# Operational and Engineering Asset Identification Handbook based on KKS Standard

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**Abstract:** The main purpose of this handbook is to define the methods used by NTPC for operational identification, classification and the naming convention of assets in mechanical, civil, electrical and control & instrumentation engineering, based on the KKS standard.

# Contents

## Glossary

Definitions of the terms and acronyms used in this handbook are in the table below:

| Acronym / Term | Description |
|---|---|
| AIC | Asset Identification Code |
| BDL | Break Down Level |
| CMMS | Computerized Maintenance Management System |
| DIN | German: **D**eutsches **I**nstitut für **N**ormung<br>English: German Institute for Standardization |
| ERP | Enterprise Resource Planning system;<br>Microsoft Dynamics Great Plains (GP) at NTPC |
| FERC | Federal Energy Regulatory Commission |
| GP | Great Plains, see ERP |
| GPS | Global Positioning System |
| I&C | Instrumentation & Control |
| IEC | International Electrotechnical Commission |
| ISO | International Organization for Standardization |
| KKS | German: **K**raftwerk-**K**ennzeichen**s**ystem<br>English: Identification Systems for Power Plants |
| RTU | Remote Telemetry Unit |
| SCADA | Supervisory Control and Data Acquisition |
| VGB | VGB PowerTech Service GmbH in Essen, Germany is the issuer of the KKS standard |

# 1 Introduction

This handbook's main purpose is to define the methods used by the Northwest Territories Power Corporation (NTPC) for operational identification in mechanical, civil, electrical, control & instrumentation engineering, and asset management.

For this purpose, NTPC chose the identification system **KKS**; in German ***K****raftwerk* ***K****ennzeichen* ***S****ystem,* or the "Identification System for Power Plants" to create unique **A**sset **I**dentifier **C**odes (AICs) for its integrated utility business in the Northwest Territories.

The AIC system provides classification of assets according to task, type, and location. Asset identifiers linked to the facility and function rather than the specific piece of equipment fulfilling the function.

The KKS key is based on the **I**nternational **E**lectrotechnical **C**ommission (IEC) and International **O**rganization for **S**tandardization (ISO) standards together with the ***D****eutsche* ***I****ndustrie* ***N****orm* (DIN) 40719 part 2 (IEC 750).

In this handbook, KKS refers to the KKS Guidelines VGB-B 105 E, 7th edition 01/2010 (index E) with ISBN 978-3-86875-329-5.

## 1.1 Business case for NTPC's selection of KKS

Prior to the development and implementation of NTPC's Computerized Maintenance Management System (CMMS), NTPC did not have a unique asset identification system and naming convention for asset maintenance purposes. NTPC analyzed available options to classify its assets. A unique asset naming convention is needed for any and all CMMS systems for the following reasons:

- Unique AICs facilitate the search of particular assets in an electronic system, while reducing the risk of error;
- To facilitate searching for statistics on an asset, assets need to be uniquely identified in a CMMS to avoid the selection of data from other assets;
- The use of a coding standard ensures standardization of codes of assets and over time a greater ease of searching.

Based on an analysis, the KKS unit asset identification system for power systems and stations identified as a close fit to NTPC's asset identification needs.

The operational AICs and asset descriptions that result out of the use of this handbook are used to create operational assets in the Computerized Maintenance Management System: GuideTi.

## KKS Standard

This section provides an overview of the KKS standard. The next section describes how NTPC adopts the KKS standard and how adjusted design concepts are used to support linear assets for electrical transmission and distribution and other asset types not specifically defined in KKS.

**This section serves as a reference for the KKS standard.**
**NTPC specific instructions for asset coding are described in section 3.**

### 1.2 Purpose and Area of Application

The power plant identification system is applied to clearly identify plants, systems, parts and components with respect to their purpose, type and location. The content is in accordance with "KKS Identification Systems for Power Stations" issued by VGB Power Tech Service GmbH Essen, Germany.

### 1.3 Requirements

KKS was designed to meet the following requirements:

- Uniform identification for all types of power stations and any connected processes;
- Sufficient capacity and detail for identification of all systems, components and structures;
- Sufficient capacity for extension to accommodate new technologies;
- Consistent identification for planning, licensing, construction, operation, maintenance and waste management;
- Interdisciplinary applicability to mechanical engineering, civil engineering, electrical and instrument & control engineering combined with ability to identify according to process functions, points of installation and location;
- Consideration of national and international standards;
- Non-language-based coding to ensure international usability;
- Application in computer data processing.

## 1.4 Structure and Application

The KKS consists of three types of identification:

1) The **process-related code** identifies installations and equipment according to their assigned task in the power plant process;
2) The **point of installation code** identifies the points of installation within an installation unit (e.g. cubicles, consoles, panels);
3) The **location code** identifies the rooms and floors, or other installation sites for installations and equipment in building structures.

A uniform identification structure, with a maximum of three levels (0, 1, 2 and 3), created for all three identification types; the units referred to becoming smaller from left to right. Note that "system code" is also referred to as "function".

Definitions for prefixes and breakdown symbols for writing these codes are in DIN 40719, part 2. Figure 1 shows the role of the codes on different Breakdown Levels (BDL´s).

