING SYSTEM 11
11. PIPING LINE NUMBERING SYSTEM 11
11.1 Numbering of All Lines Excluding Steam Tracing Spools 12
11.2 Steam Tracing Spools 13
12. BUILDING AND STRUCTURE NUMBERING SYSTEM 13
12.1 Numbering for Buildings and Analyzer Houses 13
12.2 Numbering for Structure 13
13. NUMBERING OF PROJECT SPECIFICATIONS AND DATA SHEETS 14
13.1 Numbering of Project Specifications 14
13.2 Numbering of Data Sheets 14
13.3 Cost Code Numbers 15
14. DRAWINGS NUMBERING SYSTEM 15
14.1 Drawing Sizes 15
14.2 Drawing Scales 15
14.3 Numbering of Drawings 16
14.4 Numbering of Isometric Drawings 16
14.5 Numbering of Project Standard Drawings 17

14.6 Numbering of Drawings for Buildings 17
14.7 Numbering of Drawings for Temporary Buildings 18
15. INQUIRY REQUISITIONS, PURCHASE ORDERS AND SUBCONTRACTS UMBERING SYSTEM 18
15.1 Identification Letters: 18
15.2 Commodity Account No.: 19
15.3 Serial Number: 19
16. VENDOR DATA NUMBERING SYSTEM 19
16.1 Identification Letters 19
17. ENGINEERING DISCIPLINES AND PROJECT SECTIONS CODING 20
17.1 Engineering Disciplines Coding 20
17.2 Project Sections Coding 20

APPENDICES:

APPENDIX A UNIT IDENTIFICATION NUMBER 22
APPENDIX B EQUIPMENT CATEGORY SYMBOL 24
APPENDIX C INSTRUMENTATION IDENTIFICATION LETTERS ACCORDING TO ISA S.5.1 28
APPENDIX D INSTRUMENTATION TYPICAL LETTER COMBINATIONS ACCORDING TO ISA S.5.1 31
APPENDIX E PAINTING, INSULATION AND HEAT TRACING DESIGNATION 32
APPENDIX F ELECTRICAL EQUIPMENT CATEGORY CODE 33
APPENDIX G SYSTEM DISTINCTION AND EQUIPMENT CATEGORY CODE FOR COMMUNICATION EQUIPMENT 34
APPENDIX H DRAWING SERIAL NUMBER 35
APPENDIX I FLUID ABBREVIATION SYMBOLS 36
APPENDIX J BUILDINGS DRAWING CATEGORIES 40
APPENDIX L DEFINITION OF NOMINAL SIZE 41

0. INTRODUCTION

The Standard Practice Manuals titled as "Fundamental Requirements for the Project Design and Engineering" is intended for convenience of use and a pattern of follow-up and also a guidance.

These Standard Engineering Practice Manuals also indicate the check points to be considered by the process engineers for assurance of fulfillment of prerequisitions at any stage in the implementation of process projects.

It should be noted that these Iranian Petroleum Standards (IPS), as Practice Manuals do not profess to cover all stages involved in every project, but they reflect the stages that exist in general in process projects of oil, gas and petrochemical industries of Iran.

These preparation stages describe the following three main phases which can be distinguishes in every project & include, but not be limited to :

Phase I : Basic Design Stages (containing seven Standards)

Phase II : Detailed Design, Engineering and Procurement Stages (containing two Standards)

Phase III : Start-Up Sequence and General Commissioning Procedures (containing two Standards)

The Process Engineering Standards of this group include the following 11 Standards:

STANDARD CODE	STANDARD TITLE
I) Manuals of Phase I:	
IPS-E-PR-150	"Basic Design Package"
IPS-E-PR-170	"Process Flow Diagram"
IPS-E-PR-190	"Layout and Spacing"
IPS-E-PR-200	"Basic Engineering Design Data"
IPS-E-PR-230	"Piping & Instrument Diagrams (P&IDs)"
IPS-E-PR-250	"Performance Guarantee"
IPS-E-PR-308	"Numbering System"
II) Manuals of Phase II:	
IPS-E-PR-260	"Detailed Design Engineering and Procurement"
IPS-E-PR-300	"Plant Technical and Equipment Manuals (Engineering Dossiers)"
III) Manuals of Phase III:	
IPS-E-PR-280	"Start-up Sequence and General Commissioning Procedures"
IPS-E-PR-290	"Plant Operating Manuals"

This Engineering Standard Specification covers:

"NUMBERING SYSTEM"

1. SCOPE

This Engineering Standard prescribes equipment and material numbering system including numbering for instrument and electrical equipment, piping line and engineering documents such as specifications, purchase orders, and other facilities.

Note:

This standard specification is reviewed and updated by the relevant technical committee on June 2003. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 220 on June 2003. These modifications are included in the present issue of IPS.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

ISA (INSTRUMENT SOCIETY OF AMERICA)

S 5.1-1984.	“Instrumentations Symbol and Identification Formerly”, Ed. 1989

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

6708-1995 (E)	"Pipe Components Definition and Selection of Nominal Size", 2nd. Ed., 1995.

3. DEFINITIONS AND TERMINOLOGY

Throughout this Standard words have specific meaning as described below:

- "Company" / "Employer" / "Owner"

Means as mentioned in General Definitions of Foreword.

- "Contractor"

Refers to the persons, firm or company whose tender has been accepted by the "Employer", and includes the contractor’s personnel representative, successor and permitted assigns.

- "Project"

Refers to the equipment, machinery and materials to be procured by the "Contractor" and the works and/or all activities to be performed and rendered by the "Contractor" in accordance with the terms and conditions of the contract documents.

- "Unit" or "Units"

Refers to one or all process, offsite and/or utility units and facilities as applicable to form a

complete operable refinery and/or complex/plant.

4. SYMBOLS AND ABBREVIATIONS

For further information reference is made to paragraphs 7.2, 8.2, 8.3.2, 12.2, 15.1, 16.1, 17.1, 17.2 and Appendices A, B, D, E, F, G and I herein.

SYMBOL/ABBREVIATION	DESCRIPTION
AK	Arak
BD	Building
CRD	Crude
DN	Diameter Nominal, in (mm)
HVAC	Heating Ventilation and Cooling
LG	Level Gage
PDB	Distribution Panel Board
PFD	Process Flow Diagram
P & IDs	Piping and Instrument Diagrams
PO	Purchase Order
PS	Pipe Support
PSV	Pressure Safety Valve
SI	System International
TEL	Tetra Ethyl Lead

5. UNITS

This Standard is based on International System of Units (SI), except where otherwise specified.

6. ASSIGNMENT AND APPLICATION OF EQUIPMENT AND MATERIAL NUMBER

6.1 Assignment of Equipment and Material Number

Equipment and material number shall be assigned to process equipment, package Units, tanks, civil constructions, buildings, structures, electrical equipment, instruments, piping, etc., including their auxiliaries as detailed as practical to secure a uniform identification of the equipment throughout the project.

6.2 Application of Equipment and Material Number

6.2.1 Documents and Drawings

6.2.1.1 Equipment and material number shall be fully utilized in engineering documents and drawings such as Process Flow Diagram (PFD), Plot Plan, Piping and Instrument Diagrams (P & IDs), Equipment Data Sheets, Instrument Data Sheets, etc.

6.2.1.2 Vendor's documents including drawings, data sheets, etc., shall bear equipment and material number.

6.2.1.3 Shipping documents shall fully utilize equipment, and material number.

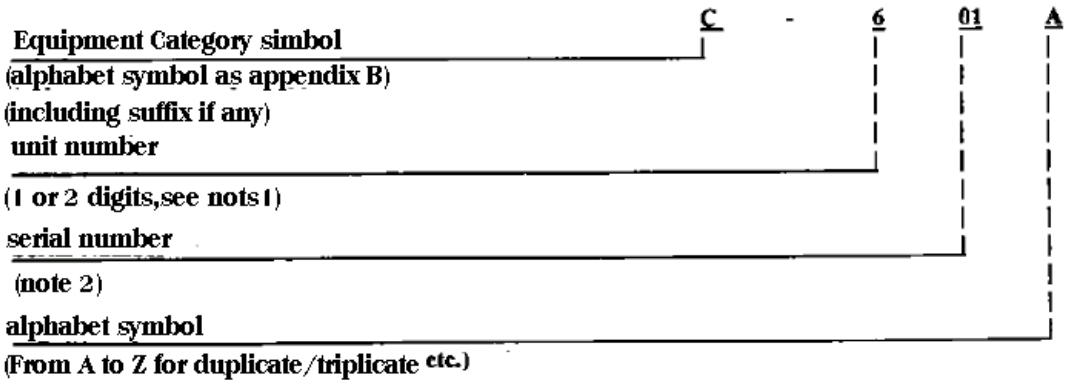
6.2.1.4 Equipment and material number shall be assigned for spare parts.

6.2.2 Equipment Name Plate and Tag Number Stamping or equipment and material number in the name plate or the tag number shall be made except for certain minor bulk items such as fire hydrants, etc.

7. EQUIPMENT NUMBERING SYSTEM

7.1 Main Equipment & Package Unit

Main Equipment and Package Unit shall be numbered in the following manner.



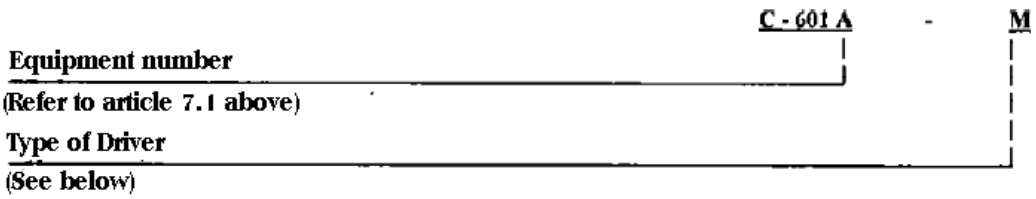
Notes:

1) Unit number for the equipment shall start from 1 (not from 01). For a typical refinery units see Appendix A.

2) Serial number for equipment including mechanical, machinery, electrical, ancillary facilities, buildings, general items, etc., shall be from 01 to 99 unless otherwise specified. The numbering of instruments and control equipment should be from 001 to 999. For the units with more than one section (e.g., crude and vacuum distillation unit, etc.), equipment serial number to be utilized for each section shall be determined by the Contractor (e.g., from 01 t0 50 and from 50 to 99 to crude distillation and vacuum distillation sections respectively).

