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		Rev: 01
		April 2011
KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia	NUMBERING SYSTEM (PROJECT STANDARDS AND SPECIFICATIONS)	

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SCOPE

This Project Standards and Specifications 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.

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.

1. **ISA (INSTRUMENT SOCIETY OF AMERICA)**

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

2. **ISO (International Organization for Standardization)**

6708-1980 (E) "Pipe Component Definition of Nominal Size", 1st. Ed., 1980

DEFINITIONS AND TERMINOLOGY

Contractor - 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 - The equipment, machinery and materials to be procured by the "Contractor" and/or "company" 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 - One or all process, offsite and/or utility Units and facilities as applicable to form a complete operable refinery/ and or plant.

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SYMBOLS AND ABBREVIATIONS

<u>SYMBOL/ABBREVIATION</u>	<u>DESCRIPTION</u>
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

UNITS

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

ASSIGNMENT AND APPLICATION OF EQUIPMENT AND MATERIAL NUMBER

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

Application of Equipment and Material Number

1. Documents and Drawings
 - a. 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.

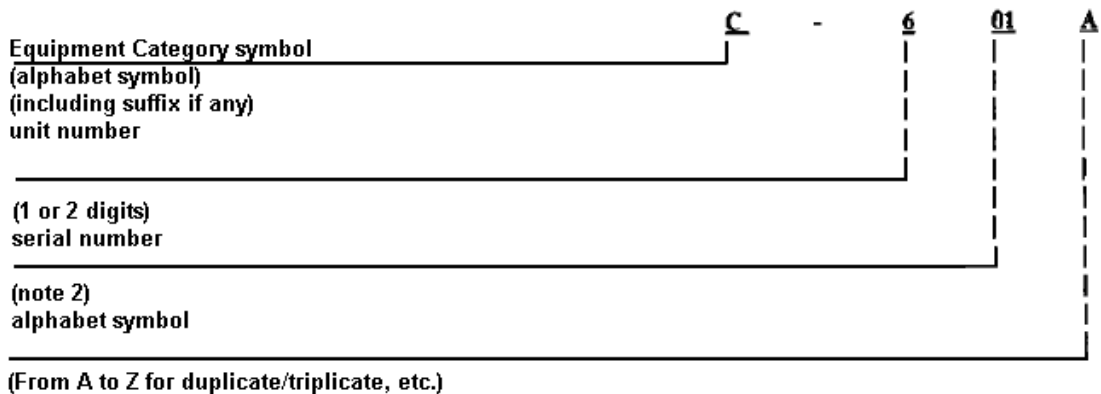
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- b. Vendor's documents including drawings, data sheets, etc., shall bear equipment and material number.
- c. Shipping documents shall fully utilize equipment, and material number.
- d. Equipment and material number shall be assigned for spare parts.
- e. 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.

EQUIPMENT NUMBERING SYSTEM

Main Equipment & Package Unit

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



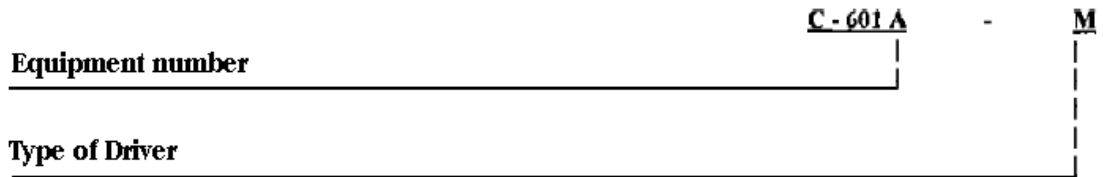
Notes:

- 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 to 50 and from 50 to 99 to crude distillation and vacuum distillation sections respectively).