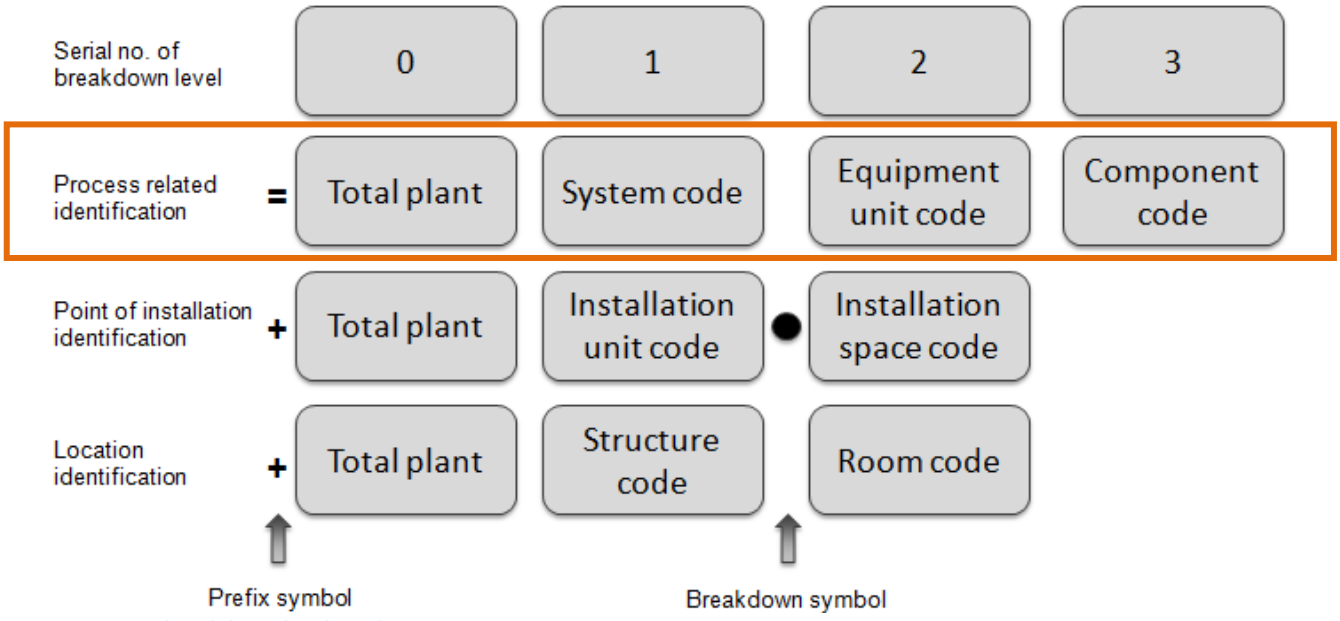


Figure 1 KKS breakdown levels and separators

**NTPC uses the process-related identification as the preferred identification type. The asset identification concept in this handbook focuses on that process-related identification type.**

### 1.4.1 Process-Related Identification

In this type of identification, the entire system is subdivided according to the function or process. The process-related identification is for many applications the most important identification. For example, identification of electrical and control equipment, signals, and the identification in circuit diagrams related to particular functions.

In the electrical and instrumentation & control (I&C) engineering sectors, the equipment for auxiliary services, power supply, open loop-control, instrumentation, protection, etc., is treated as a process engineering function. The same applies to structures in civil engineering work. The process-related identification corresponds to the identification block "Plant" in DIN 40719, part 2. This block has the prefix sign "=". According to the standard, the prefix sign can be omitted provided that the identification remains unambiguous.

| **Serial number of breakdown level** | **0** | **1** | **2** | **3** |
|---|---|---|---|---|
| Name of breakdown level | Total Plant | Function | Equipment Unit | Component |
| Example | Unit 1 | Feed water system | Pump unit | Pump |

Table 1 KKS breakdown levels

Table 1 KKS breakdown levels for the Process-Related Identification method
KKS applies the term “plant” differently than NTPC’s common usage. Within KKS, and this AIC handbook, “plant” refers to the first breakdown level within a facility. For example, a generator-set and auxiliary equipment, distribution feeder, or transmission tower group would all be considered “plants”. The commonly used term “power plant” is not reflective of this level of equipment grouping.

### 1.4.2 Point of Installation Identification

KKS also provides options for location-based identification. This method of identification is principally used to identify electrical and instrumentation & control equipment but can also be extended to mechanical equipment. Locations, for example, coordinates, racks and positions in cubicles, are identified in the breakdown level "equipment unit".

Identification letters used for the point of installation identification in the breakdown level "function" may be the same as those for the process-related identification. This improves recognition of the identification in the overall system. In order to prevent possible confusion between process-related identification and point of installation identification the prefix sign "+" must be added to the point of installation code (according to DIN 40719, part 2). The breakdown symbol "full stop" between breakdown Level 1 and 2 must also be used. This prefix sign may be omitted only when there is absolutely no ambiguity e.g. in layout documents.

**Since NTPC's focus is on the process-related identification, the point of installation identification type will not be further addressed in this handbook.**

### 1.4.3 Location Identification

In order to clearly identify the position of plants, sub-systems and equipment in the power station, the code of building structure and floor is entered at the breakdown level "function" and the rooms on the various floors of the building structure at the breakdown level "equipment unit". The breakdown level "component" is not used in location identification. Fire protection sections are identified according to the room identification.

**Since NTPC's focus is on the process-related identification, the location identification type will not be further addressed in this handbook.**

## 1.5 Structure and Contents of the Breakdown levels

### 1.5.1 General

The KKS is divided into different breakdown levels and codes from left to right in diminishing order of the units of a complete power plant:

| **Serial number of breakdown level** | **0** | | | **1** | | | | | **2** | | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of breakdown level | Total Plant | | | Function | | | | | Equipment Unit | | | | Component | | |
| Designation of data character | G | | | $F_0$ | $F_1$ | $F_2$ | $F_3$ | $F_n$ | $A_1$ | $A_2$ | $A_n$ | $A_3$ | $B_1$ | $B_2$ | $B_n$ |
| Type of data character | A/N | A/N | A/N | (N) | A | A | A | NN | A | A | NNN | (A) | A | A | NN |

Table 2 KKS Standard breakdown levels

A = Alphabetical symbols (letters, special symbols)
N = Numerical symbols (digits)
( ) = These data characters may be omitted if there is no ambiguity in created codes

The following terms are used in KKS:

- G: Overall plant prefix number;
- $F_0$: Function level prefix number;
- $F_1F_2F_3F_n$: Function code;
- $A_1A_2A_nA_3$: Equipment unit code;
- $B_1B_2B_n$: Component code.