7.2 Drivers for Main Equipment

Drivers for main equipment shall be numbered as follows:



Note:

Type of drivers shall be as follows:

DE : Diesel Engine

GE : Gas Engine

GT : Gas Turbine

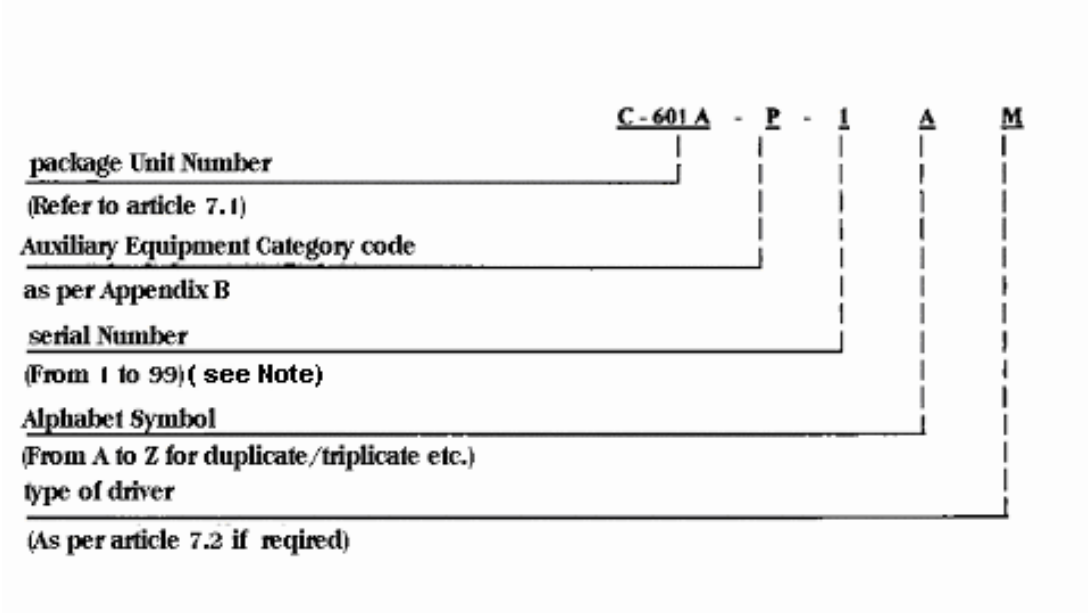
HT : Hydraulic Turbine

M : Electric Motor

ST : Steam Turbine

TEX: Turbo Expander.

7.3 Auxiliary Equipment of Package Units



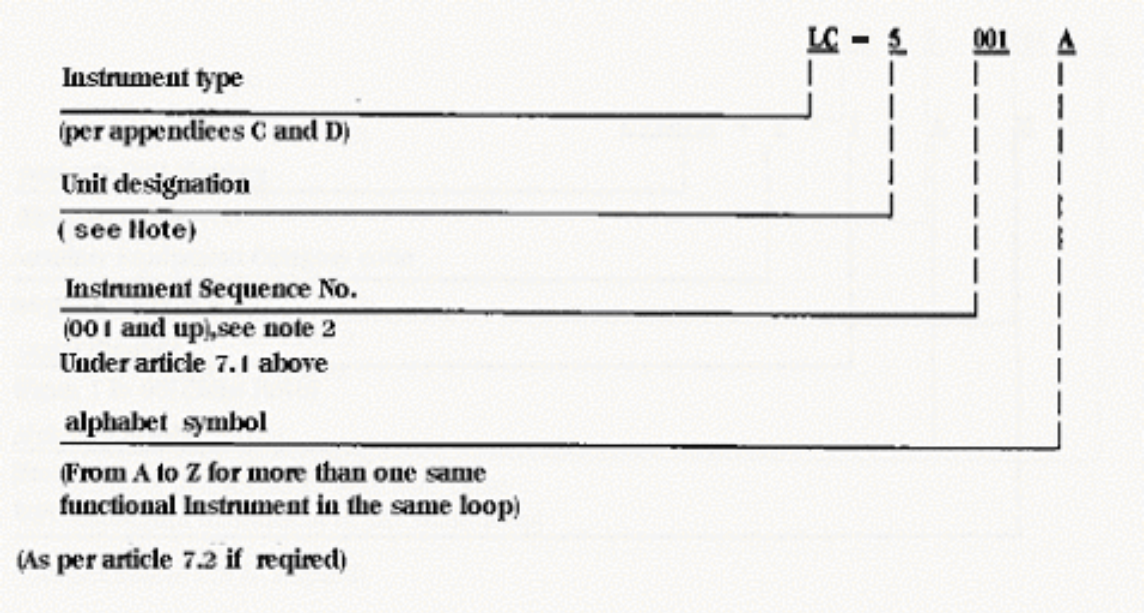
Note:

Serial number for auxiliary equipment in package unit shall start from 1 (not from 01).

8. INSTRUMENT AND CONTROL EQUIPMENT NUMBERING SYSTEM

8.1 Instrument and Control Equipment

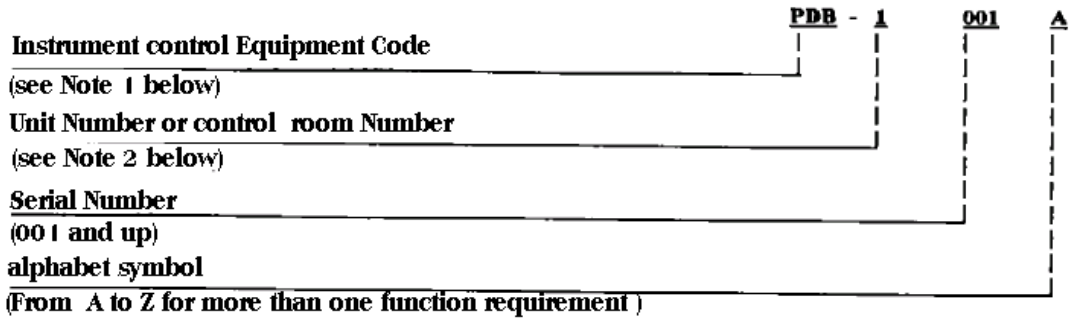
Instrument and control equipment including Pressure Safety Valve (PSV) shall be numbered in the following manner, (for gage glasses see item 8.3 below):



Note:

Unit designation for the instrument equipment shall start from 1 (not from 01). For a typical refinery units see Appendix A.

8.2 Instrument Accessories and Locations



Notes:

1) Equipment code should comply as follows:

a) Equipment located in Control Room

PNL : Panels for DCS, FCS Computer and etc.

PDB : Distribution Panel Board

MRB : Marshaling box

ESD : Emergency shut down panel

b) Equipment located at field

JBE : Junction Box (Electronic)

JBT : Junction Box (Thermocouple)

JBZ : Junction Box (Shut-Down/Alarm)

JBR : Junction Box (Thermoresistance)

JBP : Junction box (Power Supply)

c) Multi cable

MCE : Electronic

MCT : Thermocouple

MCZ : Shut-Down/Alarm/Power Supply

MCR : Thermoresistance

MCP : Power Supply

DHW : Data High Way (Sectional Indication)

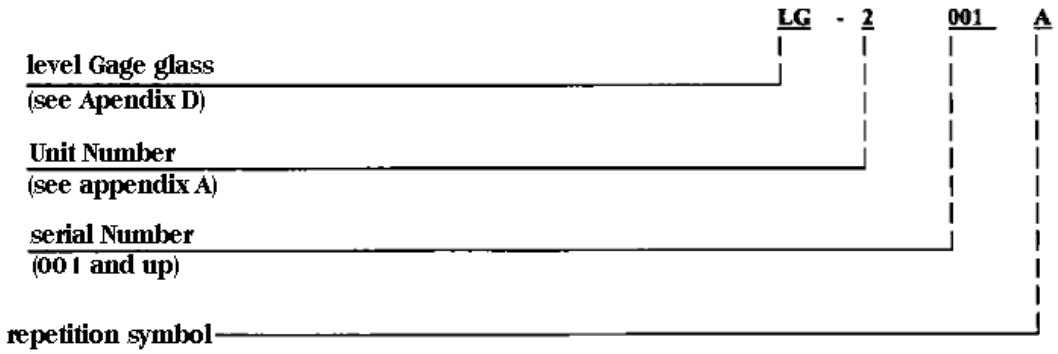
2) Unit number for items "b" and "c" above, and control room number for item a above. Unit number shall start from 1 (not from 01). For typical refinery units see Appendix A. Control room number shall be as per article 12 below.

3) For all the equipment located in the control room, the relevant drawings and data sheets shall have proper tagging or marking showing the unit numbers.

8.3 Gage Glasses Designation

8.3.1 Gage glasses numbering system

Gage glasses shall be numbered as per article 8.1 above and the following example:



8.3.2 Special feature of gage glasses

Special feature of the gage glasses shall be presented beside the gage glasses in the drawings according to the following abbreviations:

a) Type

R = Reflex

T = Transparent

b) Material of Cocks

M = Monel Trim Cocks

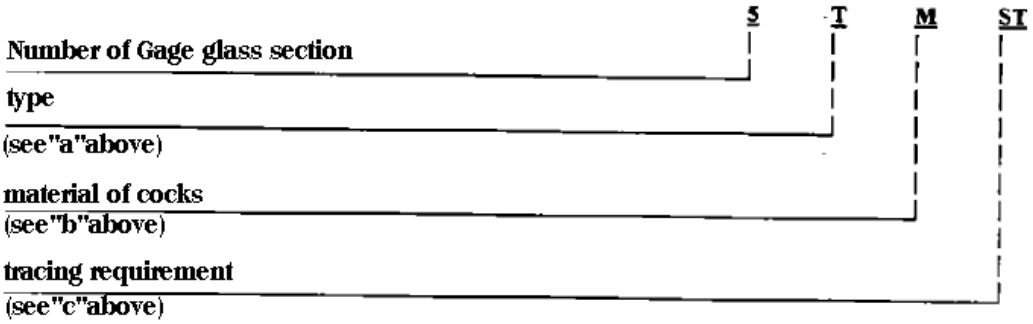
SS = Stainless Steel

c) Steam/Electrical Trace Requirement

ST = Steam Traced

ET = Electrical Traced

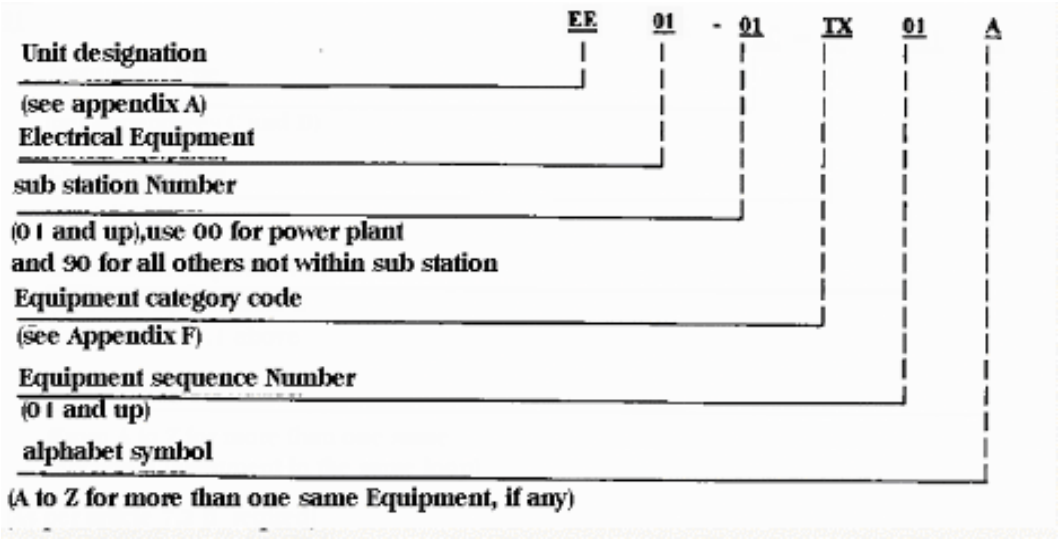
Example:



9. ELECTRICAL EQUIPMENT NUMBERING SYSTEM

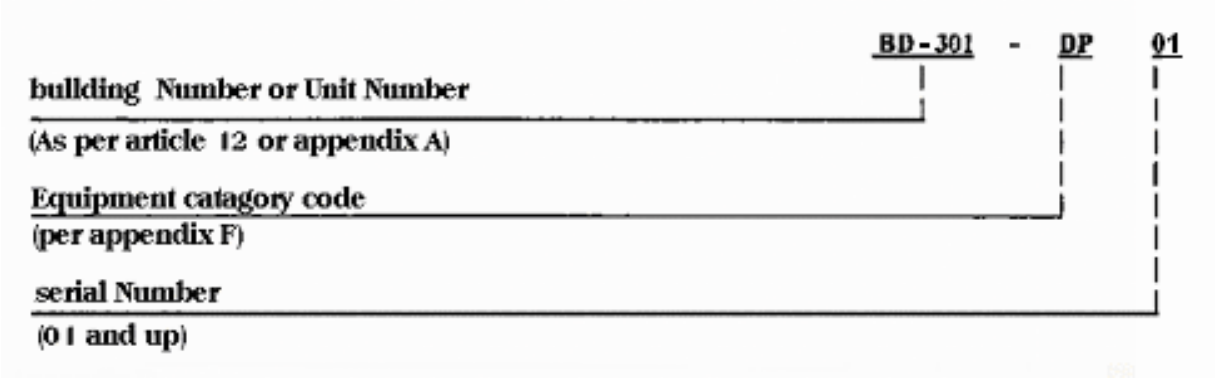
9.1 Numbering for Main Electrical Equipment

Main Electrical Equipment which compose primary power distribution system, power supply to process equipment, instrument power supply and supervisory system, shall be numbered in the following manner:



9.2 Numbering for Other Electrical Equipment

Panel boards and other electrical equipment shall be numbered in the following manner:

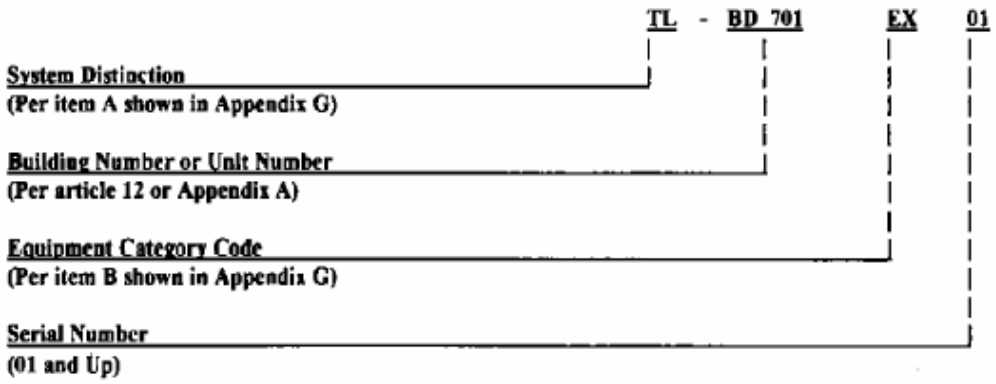


Example:

BD 701-DP02 Distribution panel board No. 02 located in the building No. BD-701.

10. COMMUNICATION EQUIPMENT NUMBERING SYSTEM

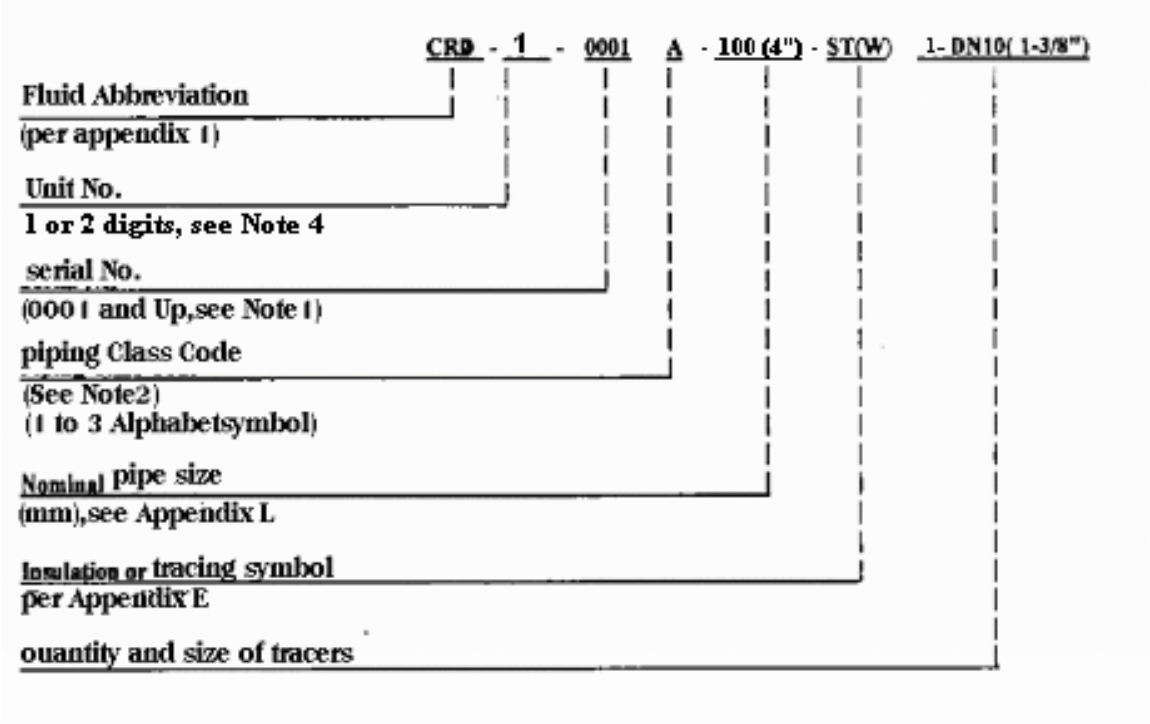
Communication equipment shall be numbered in the following manner:



11. PIPING LINE NUMBERING SYSTEM

Piping lines shall be numbered in the following manner:

11.1 Numbering of All Lines Excluding Steam Tracing Spools



Notes:

1) Piping serial number, in general is started from 0001 and Up except for the units which are characterized by more than one section such as crude and vacuum distillation unit. In such cases, split of piping serial numbers to be assigned for each section of the unit shall be determined by the Contractor.

Special number 7001 : 9999 shall be used for all drains, relief headers and utility services including fuel oil and fuel gas for all units except for the units which are producing the subject utility services.

For assigning the piping serial number, the following items should be taken into consideration:

a) Pipe line numbers shall be prefixed, from source to unit battery limit with the unit number of the unit of origin.

b) The individual line number shall be held up to the point where the line ends at the inlet of equipment such as a vessel, exchanger, pump, etc., an other number is required for the line downstream of the equipment.

c) A new line number is required when the pipe design condition can vary (e.g., downstream of the control valve assembly) or when a new piping class is to be specified.

d) Line number shall be held up to the point where the line ends to the header or unit battery limit block valve. All branches to and from header shall have an individual line number.

e) All utility headers (systems) shall be numbered with their respective units. All branches serving a specific unit will be numbered with that unit.

f) All firewater and sewer branches serving a specific unit shall be numbered in accordance with note number (e) above.

2) Piping class code shall be in accordance with the line classes utilized in project piping material specification.

3) Piping components not identified by instrument or mechanical equipment numbers, etc., and not covered by the piping material specification, are identified by a special item number.

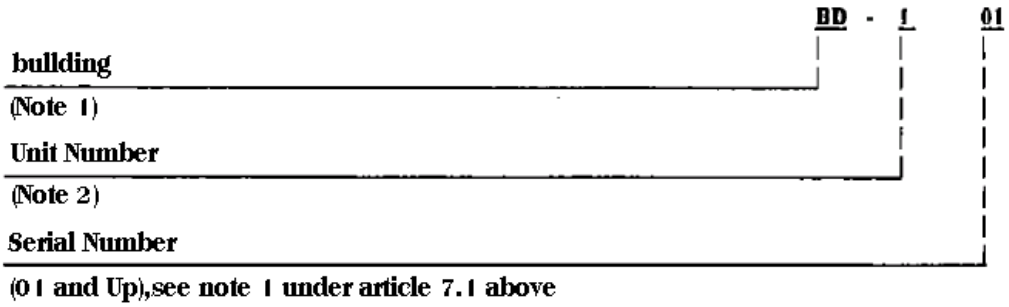
4) Unit number of the plant shall start from 1 (not from 01). For a typical refinery units see Appendix A.