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Drivers for Main Equipment

Drivers for main equipment shall be numbered as follows:

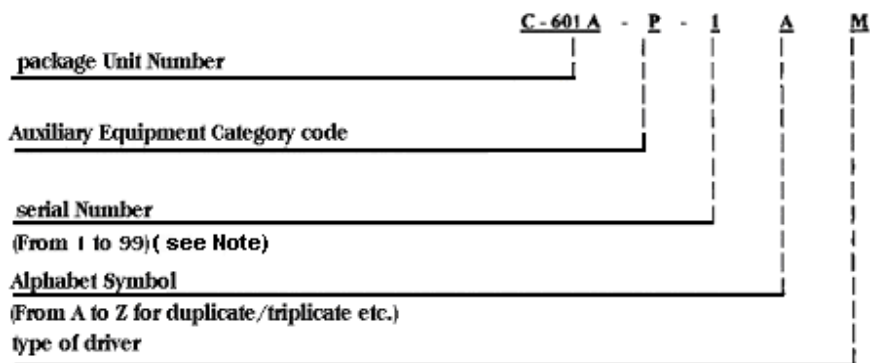


Note:

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.

Auxiliary Equipment of Package Units



Note:

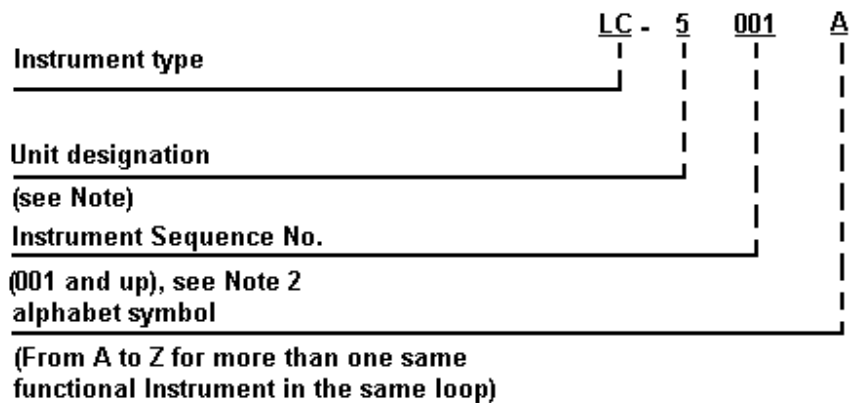
Serial number for auxiliary equipment in package unit shall start from 1 (not from 01).

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INSTRUMENT AND CONTROL EQUIPMENT NUMBERING SYSTEM

Instrument and Control Equipment

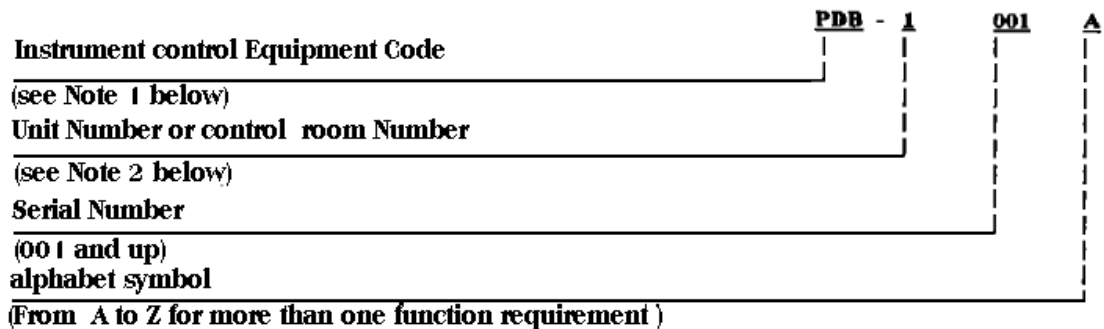
Instrument and control equipment including Pressure Safety Valve (PSV) shall be numbered in the following manner:



Note:

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

Instrument Accessories and Locations



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Notes:

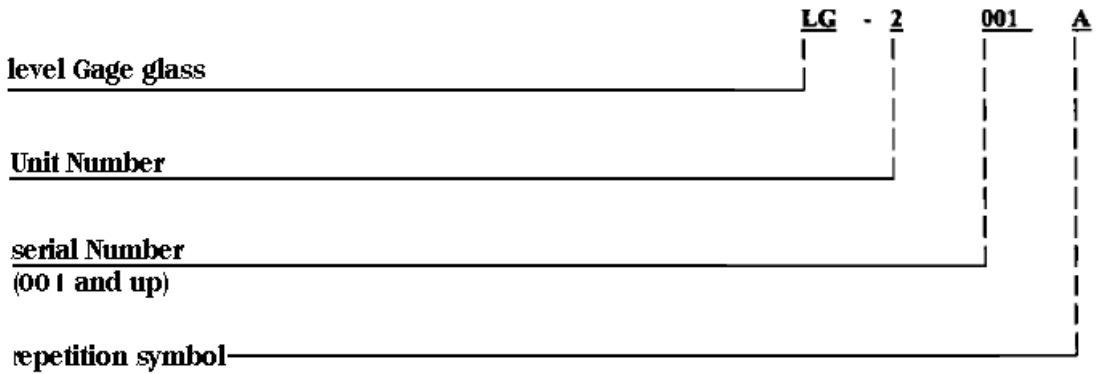
- 1) Equipment code should comply as follows:
 - a) Equipment located in Control Room
 - PNL : Panels for DCS, FCS Computer and etc.
 - PDB : Distribution Panel Board
 - MRB : Marshaling box
 - ESD : Emergency shut down panel
 - b) Equipment located at field
 - JBE : Junction Box (Electronic)
 - JBT : 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.
- 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.