### 1.5.2 Total plant (level 0)

It may be necessary to identify units, non-unit specific plants or extension stages within a power station, such that a clear and unambiguous distinction exists between them. This is provided by breakdown level 0: Overall plant. This identification **must be** agreed upon by all parties concerned, regarding the contents and type of data character (A or N). Especially the identification of existing units must be taken into account. The breakdown level "Overall plant" can be omitted when the designation remains unambiguous.

### 1.5.3 Function (level 1)

Functions in KKS are identified as follows:

| **Serial number of breakdown level** | **1** | | | | |
|---|---|---|---|---|---|
| Name of breakdown level | Function | | | | |
| Designation of data character | $F_0$ | $F_1$ | $F_2$ | $F_3$ | $F_n$ |
| Type of data character | (N) | A | A | A | NN |

Table 3 KKS Standard, level 1: Function

The following terms are used within the function code:

- $F_0$: Function level prefix number;
- $F_1$: Main group;
- $F_1F_2$: System group;
- $F_1F_2F_3$: System;
- $F_n$: Sub-system.

Keys for system ($F_1F_2F_3$) consist of 3 characters.

### 1.5.4 Equipment (level 2)

Equipment units in KKS are identified as follows:

| **Serial number of breakdown level** | **2** | | | |
|---|---|---|---|---|
| Name of breakdown level | Equipment Unit | | | |
| Designation of data character | $A_1$ | $A_2$ | $A_n$ | $A_3$ |
| Type of data character | A | A | NNN | (A) |

Table 4 KKS Standard, level 2: Equipment

The following terms are used within the equipment code:

- $A_1$: Main groups of equipment units;
- $A_1A_2$: Sub-groups of equipment units;
- $A_n$: Numbering equipment units;
- $A_3$: Additional code.

Keys for sub-groups of equipment units ($A_1A_2$) consist of 2 characters.

### 1.5.5 Component (level 3)

Components in KKS are identified as follows:

| 3 | | |
|---|---|---|
| Component | | |
| $B_1$ | $B_2$ | $B_n$ |
| A | A | NN |

Table 5 KKS Standard, level 3: Components

The following terms are used within the component code:

- $B_1$: Main groups of components;
- $B_1B_2$: Sub-groups of components;
- $B_n$: Numbering components.

Keys for sub-groups of components (B1B2) consist of 2 characters.

# 2 NTPC's Asset Coding Concept for Asset Identification Codes (AICs)

This section describes NTPC adoption of the KKS standard as the "Asset Identification Code level structure" and how Asset Identifications Codes (AICs) are constructed.

## 2.1 Asset Identification Code (AIC) levels

Table 6 summarizes the AIC level structure with the adopted[1] four Asset Identification Code levels (0, 1, 2 and 3) and NTPC's introduced facility level (-1) for identification and the types of data characters.

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Designation of data character | C | | | | G | | | $F_1$ | $F_2$ | $F_3$ | $F_n$ | $A_1$ | $A_2$ | $A_n$ | $B_1$ | $B_2$ | $B_n$ |
| Type of data character | A | N | N | N | N | N | N | A | A | A | NN | A | A | NNN | A | A | NN |

**Table 6 Asset Identification Code level structure with data character types**

A = Alphabetical symbols (letters, special symbols)
N = Numerical symbols (digits)

The $F_0$ and $A_3$ data characters are not used by NTPC. The KKS standard describes that these characters can be omitted if there is no ambiguity in created codes

The structure is the same across all divisions, with adoption of the code slightly differing across the divisions.

NTPC's instruction is to identify assets to a level (e.g. 1, 2, or 3) that is practical and cost efficient for managing the asset concerned. That rule relies on the desired level of granularity of asset identification and asset level at which maintenance is planned and executed.

[1] Within NTPC, the "Asset Identification Code levels" is the unique asset coding structure and concept based on the KKS standard. Because the naming of "breakdown levels" can create confusion compared to failing assets or issues with assets, NTPC refers to an asset code structure and numbered levels rather than KKS' breakdown levels.

For example:

- Towers in transmission lines are grouped as 10 towers as 1 asset for NTPC's desired management approach of managing that number of towers at a time;
- In Hydro, trash racks at the function level (level 1) are the lowest level of assets that need to be identified for that purpose while other assets are identified up to the component level (level 3).

Counting of assets is established through use of $F_n$, $A_n$ and $B_n$. For details on counting, refer to section **Error! Reference source not found.**.

An exception to the standard AIC data characters for the Component level (level 3) for T&D stations is used to accommodate the use of American National Standards Institute (ANSI) standard device numbers. This is NTPC's common practice, and device identifiers based on ANSI numbering are found throughout existing engineering drawings, safety diagrams, and system displays. Integrating these existing numbers into the AIC coding will provide a smoother transition for operational staff. Therefore, $B_n$ is set 3 data characters in the following format: A/N A/N A/N instead of NN.

If there is only function, equipment or component within a Facility, it must be numbered as 01 or 001 in accordance with the number of counting characters available in order to maintain the asset code length for consistency and accuracy in searching and matching assets within the CMMS software and between the CMMS software and Great Plains (GP).

The following sections provide example AIC creations for each division in NTPC, including asset descriptions. The way asset descriptions are generated is described on page 48.

The black filled boxes in the examples indicate that those fields are not used in the example asset code and description, reflecting the differences in desired granularity as described above.