11.2 Steam Tracing Spools

For steam tracing numbering and material take off, the contractor can use his own system.

12. BUILDING AND STRUCTURE NUMBERING SYSTEM

12.1 Numbering for Buildings and Analyzer Houses



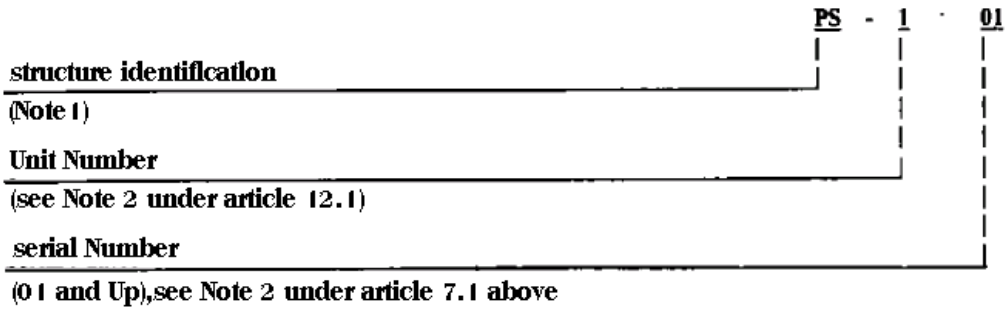
Notes:

1) Use "BD" for building and ""AH" for analyzer house.

2) Unit number for buildings and analyzer houses shall start from 1 (not from 01), see, Appendix A.

12.2 Numbering for Structure

Structure and pipe rack shall be numbered in the following manner:



Notes:

1) Structure Identification

AT = Antenna Tower

BD = Building, Shelter

CB = Catch Basin

CPS = Concrete Pipe Sleeper

MH = Sewer Manhole

MP = Miscellaneous Platform

PB = Pull Box

PBC = Pipe Box Culvert

PS = Pipe Support

SL = Stiles

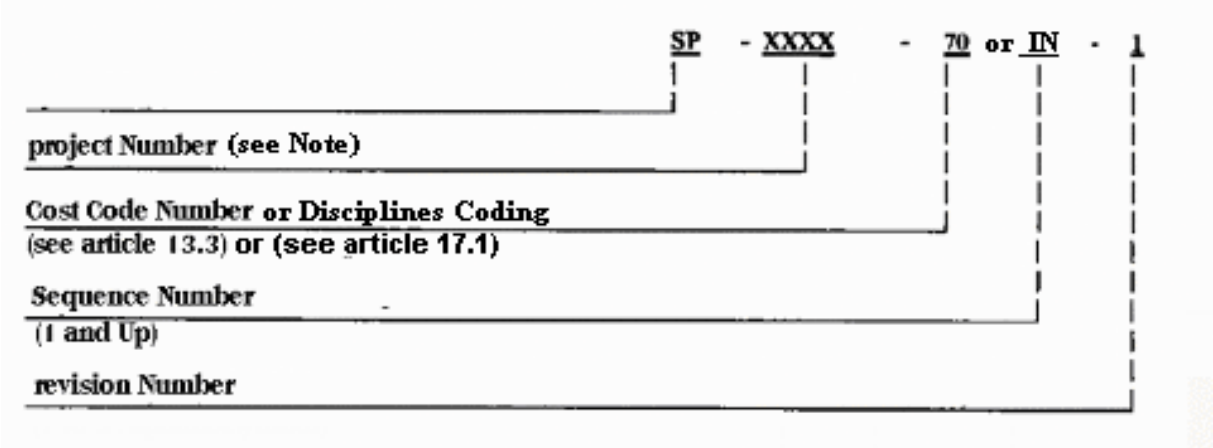
SS = Steel Structure

2) Structure numbering shall be South to North and West to East.

13. NUMBERING OF PROJECT SPECIFICATIONS AND DATA SHEETS

13.1 Numbering of Project Specifications

All project specifications shall be assigned a number as per the following example:

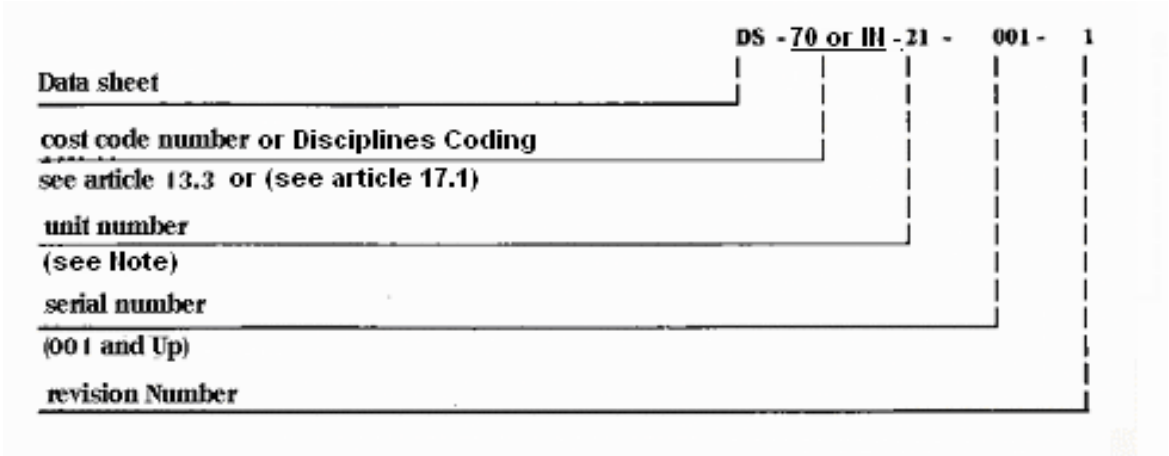


Note:

The number of digits can be varied upon project number requirement.

13.2 Numbering of Data Sheets

All data sheets shall be assigned a number as per the following example:



Note:

Unit number shall start from 1 (not from 01), see Appendix A.

13.3 Cost Code Numbers

Cost Code No.	Description
00	Excavation and Grading
10	Concrete
20	Structural
30	Buildings
40	Machinery and Equipment
41	Field Fabricated Vessels
42	Shop Fabricated Vessels
43	Compressors and Generators
44	Exchangers
45	Fired Heater and Boilers
46	Pumps
47	Material Processing Equipment
48	Material Handling Equipment
49	Miscellaneous Equipment
50	Piping
60	Electrical
70	Instrumentation
80	Insulation and Protective Coatings
90	Welding and Unclassified.

14. DRAWINGS NUMBERING SYSTEM

14.1 Drawing Sizes

Drawing sizes to be used are:

Size Designation	Drawing Dimensions (mm x mm)	Title Block Size (mm x mm)
A4	210 × 297	___
A3	297 × 420	75 × 120
AG	297 × 630	___
AF	297 × 840	___
A2	420 × 594	100 × 155
A1	594 × 841	130 × 175
A0	841 × 1189	180 × 190

Note:

The final (As Built) isometric drawings shall include the material take off table and should be in A3 size.

14.2 Drawing Scales

Drawings scales shall be any of the following:

1: 10

1 : 20

1: 25

1 : 33-1/3

1 : 50

1 : 100

1 : 250

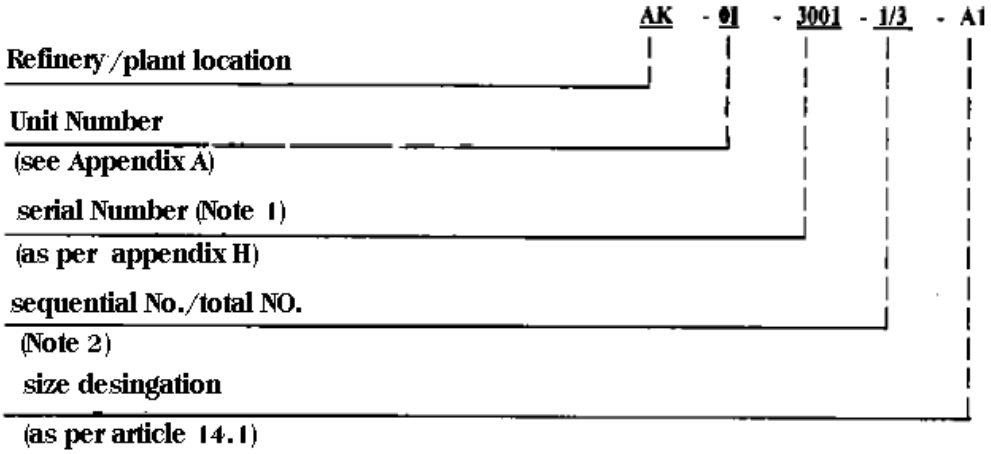
1 : 500

1 : 1000

1 : 2500 (Overall Plot Plan Only)

14.3 Numbering of Drawings

Drawings except drawings for buildings shall be numbered in the following manner. Drawings for buildings shall be numbered as defined in article 14.6.



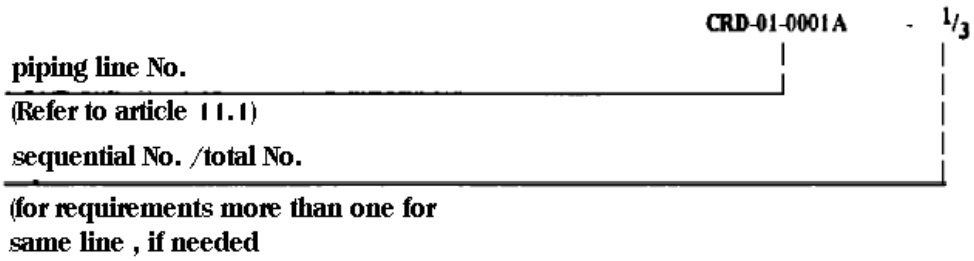
Notes:

1) Two drawings may have the same serial number but different unit number.

2) When drawings have same title and function, they shall have the same serial number and shall be identified by using Sequential No./Total No.