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Gage Glasses Designation

1. Gage glasses numbering system

Gage glasses shall be numbered as mentioned above and the following example:



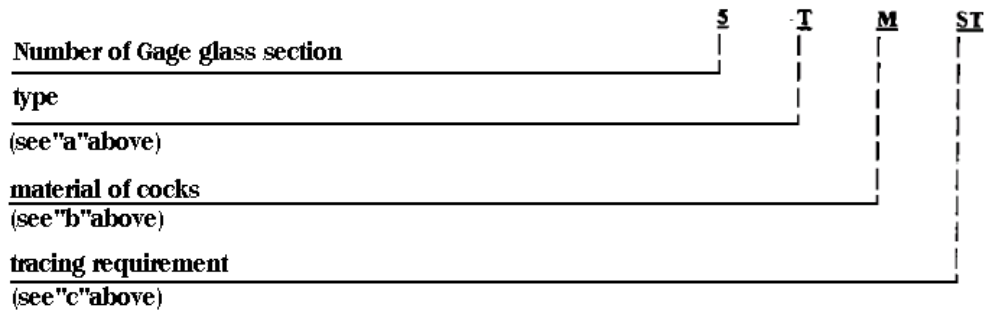
2. Special feature of gage glasses

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 Trace

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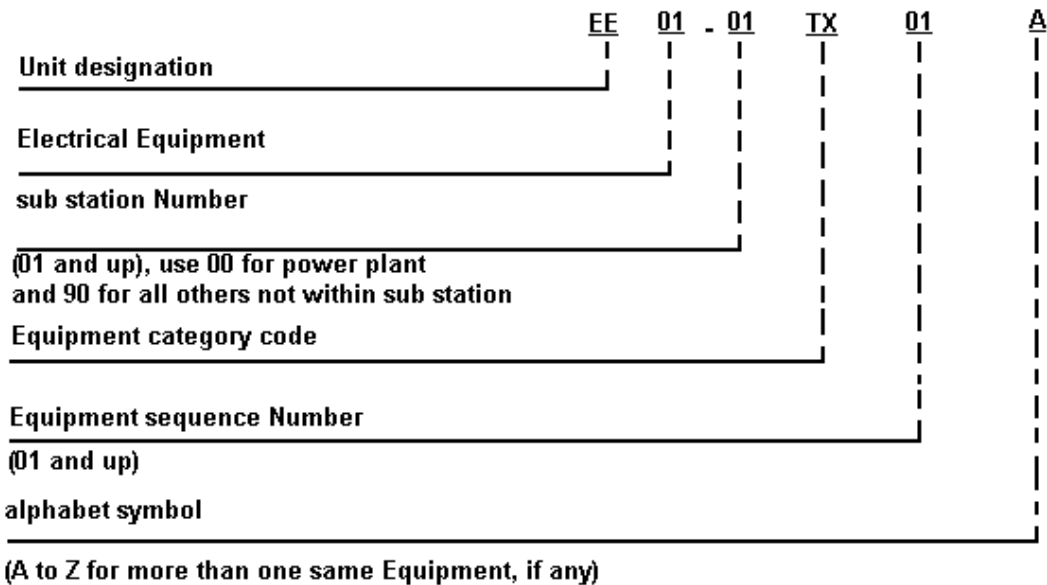
Example:



ELECTRICAL EQUIPMENT NUMBERING SYSTEM

Numbering for Main Electrical Equipment

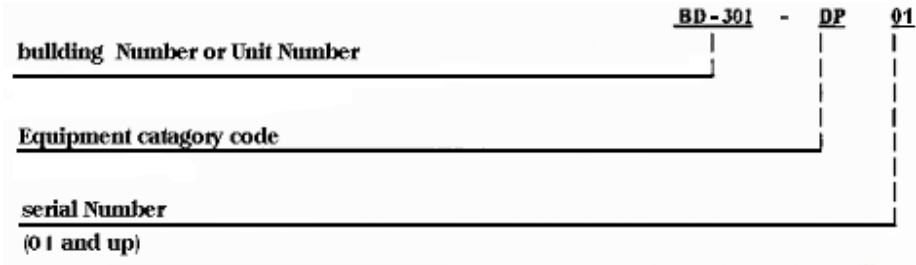
Main Electrical Equipment which compose primary power distribution system, power supply to process equipment, instrument power supply and supervisory system, shall be numbered in the following manner:



Numbering for Other Electrical Equipment

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

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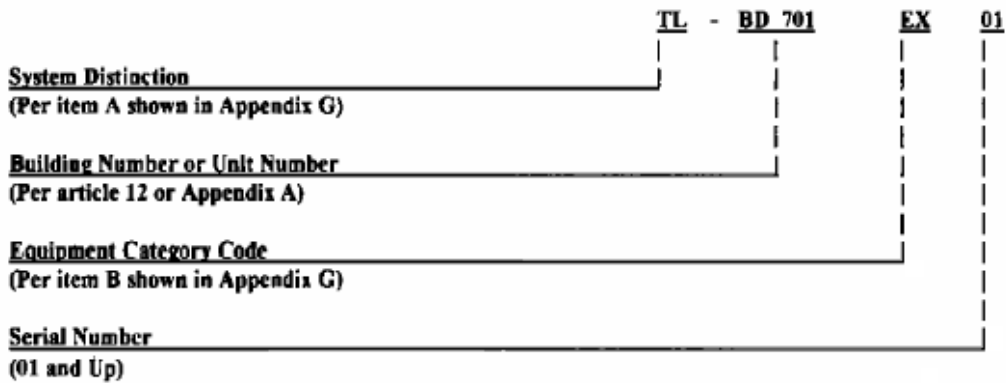


Example:

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

COMMUNICATION EQUIPMENT NUMBERING SYSTEM

Communication equipment shall be numbered in the following manner:

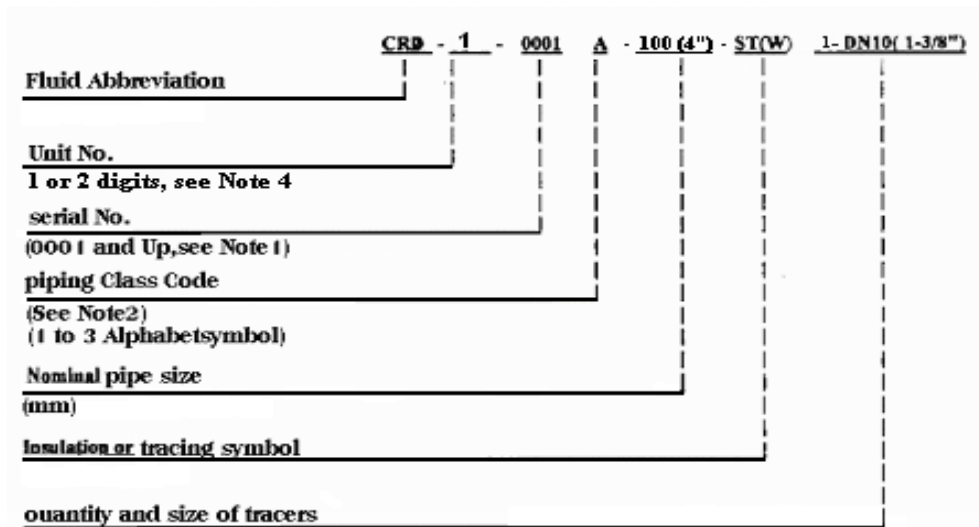


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PIPING LINE NUMBERING SYSTEM

Piping lines shall be numbered in the following manner:

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:

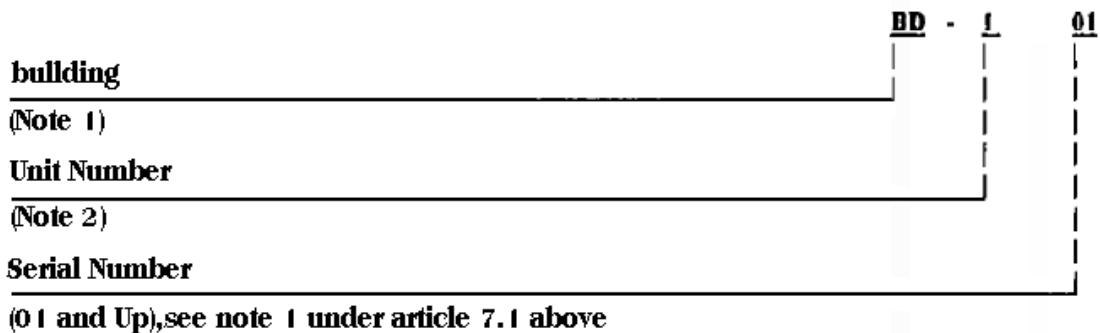
- a) Pipe line numbers shall be prefixed, from source to unit battery limit with the unit number of the unit of origin.
- b) The individual line number shall be held up to the point where the line ends at the inlet of equipment such as a vessel, exchanger, pump, etc., an other number is required for the line downstream of the equipment.

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- 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 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.
2. Steam Tracing Spools
- For steam tracing numbering and material take off, the contractor can use his own system.

BUILDING AND STRUCTURE NUMBERING SYSTEM

Numbering for Buildings and Analyzer Houses



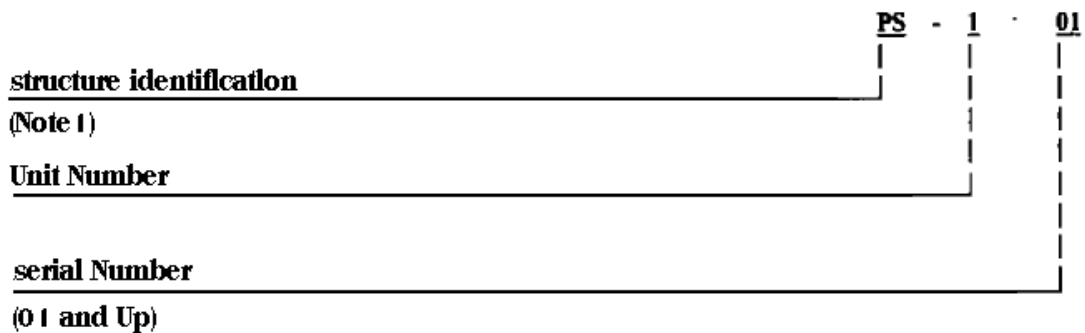
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Notes:

- 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.

Numbering for Structure

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



Notes:

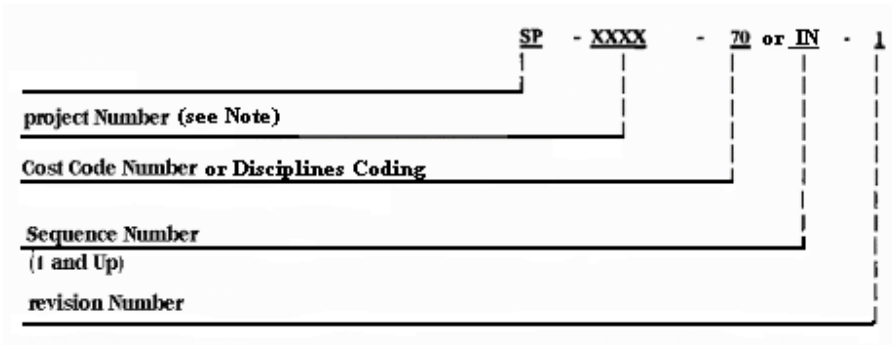
- 1) Structure Identification
 - AT = Antenna Tower
 - BD = Building, Shelter
 - CB = Catch Basin
 - CPS = Concrete Pipe Sleeper
 - MH = Sewer Manhole
 - MP = Miscellaneous Platform
 - PB = Pull Box
 - PBC = Pipe Box Culvert
 - PS = Pipe Support
 - SL = Stiles
 - SS = Steel Structure
- 2) Structure numbering shall be South to North and West to East.