### 2.1.1 Facility Codes (level -1)

| -1 | | | |
|---|---|---|---|
| Facility | | | |
| A | N | N | N |

Table 7 AIC Level -1 types of data characters

For identification of plants, distribution systems, substations, and transmission lines, the alphabetic character(s) (A) indicates the asset group:

- P = Plant (Generating Station)
- B = Building
- D = Distribution System
- S = Substation
- L = Transmission Lines
- F = Fuel Oil Pipelines
- R = Retainers (Tanks, Berms, Dams)
- E = Emergency Module ("small power plants")
- T = Transportation Infrastructure

The three numeric characters (NNN) correlate to NTPC's drawing numbering system. Refer to 1Appendix D for the possible values for P, D, S and L which have been taken from a separate and existing document, titled: "NTPC Record Drawing Numbering System", by Head Office of Engineering, revised April 2009.

For example:
- P165 = Norman Wells Diesel Plant
- S160 = Frank Channel Substation

For emergency modules ("E"), the numbering will continue to follow the GP inventory numbering method with the exception that the "M" in the previously used "EM" format has been omitted for standardization with the other facility coding as per the AIC. For example, E001, E002 are the current values rather than EM01 and EM02 respectively.

Mobile Equipment

For mobile equipment, the four numeric characters follow a separate numbering range which is described in more detail in section 2.1.9.

### 2.1.2 Equipment Group (level 0)

| 0 | | |
|---|---|---|
| Equipment Group | | |
| G | | |
| N | N | N |

Table 8 AIC Level 0 types of data characters

Level 0 identification differentiates between generating units within a single plant, feeders on a distribution system, and tower "groups" on transmission lines.

Equipment which serves more than one generating unit, distribution feeder, or tower group is coded as "000" at this level and is referred to as "common".
If there is a need to distinguish generating units or tower groups in the Transmission division, then this level is used to code with increments of 1, for example "001", "002", "003", etc. Examples of this coding are available in Sections 2.1.3 through 2.1.8 of this handbook.

**Transmission & Distribution distinction within Substations**
To facilitate the desired distinction between "transmission" and "distribution" elements of substation assets (Facility codes starting with "S"), the Level 0 identifier is used to separate the equipment as follows:

- **0XX = Plant type**
  used to refer to equipment in plants (e.g. 000, 001, 002, etcetera);

- **1XX = Transmission**
  used to refer to Transmission equipment (e.g. 101, 102, etcetera);

- **2XX = Distribution**
  used to refer to Distribution equipment (e.g. 201, 202, etcetera).

### 2.1.3 NTPC Keys for Asset Coding

Function Codes (level 1)

| 1 | | | |
|---|---|---|---|
| Function | | | |
| $F_1$ | $F_2$ | $F_3$ | $F_n$ |
| A | A | A | NN |

Table 9 AIC Level 1 types of data characters

Level 1 identification uses a three-letter equipment function code and a two digit number. The prefix $F_0$ is not used by NTPC.

KKS function codes for electrical equipment may vary based on voltage. For equipment that uses multiple voltages (transformers, etc.) the code identifying the high-side voltage is to be used when entering assets into the CMMS.
The keys for use in coding assets are shown below by level.

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| | **Distribution** | |
| AEA | Grid & Distribution Systems, 110 - 150 kV | Towers & Fixtures |
| AEB | Grid & Distribution Systems, 110 - 150 kV | Overhead Conductors & Devices |
| AEL | Grid & Distribution Systems, 110 - 150 kV | Line |
| AET | Grid and Distribution Systems, Transformer Equipment | 110-150 kV High Side Voltage |
| AHA | Grid & Distribution Systems, 30-35 kV | Poles & Fixtures |
| AHB | Grid and Distribution system 30-35 kV | Overhead Conductors & Devices |
| AHL | Grid & Distribution Systems, 34 kV | Disconnecting Switch |
| AHT | Grid and Distribution Systems, Transformer Equipment | 30-35 kV High Side Voltage |
| AKA | Grid & Distribution Systems, 10-15 kV | Poles & Fixtures |
| AKB | Grid and Distribution system 10-15 kV | Overhead Conductors & Devices |
| AKD | Grid and Distribution system 10-15 kV | Underground Line |
| AKT | Grid and Distribution Systems, Transformer Equipment | 10-15 kV High Side Voltage |
| ALA | Grid & Distribution Systems, 5 kV | Towers & Fixtures |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| ALB | Grid & Distribution Systems, 5 kV | Overhead Conductors & Devices |
| ALC | Grid and Distribution Systems, 5 kV | 5 kV Distribution Cabinets |
| ALD | Grid and Distribution, Underground Conductor and Devices, 5-6 kV | Underground Line |
| ALL | Grid and Distribution Systems, 5 kV | Line/ Disconnecting Switch |
| ALT | Grid and Distribution Systems, Transformer Equipment, | 5 kV High Side Voltage |
| ANA | Power Distribution & Auxiliary Power Supply, Foundation Cabinets | 600 v Distribution Cabinet |
| ANC | Power Distribution & Auxiliary Power Supply, Circuit Breakers | 600 v breakers |
| ANE | Grid & Distribution Systems, < 1 kV | Services |
| ANF | Grid & Distribution Systems, < 1 kV | Assets on Customer Premises |
| ANH | Grid & Distribution Systems, < 1 kV | Streetlights |
| ARA | Power Distribution, Protection <1 kV | Relays |
| ARB | Power Distribution, Protection >1 kV | Relays |
| ASQ | Grid & Distribution Systems, Decentralized panels & cabinets, Metering | Customer Meters |
| ATA | Grid & Distribution Systems, Transformer Equipment, Transmission Stabilization | Load banks, Capacitors & Inductors |
| ATH | Transformer 30-35 high side | |
| | | |
| | **Transmission** | |
| BAB | Power Transmission & Auxiliary Power Supply, Foundation Cabinets | Cabinets |
| BAC | Power transmission, Generator Circuit Breaker | Generator Breakers |
| BAU | Power transmission, Earthing and lightning protection system | |
| BAY | Control and Protection Equipment | Protection Relay |
| BBA | Power Transmission, Medium Voltage Distribution Boards | 600V MCC |
| BBB | Power Transmission, Medium Voltage Distribution Boards | 480V MCC |
| BBT | Medium voltage auxiliary power transformers | Step Up/Down 4160v/ PTs & CTs |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| BFA | Power Transmission, Low Voltage Distribution Boards | 600V or less lighting panel |
| BFC | Power Transmission, Low Voltage Distribution Boards | Combined AC/DC Panel 240V or less |
| BFT | Low voltage auxiliary power transformers | Step Up/Down 600 v/ PTs & CTs |
| BLC | Low voltage, Power Transmission, Distribution Boards, Sub-Distribution Boards | Transmission Cabinets |
| BTB | Power Transmission, 125V Batteries | Output Voltage 120v or 125v |
| BTC | Power Transmission, 110V Batteries | Output Voltage 110v |
| BTE | Power Transmission, 48V Batteries | Output Voltage 48v |
| BTG | Power Transmission, 24V Batteries | Output Voltage 24v |
| BTM | Battery Chargers, 125V | Output Voltage 125v |
| BTN | Battery Chargers, 120V | Output Voltage 120v |
| BTQ | Battery Chargers, 48V | Output Voltage 48v |
| BTS | Battery Chargers, 24V | Output Voltage 24v |
| BRU | Static Inverter, Uninterruptible Power Supply | Static inverter/converter |
| BTW | Power Transmission | UPS/Inverters |
| BUA | Power Transmission, Direct Current Normal Distribution Board | Greater than 220v |
| BUB | Power Transmission, Direct Current Normal Distribution Board | 120 or 125v |
| BUE | Power Transmission, Direct Current, Distribution Board | 48v |
| BUG | Power Transmission, Direct Current, Distribution Board | 24v |
| BVA | Emergency Power Transmission, Direct Current, Distribution Board | 125v |
| | | |
| CAA | Cabinets for protective interlocks | Automatic Transfer Switch |
| CBA | Instrumentation & Control, Cabinets, Generating Unit Controls | Regulators, etc./Governor controls, etc. |
| CHA | Instrumentation and control equipment, Generator Switchgear, Meters | KWH, |
| CJA | Unit Control panels, Instrumentation & Control Equipment | Local Control Panel |