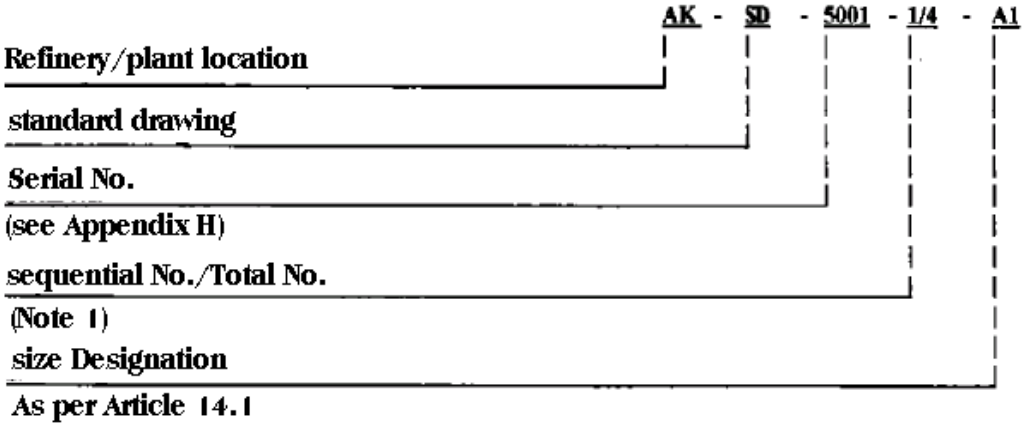
14.4 Numbering of Isometric Drawings

Numbering of Isometric Drawings shall be the same as the piping line number which is shown on the Isometric Drawing.



14.5 Numbering of Project Standard Drawings

Project standard drawings shall be numbered as follows:

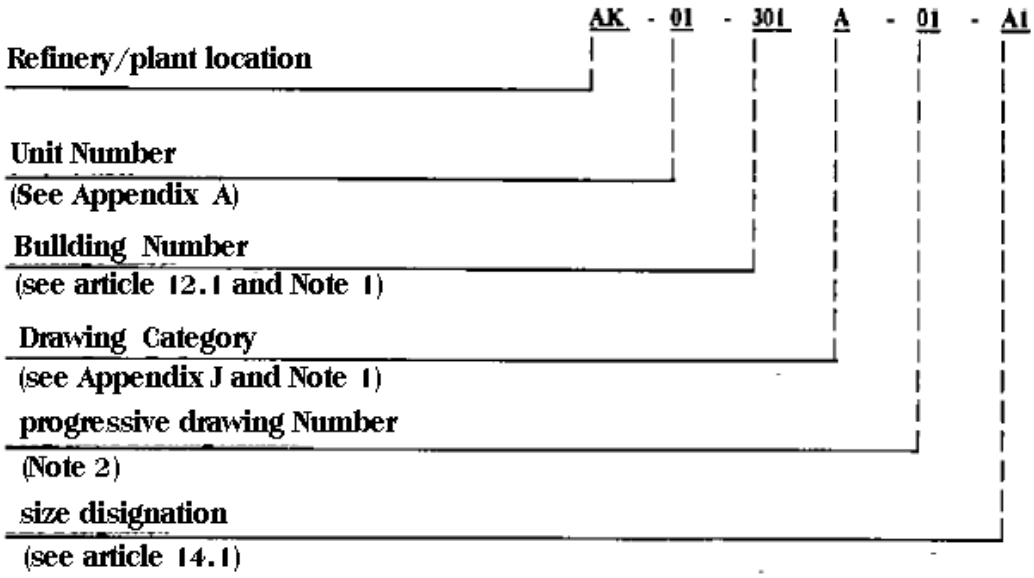


Note 1:

For requirements more than one for same functions, if needed.

14.6 Numbering of Drawings for Buildings

Drawings for buildings shall be numbered as follows:



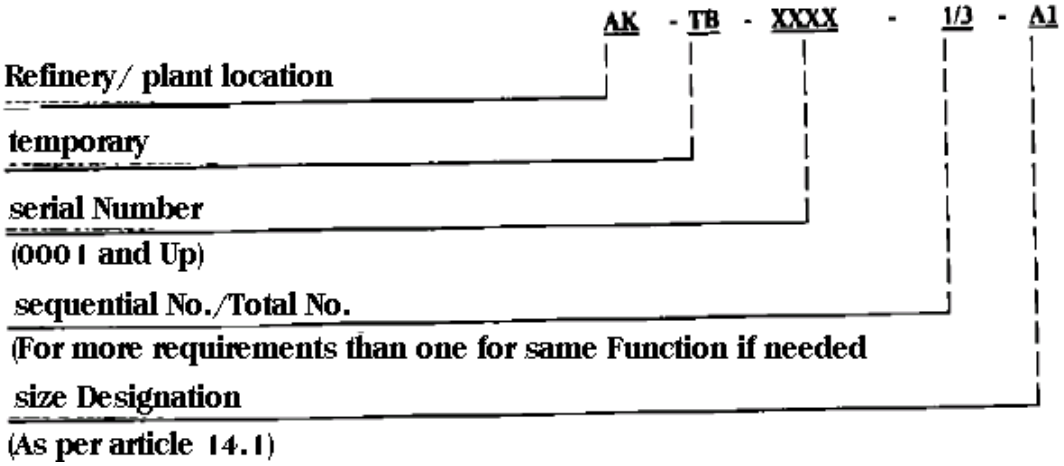
Notes:

1) Two drawings may have the same building serial number, and drawing category, but different unit number.

2) Progressive drawing number from 01 to 99 per each unit and/or building serial number and/or drawing category.

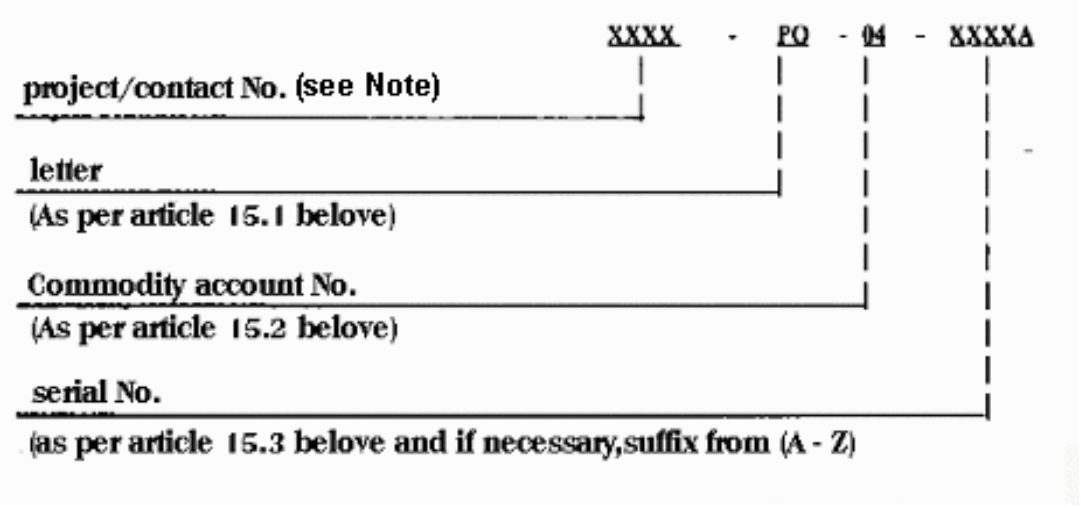
14.7 Numbering of Drawings for Temporary Buildings

Temporary buildings drawings shall be numbered as follows:



15. INQUIRY REQUISITIONS, PURCHASE ORDERS AND SUBCONTRACTS UMBERING SYSTEM

All inquiry requisitions, purchase orders and subcontracts shall be identified by means of the following system:



Note:

The number of digits can be varied upon project number requirement.

15.1 Identification Letters:

Inquiry Requisitions	IR
Purchasing Order	PO
Subcontracts	SC
Procedure	PR
List of Attachment	LA
List of Requested Document	RD

15.2 Commodity Account No.:

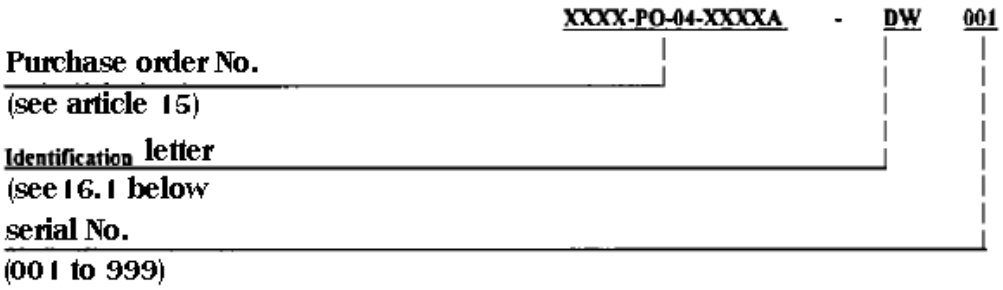
- Civil	01
- Instrumentation	02
- Electrical	03
- Machinery	04
- Heaters	05
- Heat Exchangers (including reboilers, coolers, double pipe heat exchangers, coils, plate heat exchangers, etc.)	06
- Vessels, Towers or Drums	07
- Tanks and Spheres	08
- Package Units	09
- Miscellaneous Mechanical	10
- Piping	11
- Management	12
- Site Construction	13
- Miscellaneous	14

15.3 Serial Number:

Field Issue	0001 - 0999
Home Office Issue	1001 - 8999
Reimbursable Items & Spare Parts	9001 - 9999

16. VENDOR DATA NUMBERING SYSTEM

Vendor data including drawings, spare parts lists, performance curves, operating and instrument books and miscellaneous items shall be numbered as follows:



16.1 Identification Letters

SYMBOL	DESCRIPTION
SP	- Specification
DW	- Drawings
PC	- Performance Curves
FS	- Fabrication Schedule
DS	- Data Sheets
PR	- Procedures

CE	- Certificates
WS	- Welding Specification
IR	- Inspection Record
LS	- Lists (Lubrificating oil, spare parts, etc.)
CA	- Calculations
SD	- Standard Drawings
MU	- Manuals
OT	- Others

17. ENGINEERING DISCIPLINES AND PROJECT SECTIONS CODING

17.1 Engineering Disciplines Coding

Generally, the following engineering disciplines are distinguished in carrying out a typical project, for which a twoletter code shall be used:

AC	Heating, Ventilation, Air conditioning & Refrigeration Engineering
CI	Civil Engineering (General) including Architectural
EL	Electrical Engineering
GM	General Machineries
GN	General
HM and/or	Heat and Mass Transfer Engineering (Thermal Equipment Engineering)
IN	Instrumentation Engineering
ME	Fixed Mechanical Equipment Engineering (Non Rotating Equipment Engineering)
PI	Piping Engineering (General Mechanical and Interconnection Engineering)
PR	Process and Chemicals Engineering
PV	Pressure Vessel Engineering (Generally, Vessels Engineering)
RE and/or	Rotating Equipment and/or (Process Machineries) Engineering
(PM)	
SF	Safety, Fire Fighting & Environmental Control Engineering
ST	Structural Engineering
TC	Telecommunication Engineering
TP	Technical Protection Engineering

17.2 Project Sections Coding

Besides to the above mentioned engineering disciplines and specialities, the following most general project sections are defined in two-letter codes and they shall be used in parallel with discipline codes, as required:

AC	Accounting
CC	Cost Control
CN	Construction
DC	Document Center
FN	Finance

GN	General
PC	Project Coordination
PE	Project Engineering
PN	Planning
PM	Project Management
PQ	Procurement
QA	Quality Assurance
QC	Quality Control

Any other required code not mentioned under clauses 17.1 and 17.2 above, may be added, but in the same rule, i.e., with a two-letter code, noting not to repeat the indicated cases.