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NUMBERING OF PROJECT SPECIFICATIONS AND DATA SHEETS

Numbering of Project Specifications

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

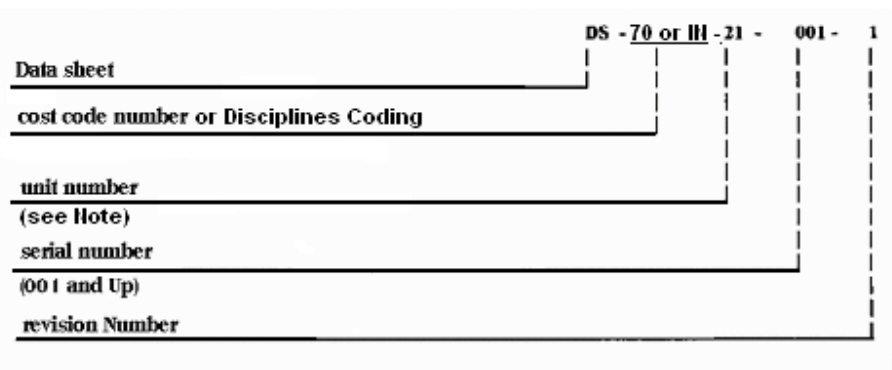


Note:

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

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.

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Cost Code Numbers

<u>Cost Code No.</u>	<u>Description</u>
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.

DRAWINGS NUMBERING SYSTEM

Drawing Sizes

Drawing sizes to be used are:

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

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Note:

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

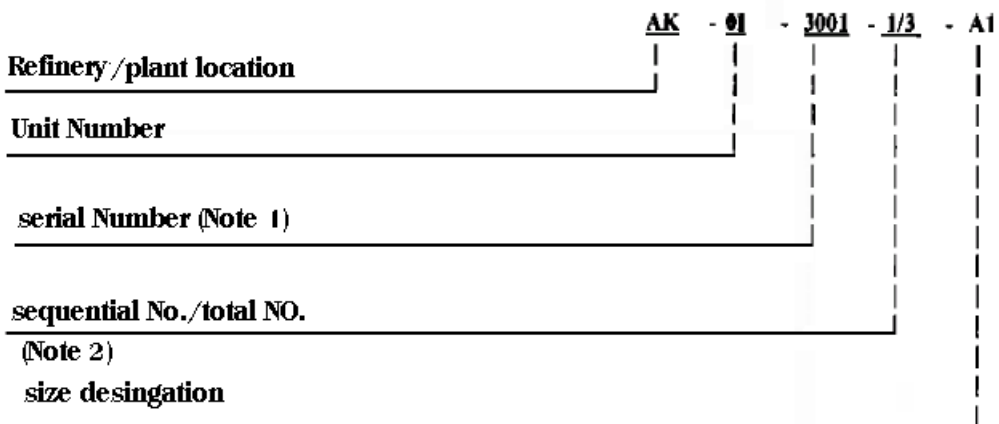
Drawing Scales

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)

Numbering of Drawings

Drawings except drawings for buildings shall be numbered in the following manner.



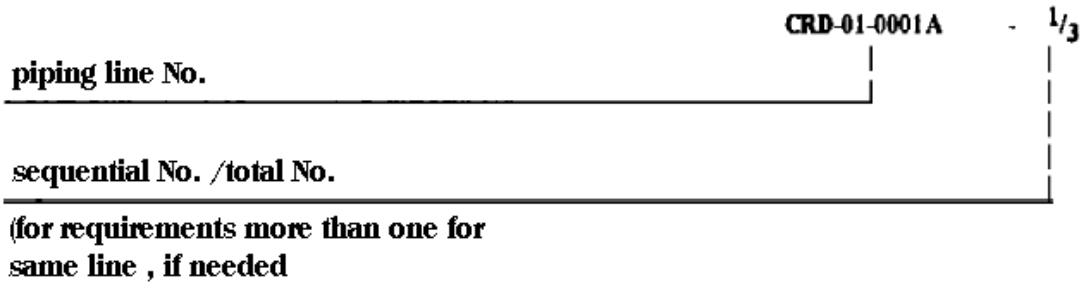
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Notes:

- 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.