| The keys for use in coding NTPC assets are shown below by level. | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| CKP | Instrumentation & Control Equipment, Process Computer | PLC |
| CKN | Instrumentation & Control Equipment, Process Computer | Panel Mates |
| CMB | Instrumentation & Control Equipment | Vibration Monitoring System |
| CXA | Instrumentation and control equipment, Local Control Stations | Motor Control |
| CYA | Instrumentation & Control Equipment, Communication & Information System | Telephone System |
| CYE | Instrumentation & Control Equipment, Communication & Information System | Fire Alarm |
| CYF | Instrumentation & Control Equipment, Communication & Information System | Clock System |
| CYH | Instrumentation & Control Equipment, Communication & Information System | SCADA, Man Down |
| CYK | Instrumentation and Control equipment, Telemetry System | Carrier Telephone |
| CYQ | Instrumentation & Control Equipment, Communication & Information System | Gas Detection |
| CYS | Instrumentation & Control Equipment, Communication & Information System | Radio Phone System |
| CYV | Instrumentation & Control Equipment, Communication & Information System | Plant and Production Management Systems |
| CYW | Instrumentation & Control Equipment, Communication & Information System | Satellite Systems |
| EGA | Supply of Liquid Fuels, Tank Farm | Piping/Valves |
| EGB | Supply of Liquid Fuels, Tank Farm | Tanks |
| EGC | Supply of Liquid Fuels, Pump System | Fuel pumps |
| EGF | Supply of Liquid Fuels, Temporary Storage | Berms |
| EGU | Supply of Liquid Fuels, Tank Farm | Tank Farm Meters |
| EGY | Supply of Liquid Fuels, Control and Protection Equipment | Level monitoring |
| GKC | Water Supply and Disposal, Process Drainage System, | Drinking Water |
| GMA | Water Supply and Disposal, Process Drainage System, | Pumps |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| GMX | Fluid Supply System, Control and Protection Equipment | Level monitoring |
| GQA | Water Supply and Disposal, Domestic Wastewater collection and drainage systems | Septic Systems |
| | | |
| LNA | Head & Tailrace System, Water Impounding Work | |
| LNB | Water impounding works for hydroelectric plants, Dam or Weir System | Trash Racks/Spillway Gate Hoist |
| LNC | Water impounding works for hydroelectric plants, Dam or Weir System | Dams and Weirs |
| LND | Spillways, Water Impounding Work | Spillways |
| LPA | Rake and cleaning system, Intake Systems | |
| LPB | Intake systems, Isolating Equipment | Intake gates /Stop logs/Hoists |
| LPC | Piping and penstock system | Penstock |
| LQA | Underwater Piping & Culvert System, Tailrace System | |
| LQC | Tail race systems, | Tailrace Stop logs |
| LQG | Extraction Systems for External Purpose | |
| | | |
| MEA | Main Machine Sets, Hydraulic Turbine Plant, Turbine | |
| MEA10 | Spiral Case | |
| MEA20 | Wicket gate | |
| MEA30 | Runner, Main shaft | |
| MEA40 | Turbine head cover, stay ring, draft tube, main shaft seal | |
| MEA50 | Spiral case drain | |
| MEB | Isolating Valve, Control Head Water Flow | Butterfly Valve, |
| MED | Main Machine Sets, Hydraulic Turbine Plant, Bearings | Bearings |
| MEV | Lubricant Supply System, Hydraulic Turbine Plant | Greasers/Oil |
| MEX | Governor, Hydraulic Turbine, Non-Electric Controls & Protection Equipment | |
| MEX10 | Governor sump tank, pumps and pressure tank | |
| MEX20 | Governor actuator, main control system | |
| MEX30 | Governor, pilot control system | |
| MEX40 | Governor servomotors | |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| MEX50 | Governor air pressure device | |
| MEX60 | Governor accumulator tanks | |
| MEY | Governor, Hydraulic Turbine, Electric Controls & Protection Equipment | |
| MJA | Main Machine Sets, Diesel Engine Plant, Engine | Diesel Engines |
| MJG | Main Machine Sets, Diesel Engine Plant, Liquid Cooling and Heating System | Radiators, heat exchangers |
| MJH | Main Machine Sets, Diesel Engine Plant, Air to Air Cooling System | Air to Air Coolers, Air Intercooling System |
| MJN | Main Machine Sets, Diesel Engine Plant, Fuel Systems | Filters/meters/Day Tanks/Piping |
| MJR | Main Machine Sets, Diesel Engine Plant, Exhaust Gas System | Silencers |
| MJV | Main Machine Sets, Diesel Engine Plant, Lubricant Supply System | Pre lube pumps |
| | | |
| MKA | Main Machine Sets, Generator | Generators |
| MKA10 | Main Machine Sets, Generator- Main shaft | |
| MKA20 | Main Machine Sets, Generator – Rotor | |