APPENDICES

APPENDIX A

UNIT IDENTIFICATION NUMBER

1) Unit identification number shall be established for each project prior to the engineering work implementation.

2) Unit number should be started from 01or 1 as required in this Standard. Unit number "00" will be used to common subject related to all units.

3) The following table presents unit identification number for a typical refinery.

UNIT No.	ABBREVIATION	UNIT NAME AND DESCRIPTION
00	COMMON	Common (Subject related to all units)
01	CDU/VDU	Crude and Vacuum Distillation Unit (including Atmospheric and Vacuum Distillation, Desalter and Gasoline Stabilizer and Splitter Sections)
02	NHT/CCR	Heavy Naphtha Hydrotreater and Continuous Catalyst Regeneration Platformer Unit
03	VBU	Visbreaker Unit (Visbreaker including Tempered Water System)
05	LPG/CAU	LPG Recovery and Caustic Dissolving Unit
06	HCU	Hydrocracker Unit (HC-Unibon)
07	HPU	Hydrogen Production Unit
08	AMN/SWS	Amine Treating and Sour Water Stripper Unit
09	SRU/SSU	Sulphur Recovery and Sulphur Solidification Unit
10	ABU	Asphalt Blowing Unit
11	NIT	Nitrogen Unit
20	OFF-SITE	Offsite Unit (including Tankage, Blending and Product Transfer)
21	STM/PWG S	Steam and Power Generation Unit (including Steam and Power Generation and Distribution, Demineralized Boiler Feed Water System, Main Power Feeders, all Substation Equipment)
22	WTR	Water System Unit (Water System including Cooling Water, Plant Water, Potable Water and Fire Water System and Distribution)
23	FOU/FGU	Fuel Oil and Fuel Gas Unit (including Distribution)(to be continued)
24	PA/ISA	Plant and Instrument Air Unit (including Distribution)
25	FLARE	Flare Unit (including Distribution)

(to be continued)

APPENDIX A (continued)

26	WWT	Waste Water Treatment Unit (including Waste Water Treatment, Evaporation Pond, Sewage Treatment and Disposal)
30	LPG/LOAD	LPG Tankage and Loading Unit
40	ANCILLARY	Ancillary Facilities (including all Ancillary Refinery Building, Civil Works and all general items)
45	INTERCONN	Interconnections

APPENDIX B

EQUIPMENT CATEGORY SYMBOL

EQUIPMENT ITEMS	EQUIPMENT CODE
AERATION PAD	AP
AGITATOR	AG
AIR CONDITIONER	AC
AIR FOAM CHAMBERS	AFS
AIR LIFT	AF
AIRLOCK	AL
AMMONIA SEMI TANK TRAILER	TTR
AMMONIATOR	AM
AUTOCLAVE	AU
BAGHOUSE	BH
BIN	BN
BIN ACTIVATOR	BA
BLENDER	BR
BLOWER	BL
BOILER, STEAM	B
BREACKER GYRATORY	BG
BRICKETING MACHINE	BK
BUCKET ELEVATOR	BE
BUILDING	BD
CALENDER ROLL	CA
CAR DUMPIER	CD
CAR PULLER	CP
CENTRIFUGE	CE
CHLORINATOR	CH
CHUTE	CHU
CLASSIFIER	CL
COALESCER VESSEL TYPE	V
COMPRESSOR	C
CONTINUOUS MIXER, PLASTICS	CM
CONTROL PANEL	CPL
CONVEYOR, MECHANICAL OR PNEUMATIC	CV
COOLING TOWER	CT
COUPLING, HYDRAULIC OR FLUID	CO
CRANE	CN
CRUSHER	CR
CRYSTALLIZER	CS
CUTTER	CU
CYCLONE AND HYDROCLONE	CY
CYLINDER	CYL
COMMINUTOR	COM
DAMPER	DP
DEAERATOR	DA
DESALTER	DE
DESUPERHEATER	DS
DIVERTER VALVE	DV

(to be continued)

APPENDIX B (continued)

EQUIPMENT ITEMS	EQUIPMENT CODE
DRUM MACHINERY	DU

DRYER	DR
DRYING OVEN	DO
DUST COLLECTOR	DC
DISTRIBUTOR	DB
EDUCTOR	ED
EJECTOR	EJ
ELECTRICAL EQUIPMENT	EE
ELECTROLYTIC CELL	EC
ELECTROSTATIC PRECIPITATOR	EP
ELEVATOR, PASSENGER OR FREIGHT	EL
EMBOSSING UNIT	EM
ENGINE	EN
EVAPORATOR	EV
EXCHANGER, SHELL-AND TUBE, DOUBLE PIPE, PLATE, COILS, AIR COOLED, REBOILER, BOX COOLER, CASCADE COOLER, SURFACE CONDENSER, BAROMETRIC CONDENSER, WASTE-HEAT BOILER	E
EXTRUDER	EX
FAN	FA
FEEDER	FE
FESTOON, CALENDER PRODUCT	FS
FILTER	F
FIRE ALARM PANELS (OR FIRE ALARM & CONTROL PANEL)	FAP
FIRE WATER HYDRANTS	FWH
FIXED WATER MONITORS	FWM
FLAKIER	FK
FLARE STACK	FST
FLOTATION CELL	FC
FLUID SEAL	FSL
FOAM GENERATORS	FG
FORK LIFT	FL
FURNACE (SEE HEATER)	H
GAS GEN.	GG
GAS HOLDER	GH
GATE, FLOP	FG
GATE, SLIDE	SG
GEAR, REDUCER OR INCREASER	GE
GEAR BOX	GB
GENERATOR, ELECTRIC	G
GRANULATOR, NODULIZER (DRUM OR PAN)	GN
GRINDER	GR
GRIZZLY	GZ
HALON (1301) CONTROL PANELS	HLP
HALON (1301) CYLINDERS	HLC
HALON (1301) NOZZLES	HLN
HALON (BCF) CONTROL PANELS	HBP
HALON (BCF) CYLINDERS	HBC
HALON (BCF) NOZZLES	HBN
HEATER, FIRED	H

(to be continued)

APPENDIX B (continued)

EQUIPMENT ITEMS	**EQUIPMENT CODE**
HOIST	HI
HOPPER (SEE TANK)	TK
HOSE HOUSE	HH

HOSE REEL	HR
INCINERATOR	IN
INDOOR HOSE REELS	IHR
INTENSIFIER	IT
KILN	KI
KNEADER	KN
LET OFF, SPOOL UNWINDING	LE
LOADER, BULK	LO
LOADING ARM	LA
MAGNETIC SEPARATOR	MS
METAL DETECTOR	MD
MILL	MI
MECHANICAL EQUIPMENT, MISC.	ME
MIXER, SOLID, LIQUID OR IN-LINE	MX
MOTOR, ELECTRIC	M
MUFFLER (SEE SILENCER)	SI
NODULIZER (DRUM OR PAN) (SEE GRANULATOR)	GN
OIL SKIMMER	OS
OUTDOOR HOSE REELS	OHR
PACKAGING UNIT, BAG, BOTTLE OR CAN	PK
PALLETIZER	PA
PELLETIZER	PE
PRECIPITATOR, SOLID FORM LIQUID	PR
PULSATION DAMPENER	PD
PUL VERIZER	PU
PUMP	P
REACTOR	R
REACTOR JET	RJ
RECLAIMER	RC
REFRIGERATION UNIT, PROCESS	RE
RIGGING EQUIPMENT	RG
ROTARY KILN	RK
SAMPLER	SA
SCALE, WEIGHING OR MEASURING	SC
SCRAPER	SCR
SCRUBBER	SK
SCREEN	SR
SCREW CONVEYOR	SCV
SCUM BREAKER	SB
SCUM PIPE	SP
SEPARATOR, ATMOSPHERIC	SE
SEWING PEDESTAL, BAG	SH
SILO (SEE TANK)	TK
SILENCER, MUFFLER	SI

(to be continued)

APPENDIX B (continued)

EQUIPMENT ITEMS	**EQUIPMENT CODE**
SPECIALITY MOBILE EQUIPMENT, (FIRE TRUCK, SNOW REMOVAL)	SM
SPLICING PRESS, CALENDERING LINE	SP
STACK, CHIMNEY	S
STACKER	ST

STEAM TRAP	STP
STRAINER	STR
SUMP	SU
TANK; API, SILO, HOPPER	TK
THICKENER	TH
TRIPPER	TR
TURBINE	T
TURO EXPANDER	TEX
TURNTABLE	TT
UNLOADER, BULK	UL
VALVE, SLIDE (SEE GATE, SLIDE)	SG
VALVE, ROTARY	RV
VALVE, MOTORIZED	MOV
VESSEL, PRESSURE (COLUMN, ACCUMULATOR, K.O. DRUM SPHERE, BULLET)	V
VIBRATOR	VB
WASHER	WA
WATER SOFTENER UNIT	WS
WINCH	WI
WIND-UP, SPOOL MECHANISM	WU

APPENDIX C

INSTRUMENTATION IDENTIFICATION LETTERS ACCORDING TO ISA S.5.1

	FIRST-LETTER (4)		SUCCEEDING-LETTERS (3)		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READ-OUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	Analysis (5,19)		Alarm		
B	Bumer, Combustion		User's Choice (1)	User's Choice (1)	User's Choice (1)
C	Conductivity (Elec.)			Control (13)	
D	Density/ Rel. Density (Sp.Gr)	Differential (4)			
E	Voltage		Sensor (Primary Element)		
F	Flow Rate	Ratio (Fraction) (4)			
G	Gaging (Dimensional)		Glass, Viewing Device (9)		
H	Hand				High (7,15,16)
I	Current (Electrical)		Indicate (10)		
J	Power	Scan (7)			
K	Time, Time Schedule	Time Rate of Change (4,21)		Control Station (22)	
L	Level		Light (11)		Low (7,15,16)
M	Moisture/Humidity	Momentary (4)			Middle, Intermediate (7,15)
N	User's Choice (1)		User's Choice (1)	User's Choice (1)	User's Choice (1)
O	User's Choice (1)		Orifice, Restriction		
P	Pressure, Vacuum		Point (Test) Connection		
Q	Quantity	Integrate, Totalize (4)			
R	Radiation		Record (17)		
S	Speed, Frequency	Safety (8)		Switch (13)	
T	Temperature			Transmit (18)	
U	Multivariable (6)		Multifunction (12)	Multifunction (12)	Multifunction (12)
V	Vibration, Mechanical Analysis (19) – Viscosity			Valve, Damper, Louver (13)	
W	Weight, Force		Well		
X	Unclassified (2)	X Axis	Unclassified (2)	Unclassified (2)	Unclassified (2)
Y	Event, State or Presence (20)	Y Axis		Relay, Compute, Convert (13,14,18)	
Z	Position, Dimension	Z Axis		Driver, Actuator, Unclassified Final Control Element	

Note:

Numbers in parentheses refer to specific explanatory notes on the following pages.