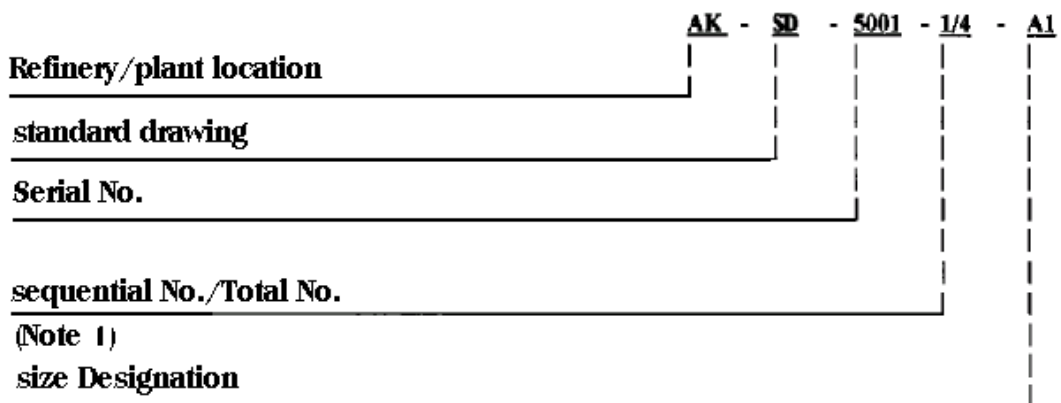
Numbering of Isometric Drawings

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



Numbering of Project Standard Drawings

Project standard drawings shall be numbered as follows:



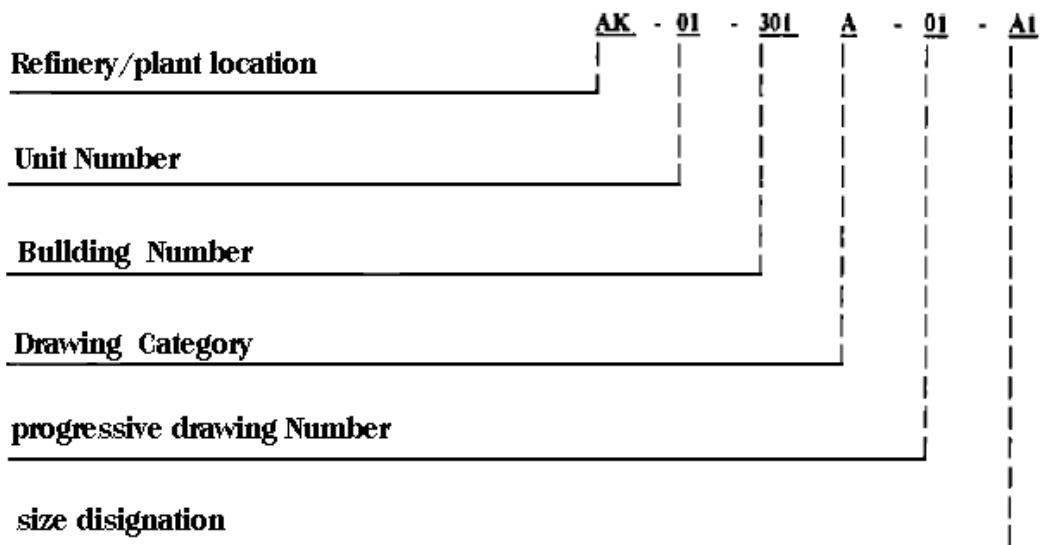
Note 1:

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

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Numbering of Drawings for Buildings

Drawings for buildings shall be numbered as follows:



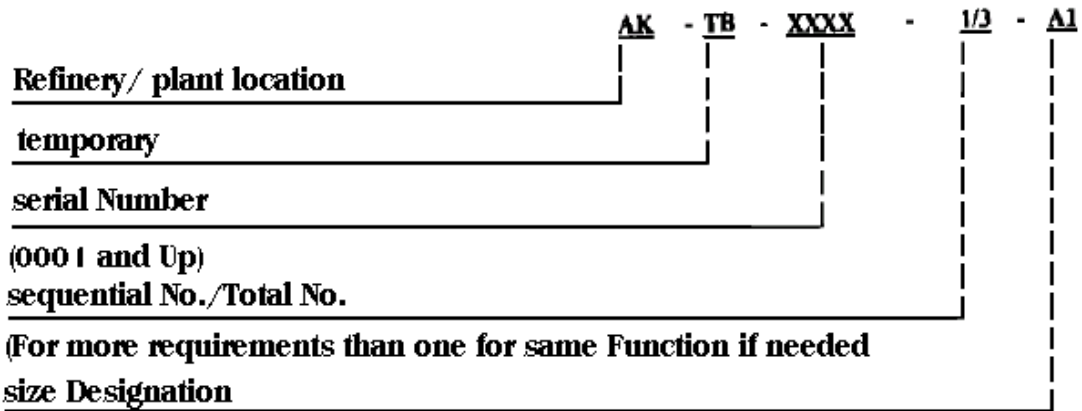
Notes:

- 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.

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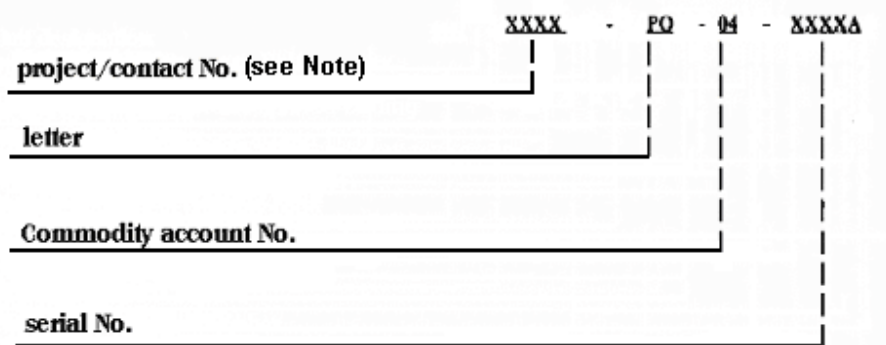
Numbering of Drawings for Temporary Buildings

Temporary buildings drawings shall be numbered as follows:



INQUIRY REQUISITIONS, PURCHASE ORDERS AND SUBCONTRACTS NUMBERING 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.

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Identification Letters:

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

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

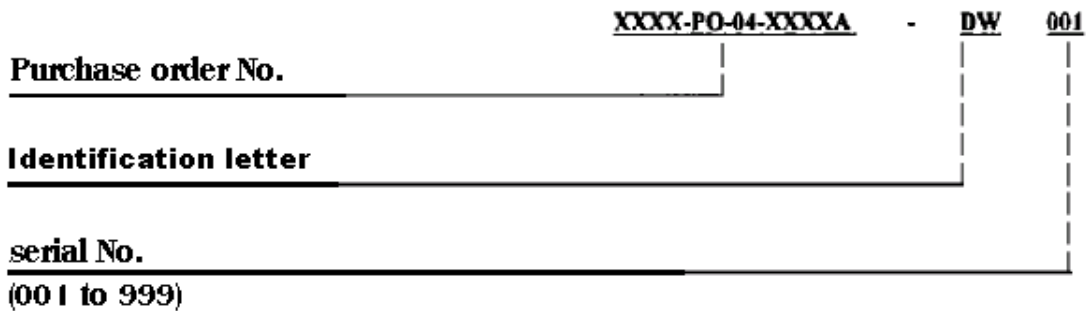
Serial Number:

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

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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:



Identification Letters

<u>SYMBOL</u>	<u>DESCRIPTION</u>
SP	- Specification
DW	- Drawings
PC	- Performance Curves
FS	- Fabrication Schedule
DS	- Data Sheets
PR	- Procedures
CE	- Certificates
WS	- Welding Specification
IR	- Inspection Record
LS etc.)	- Lists (Lubricating oil, spare parts,
CA	- Calculations
SD	- Standard Drawings
MU	- Manuals
OT	- Others

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ENGINEERING DISCIPLINES AND PROJECT SECTIONS CODING

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	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 (PM)	Rotating Equipment and/or (Process Machineries) Engineering
SF	Safety, Fire Fighting & Environmental Control Engineering
ST	Structural Engineering
TC	Telecommunication Engineering
TP	Technical Protection Engineering

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

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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 above, may be added, but in the same rule, i.e., with a two-letter code, noting not to repeat the indicated cases.