| MKA30 | Main Machine Sets, Generator - Stator | |
| MKA40 | Main Machine Sets, Generator - Support structure and foundation | |
| MKA50 | Main Machine Sets, Generator - Coolers | |
| MKC | Main Machine Sets, Generator Exciter | |
| MKD | Main Machine Sets, Generator Bearings | |
| MKV | Main Machine Sets, Generator, Lubricant Supply System | Oil Coolers, Pumps |
| | | |
| MRA | Main Machine Sets, Gas Engine Plant, Engine | Gas Engines |
| MRG | Main Machine Sets, Gas Engine Plant, Liquid Cooling System | |
| MRN | Main Machine Sets, Gas Engine Plant, Fuel Systems | |
| MRR | Main Machine Sets, Gas Engine Plant, Exhaust Gas System | |
| MRV | Main Machine Sets, Gas Engine Plant, Lubricant Supply System | |
| | | |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| PCM | Cooling Water for generator | Generator Bearings |
| PHB | Mechanical Cleaning System, Cooling Water Treatment | Oily water separators |
| | | |
| SAA | Ancillary Systems, Heating Ventilation and Air Conditioning System | Hydronic Heating / cooling system |
| SAB | Ancillary Systems, Heating Ventilation and Air Conditioning System, Forced Air heating | Gas Fired/ Electric Heat/Oil Fired |
| SAH | Ancillary Systems, Heating Ventilation and Air Conditioning System | Building Ventilation, Fans |
| SBA | Ancillary Systems, Space Heating Systems | Residual Heating |
| SCA | Ancillary Systems, Stationary compressed Air Supplies, Compressed Air Generation System | Compressors/Air Systems |
| SGE | Ancillary Systems, Stationary Fire Protection | Sprinkler System |
| SGJ | Ancillary Systems, Stationary Fire Protection Systems, CO2 / Nitrogen Systems | |
| SMA | Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances | Overhead cranes |
| SMB | Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances | Gantry Crane |
| SMD | Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances | Monorail Systems |
| | | |
| UAA | Civil Structures, Switchyard Structure | Switchyard structures |
| UAB | Civil Structures, Switchgear | Switchgear |
| UAC | Civil Structures, Structures for Grid and Distribution | Grid System Control Building |
| UAG | Civil Structures, Structures for Grid and Distribution Systems, Structure for Transformers | |
| UAX | Civil Structures, Structures for Grid and Distribution Systems, Special Structure (plant specific) | |
| UCC | Civil Structures, Structure for Communication Towers | Radio Tower |
| UEJ | Civil Structures, Structure for storage of liquid fuels | Fuel/Oil Tanks, |
| UEL | Civil Structures, Structures for Conventional Fuel Supply, Forwarding of | Fuel/Exhaust modules |
| ULN | Civil structures, Structures for Hydraulic Turbine Spillway Systems | Spillways Structure |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| ULP | Civil structures, Structures for Hydraulic Turbine Intake Systems | Head Gates Structures |
| ULQ | Civil structures, Structures for Hydraulic Turbine, Tail Race Systems | Tail Race |
| UME | Civil structures, Structures for Main Machine Sets, Hydraulic Turbine Building | Hydro plant Building |
| UMJ | Civil structures, Structures for Main Machine Sets, Diesel engine building | Diesel plant building |
| USU | Civil Structures, General Service Structures | Storage Building/warehouse |
| UST | Civil Structures, General Service Structures | Workshop |
| UYC | Civil Structures, General Service Structures | Administration building |
| UYQ | Civil Structures, Garages | Garages |
| UYX | General Service Structures, Special Structure | Septic System Building |
| UZA | Outdoor Area, Plots of Land and Land Rights, Civil Structures | Airstrip/Helicopter/Roads /walkway/ Access Road |
| UZJ | Outdoor Area, Plots of Land and Land Rights, Civil Structures | Fencing/Gates |
| UZR | Structures for Transport | Boat Docks |
| UZT | Outdoor Area, Plots of Land and Land Rights, Civil Structures | Right of Way |
| UZW | Residential Buildings, Residential Area | Office, Trailers, Staff housing |
| UZY | Outdoor Area, Plots of Land and Land Rights, Civil Structures | Bridge Structures |
| UZX | Civil Structures, Special Structure | Pipe rack/Power pole rack, etc. |
| | | |
| WSA | Renewable Energy Plants, Solar Systems | Solar Array |
| | | |
| XJA | Station Service, Diesel Engine | Emergency Units |
| XJG | Liquid Cooling and Heating System | |
| XJN | Fuel Systems | |
| XJR | Exhaust Gas System | |
| XKA | Station Service, Generator | |
| XKY | Control & Protection Equipment | Transfer switch |
| | | |