(to be continued)

APPENDIX C (continued)

1) A "user's choice" letter is intended to cover unlisted meanings that will be used repetitively in a particular project. If used, the letter may have one meaning as a first-letter and another meaning as a succeeding-letter. The meanings need to be defined only once in a legend, or other place, for that project. For example, the letter N may be defined as "modulus of elasticity" as a first-letter and "oscilloscope" as a succeeding-letter.

2) The unclassified letter X is intended to cover unlisted meanings that will be used only once or used to a limited extent. If used, the letter may have any number of meanings as a first-letter and any number of meanings as a succeeding-letter. Except for its use with distinctive symbols, it is expected that the meanings will be defined outside a tagging bubble on a flow diagram. For example, XR-2 may be a stress recorder and XX-4 may be a stress oscilloscope.

3) The grammatical form of the succeeding-letter meanings may be modified as required. For example, "indicate" may be applied as "indicator" or "indicating," "transmit" as "transmitter" or "transmitting," etc.

4) Any first-letter, if used in combination with modifying letters D (differential), F (ratio), M (momentary), K (time rate of change), Q (integrate or totalize), or any combination of these is intended to represent a new and separate measured variable, and the combination is treated as a first-letter entity. Thus, instruments TDI and TI indicate two different variables namely, differential-temperature and temperature. Modifying letters are used when applicable.
5) First-letter A (analysis) covers all analyses not described by a "user's choice" letter. It is expected that the type of analysis will be defined outside a tagging bubble.
6) Use of first-letter U for "multivariable" in lieu of a combination of first letters is optional. It is recommended that nonspecific variable designators such as U be used sparingly.
7) The use of modifying terms "high," "low," "middle" or "intermediate," and "scan" is optional.
8) The term "safety" applies to emergency protective primary elements and emergency protective final control elements only. Thus, a self-actuated valve that prevents operation of a fluid system at a higher-than-desired pressure by bleeding fluid from the system is a back-pressure-type PCV, even if the valve is not intended to be used normally. However, this valve is designated as a PSV if it is intended to protect against emergency conditions, i.e., conditions that are hazardous to personnel and/or equipment and that are not expected to arise normally.
The designation PSV applies to all valves intended to protect against emergency pressure conditions regardless of whether the valve construction and mode of operation place them in the category of the safety valve, relief valve, or safety relief valve. A rupture disc is designated PSE.
9) The passive function G applies to instruments or devices that provide an uncalibrated view, such as sight glasses and television monitors.
10) "Indicate" normally applies to the read-out-analog or digital-of an actual measurement. In the case of a manual loader, it may be used for the dial or setting indication. i.e., for the value of the initiating variable.
11) A pilot light that is part of an instrument loop should be designated by a first-letter followed by the succeeding-letter L. For example, a pilot light that indicates an expired time period should be tagged KQL. If it is desired to tag a pilot light that is not part of an instrument loop, the light is designated in the same way. For example, a running light for an electric motor may be tagged EL, assuming voltage to be the appropriate measured variable, or YL, assuming the operating status is being monitored. The unclassified variable X should be used only for applications which are limited in extent. The designation XL should not be used for motor running lights, as these are commonly numerous. It is permissible to use the user's choice letters M, N or O for a motor running light when the meaning is previously defined. If M is used, it must be clear that the letter does not stand for the word "motor," but for a monitored state.
12) Use of a succeeding-letter U for "multifunction" instead of a combination of other functional letters is optional. This nonspecific function designator should be used sparingly.

(to be continued)

APPENDIX C (continued)

13) A device that connects, disconnects, or transfers one or more circuits may be either a switch, a relay, as ON-OFF controller, or a control valve, depending on the application.

If the device manipulates a fluid process stream and is not a hand-actuated ON-OFF block valve, it is designated as a control valve. It is incorrect to use the succeeding-letters CV for anything other than a self actuated control valve. For all applications other than fluid process streams, the device is designated as follows:

A switch, if it is actuated by hand.

A switch or an ON-OFF controller, if it is automatic and is the first such device in a loop. The term "switch" is generally used if the device is used for alarm, pilot light, selection, interlock, or safety.

The term "controller" is generally used if the device is used for normal operating control.

A relay, if it is automatic and is not the first such device in a loop, i.e., it is actuated by a switch or an ON-OFF controller.

14) It is expected that the functions associated with the use of succeeding-letter Y will be defined outside a bubble on a diagram when further definition is considered necessary. This definition need not be made when the function is self-evident, as for a solenoid valve in a fluid signal line.

15) The modifying terms "high," and "low," and "middle" or "intermediate" correspond to values of the measured variable, not to values of the signal, unless otherwise noted. For example, a high-level alarm derived from a reverse-acting level transmitter signal should be an LAH, even though the alarm is actuated when the signal falls to a low value. The terms may be used in combinations as appropriate. (See Section 6.9 A of ISA).

16) The terms "high" and "low," when applied to positions of valves and other open-close devices, are defined as follows:

"high" denotes that the valve is in or approaching the fully open position, and "low" denotes that it is in or approaching the fully closed position.

17) The word "record" applies to any form of permanent storage of information that permits retrieval by any means.

18) For use of the term "transmitter" versus "converter", see the definitions in Section 3 of ISA.

19) First-letter V, "vibration or mechanical analysis," is intended to perform the duties in machinery monitoring that the letter A performs in more general analysis. Except for vibration, it is expected that the variable of interest will be defined outside the tagging bubble.

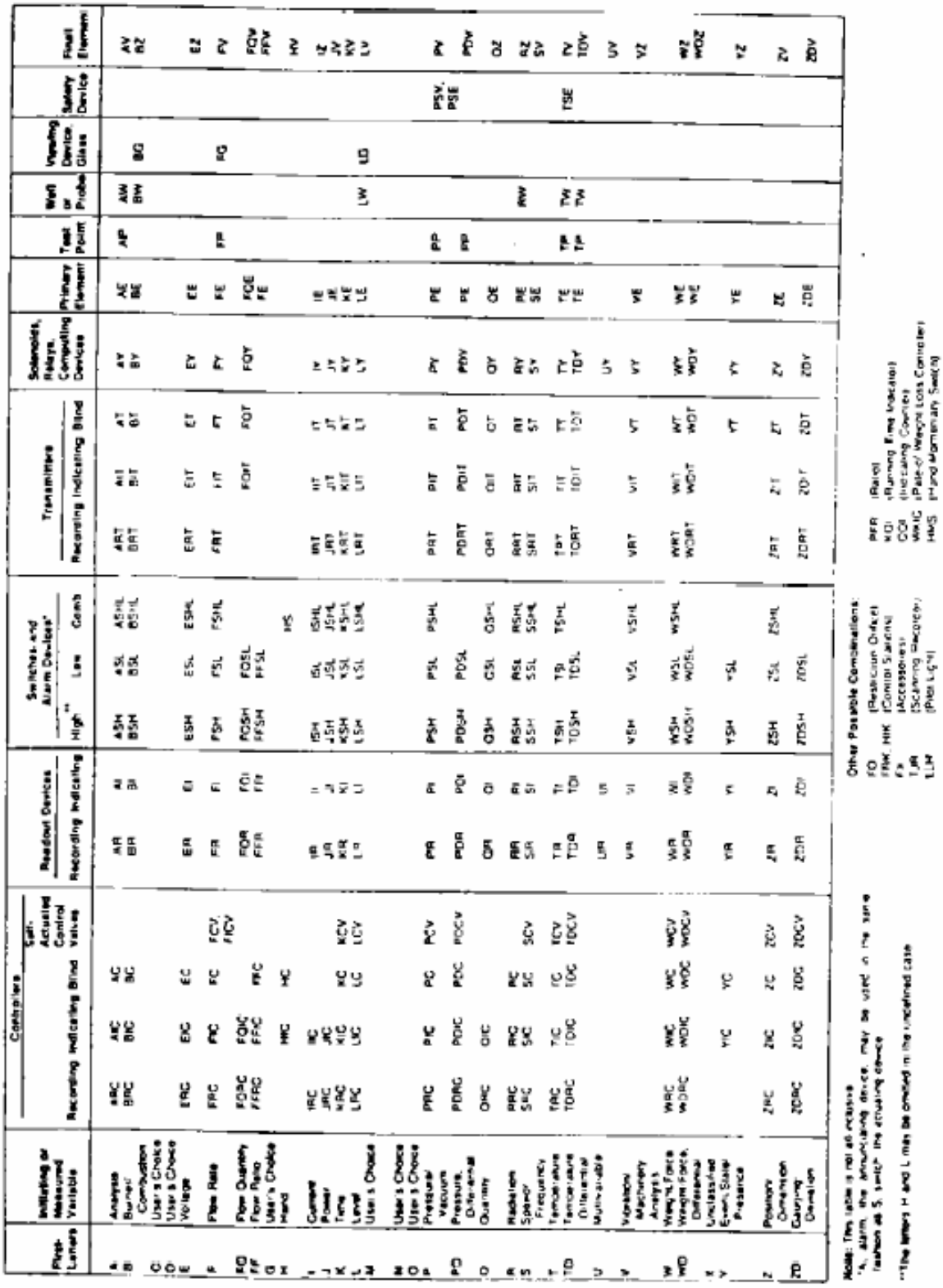
20) First-letter Y is intended for use when control or monitoring responses are event-driven as opposed to time or time schedule driven. The letter Y, in this position, can also signify presence or state.

21) Modifying-letter K, in combination with a first-letter such as L, T, or W, signifies a time rate of change of the measured or initiating variable. The variable WKIC, for instance, may represent a rate-of-weight-loss controller.

22) Succeeding-letter K is a user's option for designating a control station, while the succeeding-letter C is used for describing automatic or manual controllers. (See Section 3, "Definitions" of ISA).

APPENDIX D

INSTRUMENTATION TYPICAL LETTER COMBINATIONS ACCORDING TO ISA S.5.1



APPENDIX E

PAINTING, INSULATION AND HEAT TRACING DESIGNATION

INSULATION OR HEAT TRACING TYPE	SERVICE
ET (1)	Electrical Traced and Insulated
ETT (1)	Electrical Traced With Heat Transfer Cement and insulated
IC	Insulation Cold
IH	Insulation Hot
IS	Insulation for Personnel Protection
SJ (1)	Steam Jacketed and Insulated
ST (1)	Steam Traced and Insulated
STS (1)	Steam Traced With Spacers and Insulated
STT (1)	Steam Traced with Heat Transfer Cement and Insulated
TB	Trace Body and Insulate
TBB	Trace Body and Bonnet and Insulate
PT	Painting
NP	NO Painting, No Insulation
UW	Underground Wrapping

Note:

(1) Use (W) for Winterization and (H) for Heat Conservation as a suffix after the above symbols.

APPENDIX F
ELECTRICAL EQUIPMENT CATEGORY CODE

EQUIPMENT ITEMS	EQUIPMENT CODE
G	GENERATOR
TX	TRANSFORMER
SW	20 kV, 10 kV & 6 kV SWITCHGEAR
MC	400 V MOTOR CONTROL CENTER
DP	DISTRIBUTION PANEL BOARD
GR	GROUNDING RESISTOR
UP	UNINTERRUPTIBLE POWER SUPPLY SYSTEM
IS	INSTRUMENT POWER SUPPLY
DC	DIRECT CURRENT PANEL
EP	400 V EMERGENCY PANEL
MB	MARSHALING BOX
AN	ANNUNCIATOR PANEL
RU	RING MAIN UNITS
C	POWER FACTOR CORRECTION CAPACITOR BANK

APPENDIX G
SYSTEM DISTINCTION AND EQUIPMENT CATEGORY CODE FOR COMMUNICATION EQUIPMENT

A. Each communication system shall have the following character for system distinction:

TL : Telephone System

RA : Radiocommunication System

PC : Intra Plant Communication System

FT : Fire Telephone System

B. Equipment category code

1. Telephone System

EX : Automatic Telephone Exchanger

TH : Telephone Hand-set (Outdoor use)

TB : Telephone Terminal Board

2. Radiocommunication System

BS : Radio Base Station

RD : Radio Remote Desk Set

MC : Radio Multi Coupler

3. Intra Plant Communication System

Paging Base Station

AP : Amplifire Panel

EP : Exchanger Panel

DP : AC/DC Distribution Panel

TB : Paging Terminal Board

4. Fire Telephone System

FX : Telephone Exchange

FH : Telephone Hand-Set for Fire Alarm System

FP : Paging Equipment

FS : Fire Loudspeaker

APPENDIX H
DRAWING SERIAL NUMBER

TYPE OF DRAWING	SERIAL NUMBER (4 Digits)
- PROCESS FLOW DIAGRAM	0001 - 0099
- MECHANICAL FLOW DIAGRAMS (P & IDs)	0100 - 0199
- UTILITY FLOW DIAGRAM	0200 - 0399
- AUXILIARY DIAGRAM	0400 - 0499
- PLOT PLAN	0500 - 0599
- SITE PREPARATION AND ROUGH GRADING DIAGRAMS	0600 - 0700
- CONCRETE	1000 - 1999
- STRUCTURAL STEEL	2000 - 2999
- ARCHITECTURAL (SEE ALSO APPENDIX J)	3000 - 3999
- VESSEL	4000 - 4999
- PIPING	5000 - 5999
- ELECTRICAL	6000 - 6999
- INSTRUMENT	7000 - 7999
- INSULATION	8000 - 8999
- MISCELLANEOUS	9000 - 9999

Note:

Each serial number has to be utilized once only for the same unit number.

APPENDIX I
FLUID ABBREVIATION SYMBOLS

a) Air Systems

ISA	Instrument Air
PLA	Plant Air

b) Blowdown and Pump Out Systems

BDN	Blowdown
CBD	Continuous Blowdown
IBD	Intermittent Blowdown

c) Condensate Systems

COC	Cold Condensate
HPC	High Pressure Condensate
LPC	Low Pressure Condensate
MPC	Medium Pressure Condensate

d) Drain (Sewer) Systems

CDH	Closed Drain Header
CSW	Chemical Sewer
NSW	Non Oily Sewer
OSW	Oily Sewer
SSW	Sanitary Sewer

e) Flare Systems

FL	Flare (Normal)
HFL	High Pressure Flare
LFL	Low Pressure Flare

f) Fuels

FLG	Fuel Gas
FLO	Fuel Oil
NG	Natural Gas
RFO	Refinery Fuel Oil

g) Special Gas Systems

ACG	Acid Gas
AIR	Air (Drying Service)

(to be continued)

APPENDIX I (continued)

CHL	Chlorine
HEL	Helium
HYD	Hydrogen
NIT	Nitrogen
NOX	Nitrous Oxide
OXY	Oxygen
UTA	Utility Air

h) Special Chemical and Solvent Systems

AMN	Amine
AMO	Ammonia
CAU	Caustic Soda
CHM	Chemicals
DEA	di-Ethanol Amine
DGA	di-Glycole Amine
FS	Flushing Solvent
MEA	mono-Ethanol Amine
MEK	Methyl Ethyl Ketone
TOL	Toluene

i) Oil Utility Systems

INO	Injection Oil
LBO	Lubricating Oil
SLO	Seal Oil
FGO	Flushing Oil

j) Steam systems

DKS	Decoking Steam
DLS	Dilution Steam
HOR	Hot Oil Return
HOS	Hot Oil Supply
HPS	High Pressure Steam
LLS	Low Low Pressure Steam
LPS	Low Pressure Steam
MPS	Medium Pressure Steam

l) Water Systems

AFW	Air Foam Water Solution
BFW	Boiler Feed Water
CLW	Chlorinated Water
CWR	Cooling Water Return
CWS	Cooling Water Supply
DIW	Distilled Water
HWS	Hot Water Supply
HWR	Hot Water Return
TWR	Tempered Water Return

TWS	Tempered Water Supply

(to be continued)

APPENDIX I (continued)

DMW	Demineralized Water
DWA	Drinking Water
FWA	Fire Water
HBW	High Pressure Boiler Feed Water
HCW	Hot and Chilled Water
MBW	Medium Pressure Boiler Feed Water
OWA	Oily Water
PHW	Phenol Water
PRW	Process Water
PWA	Plant Water
PTW	Potable Water
QHW	Quench Water
RWA	Raw Water
SWA	Sour Water
TWA	Treated Water
WAT	Water

k) Process Services

ACE	Acetylene
ALC	Alchohol
ASP	Asphalt
BZN	Benzene
BUT	Butane
CAT	Catalyst
CRD	Crude
CSL	Cold slop
CRG	Cracked Gas
ETA	Ethane
ETN	Ethylene
FOP	Fuel Oil Product
GAS	Gas
GHS	Natural Gas with Hydrogen and Steam
GSL	Gasoline
GSO	Gas oil
HRG	Hydrogen Rich Gas
HSL	Hot Slop
HCB	Hydrocarbon
HCH	Hydrocarbon with Hydrogen
HSR	Heavy Straight Run Naphtha
HNA	Heavy Naphtha
JP4	Jet Fuel (JP-4)
JTA	Jet A-1
KER	Kerosene

NGH	Natural Gas with Hydrogen
RGH	Reformed Gas with Hydrogen

(to be continued)

APPENDIX I (continued)

LNA	Light Naphtha
LPG	Liquefied Petroleum Gas
MEL	Methanol
MET	Methane
NAP	Naphtha
PLF	Platformate
PNT	Pentane
PRP	Propane
PPN	Propylene
PRA	Process Air
PRO	Process Fluid
PYG	Pyrolysis Gasoline
QHO	Quench Oil
RAF	Raffinate
REF	Reformate
REG	Recycle Gas
RES	Residue
SLG	Sludge
SLP	Slop
SUL	Sulfur

APPENDIX J

BUILDINGS DRAWING CATEGORIES

DRAWING CATEGORIES	DESIGNATION SYMBOL
Architectural	A
Structural (Note 1)	S
Electrical (Note 2)	E
Mechanical (HVAC) (Note 3)	M
Plumbing (Note 4)	P
Equipment Layout (Note 5)	L
Building Drawing List	X
BAR Bending Schedule	B

Notes:

1) Either concrete or steel.

2) Refers only to lighting, grounding, convenience outlet telephone. Other electrical drawings will follow the procedure stated in article 14.3.

3) Refers to all HVAC drawings such as equipment layout, related piping network, ducting etc., including also HVAC building.

4) Piping drawings other than water supply and discharge system will follow the procedure stated in article 14.3 (i.e.,: process and utility distribution, fire water,Halon system etc.)

5) Refers to certain building only such as:

- **Laboratory building**
- **Clinic**
- **Workshop**
- **Transport and garage**

Equipment layouts for Substations, Power House, Control House, Compressors and pumps shelters, TEL building and similar will follow the procedure stated in article 14.3.

APPENDIX L

DEFINITION OF NOMINAL SIZE

1) Definition

Nominal size (DN): A numerical designation of size which is common to all components in a piping system other than components designed by outside diameters or by thread size. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions.

Notes:

1) It is designated by DN followed by a number.

2) It should be noted that not all piping components are designated by nominal size, for example steel tubes are designated and ordered by outside diameter and thickness.

3) The nominal size DN cannot be subject to measurement and shall not be used for purposes of calculation.