| **The keys for use in coding NTPC assets are shown below by level.** | | |
|---|---|---|
| Function 1 | | |
| **Possible values** | **Value Meaning** | **Notes** |
| ZAA | Workshop & Office Equipment | Furniture |
| ZTA | Workshop & Office Equipment | Tools |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Table 10 Function Keys

### 2.1.4 Equipment Unit Codes (level 2)

| 2 | | |
|---|---|---|
| Equipment Unit | | |
| $A_1$ | $A_2$ | $A_n$ |
| A | A | NNN |

Table 11 AIC Level 2 types of data characters

Level 2 identification follows a two-letter, three digit pattern to identify sub-assemblies of Level 1 equipment. Only some assets will have Level 2 identification. An optional alphabetic suffix $A_3$ is permitted by KKS, but is not used by NTPC.

| **Function Level 2** | | |
|---|---|---|
| Equipment Unit | | |
| **Possible values** | **Value Meaning** | **Notes** |
| AA | Mechanical Equipment, Valves, Dampers etc. | Louvers |
| AB | Mechanical Equipment, Isolating Elements / Air Locks | Seals/Gates |
| AC | Mechanical Equipment, Heat Exchangers / heat transfer surfaces | |
| AE | Mechanical equipment, Turning driving lifting and slewing gear | Hoists |
| AH | Mechanical Equipment, Heating Cooling and Air Conditioning Units | |
| AJ | Mechanical Equipment, Size Reduction Equipment | |
| AN | Mechanical Equipment, Compressor Units / Fans | Intake/Discharge |
| AP | Mechanical Equipment, Pump Units | |
| AS | Mechanical Equipment, Adjusting & Tensioning Equipment for non-electrical variables | |
| AT | Mechanical Equipment, Cleaning, drying, separating & filtering | Filters |
| AU | Breaking, gearboxes & coupling equipment | |
| AX | Mechanical Equipment, test and monitoring equipment | |
| BB | Mechanical Equipment, Storage Equipment (Tanks) | Tanks |
| BF | Foundation | |
| BN | Mechanical Equipment, Jet Pumps / Ejectors / Injectors | |
| BQ | Mechanical Equipment, Hangers / Supports / Racks / Piping Penetrations | |

| **Function Level 2** | | |
|---|---|---|
| Equipment Unit | | |
| **Possible values** | **Value Meaning** | **Notes** |
| BR | Piping, Ductwork & Chutes | |
| BS | Mechanical Equipment, Exhaust Gas System, Main Machine Sets | Silencers |
| BU | Insulation, sheathing | |
| | | |
| | **Coding of current- and voltage circuits**<br>Electrical measurements are coded as shown in table below. The main parts are named CE_ _ _ and are numbered by hundreds on $A_N$. | See also the counting specifics further down in this document for use with "GS" |
| CE | Meter | |
| CE100 | Current | |
| CE101 | Current phase L1 or R | |
| CE102 | Current phase L2 or S | |
| CE103 | Current phase L3 or T | |
| CE200 | Voltage | |
| CE201 | Voltage phase L1 or R | |
| CE202 | Voltage phase L2 or S | |
| CE210 | CVT | |
| CE203 | Voltage phase L3 or T | |
| CE300 | Measurement with different variables, (i.e. power, energy, inductance and resistance, cosϕ) | |
| CE400 | Multi | |
| CE500 | Frequency | |
| CE600 | Special measurements (i.e. earth fault measurements). | |
| CE700 | Not in use | |
| CE800 | Not in use | |
| CE900 | Common/mixed measurements. | |
| | | |
| CF | Flow, Rate | Fuel Meters |
| | | |
| CH | Direct measuring circuits Fire Alarm | Pull Station |
| | | |
| CR | Direct measuring circuits, Fire Alarm | Flame Detector |
| CT | Direct measuring circuits, Fire Alarm, | Heat Detector |
| | | |

| **Function Level 2** | | |
|---|---|---|
| Equipment Unit | | |
| **Possible values** | **Value Meaning** | **Notes** |
| CL | Direct measuring circuits, Combined & Other Variables | Level monitoring |
| CP | Direct measuring circuits, Combined & Other Variables | Pressure Switch |
| CU | Direct measuring circuits, Combined & Other Variables | Smoke Detectors |
| | | |
| DE | Closed Loop Control Circuits, Electrical Variables (Current, Voltage, etc.) | |
| DS | Closed Loop Control Circuits, (Mechanical) Velocity, speed, frequency | VFD |
| EG | Bell and Strobe Light, | |
| | **Relay protection Distribution** | |
| EY | Analog & Binary Signal Conditioning, Protection | Multi-Functional Relay |
| EY100 | Over current | |
| EY200 | Differential current | |
| EY300 | Under voltage / over voltage | |
| EY400 | Under frequency / over frequency | |
| | | |
| | | |
| | **Relay protection Transmission** | |
| EX | Analog & Binary Signal Conditioning, Protection | Multi-Functional Relay |
| EX100 | Over current | |
| EX200 | Differential current | |
| EX220 | Differential current Id>, Lines | |
| EX300 | Under voltage / over voltage | |
| EX400 | Under frequency / over frequency | |
| EX560 | Reverse power | |
| EX830 | Loss of excitation | |
| EX900 | Relay protection undefined | Neutral Differential Relay |
| EX980 | Ground fault relay | |
| | | |
| FG | Indirect measuring Circuits, Distance / Length / Position / Direction of Rotation | |
| | | |
| GB | Overhead conductor and Insulators | |

| Function Level 2 | | |
|---|---|---|
| Equipment Unit | | |
| **Possible values** | **Value Meaning** | **Notes** |
| GE | Conductor/Cable | |
| GH | Electrical Instrumentation and control equipment | Cubicles |
| GL | Overhead reactor | |
| GN | Electrical Instrumentation and control equipment, Network Equipment (SCADA) | |
| GR | Electrical Instrumentation and control equipment, D.C. Generating Equipment - | Batteries, Solar Panel |
| | | |
| GS | Electrical Instrumentation and control equipment, Switchgear equipment if not identified under process equipment | (Generator Breaker, Generator Protection Relay) |
| GS100 | Circuit breakers | |
| GS200 | Disconnecting switches | |
| GS300 | Earthing Switch | |
| GS400 | Reclosers | |
| | | |
| GT | Transformer equipment | |
| GU | Electrical Instrumentation and control equipment, D.C. Generating Equipment, Convertor Equipment | Battery chargers |
| GV | Structure related earthing and lightning protection equipment, surge arrestors | |
| GZ | Support, Rack, hangers | |
| HD | Subassemblies of Main and Heavy Machinery | Bearings |

Table 12 Equipment Unit Keys

### 2.1.5 Component Codes (level 3)

| 3 | | |
|---|---|---|
| Component | | |
| $B_1$ | $B_2$ | $B_n$ |
| A | A | NN |

Table 13 AIC Level 3 types of data characters

Level 3 for components of equipment is not required for all assets but is used as-needed depending on the type of asset.

| | Function Level 3 | |
|---|---|---|
| | Component | |
| **Possible values** | **Value Meaning** | **Notes** |
| -A | Assemblies | |
| -C | Capacitors | |
| -K | Relays, contactors | |
| -S | Switches | |
| -F | Electrical Components, Protective Devices | |
| -M | Electrical components, Motors | |
| -P | Electrical components, Measuring & Testing | |
| QP | Instrumentation and control components (non-electrical), Measuring Instruments / testing equipment | |
| -W | Electrical Components, Transmission paths / Waveguides / Aerials | |
| -Y | Electrical Components, Electrical Positioners (e.g. solenoids not motors) | |
| -Z | Filters, Limiters (LMUs, WT) | |

Table 14 Component Keys

**"Decade" and "Century" counting**

Where KKS does not provide separation of assets into desired sections through the use of alphabetic codes or breakdown levels, the counting data characters may be assigned in ranges to allow further categorization. This use of the counting characters is referred to as "decade" or "century" numbering, depending upon the number of digits used to create the groups.

NTPC has applied a "century" numbering strategy to provide separation of transmission and distribution assets within substations, and to group mobile equipment into categories for easier searching. Decade numbering systems

described below have also been adopted to help provide consistency in naming and locating assets.

**Measuring circuits**

**Coding of current- and voltage circuits**

Electrical measurements are coded as shown in table below. The main parts are named CE_ _ _ and are numbered by hundreds on $A_N$.

| $A_1$ | $A_2$ | $A_N$ | $A_N$ | $A_N$ | Equipment |
|---|---|---|---|---|---|
| C | E | 1 | 0 | 0 | Current |
| C | E | 1 | 0 | 1 | Current phase L1 or R |
| C | E | 1 | 0 | 2 | Current phase L2 or S |
| C | E | 1 | 0 | 3 | Current phase L3 or T |
| C | E | 2 | 0 | 0 | Voltage |
| C | E | 2 | 0 | 1 | Voltage phase L1 or R |
| C | E | 2 | 0 | 2 | Voltage phase L2 or S |
| C | E | 2 | 0 | 3 | Voltage phase L3 or T |
| C | E | 3 | - | - | Measurement with different variables, (i.e. power, energy, inductance and resistance, cosϕ) |
| C | E | 4 | - | - | Not in use |
| C | E | 5 | - | - | Frequency |
| C | E | 6 | - | - | Special measurements (i.e. earth fault measurements). |
| C | E | 7 | - | - | Not in use |
| C | E | 8 | - | - | Not in use |
| C | E | 9 | - | - | Common/mixed measurements. |

Table 15 Coding of Current- and Voltage measurements, AIC level 2

### Direct Current systems

For direct current systems use B on $F_1$ and the coding shall be done according to the following table.

| DC Distribution | | | | | Accumulators | | | | | Chargers | | | | | Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_1$ | $F_2$ | $F_3$ | $F_N$ | $F_N$ | $F_1$ | $F_2$ | $F_3$ | $F_N$ | $F_N$ | $F_1$ | $F_2$ | $F_3$ | $F_N$ | $F_N$ | [Volt] |
| B | U | A | - | - | B | T | A | - | - | B | T | L | - | - | >= 220 V DC |
| B | U | B | - | - | B | T | B | - | - | B | T | M | - | - | 125 V DC |
| B | U | C | - | - | B | T | C | - | - | B | T | N | - | - | 110 V DC |
| B | U | D | - | - | B | T | D | - | - | B | T | P | - | - | 60 V DC |
| B | U | E | - | - | B | T | E | - | - | B | T | Q | - | - | 48 V DC |
| B | U | F | - | - | B | T | F | - | - | B | T | R | - | - | 36 V DC |
| B | U | G | - | - | B | T | G | - | - | B | T | S | - | - | 24 V DC |
| B | U | H | - | - | B | T | H | - | - | B | T | T | - | - | 12 V DC |
| B | U | J | - | - | B | T | J | - | - | B | T | U | - | - | 6 V DC |
| B | U | K | - | - | B | T | K | - | - | B | T | V | - | - | <6 V DC |

Table 16 Coding of DC systems, distribution, accumulators' racks and chargers on AIC level 1.

### Relay Protection

For relay protection in distribution, transmission and production the coding shall be done according the following tables.

### Distribution

### Transmission

| Relay protection Transmission, KKS coding | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EW | 000 | Combined relays, such as I>, Z<, Z>, V>, V<,f>, f<, **GENERAL** |
| EW | 010 | |
| EW | 020 | |
| EW | 030 | |
| EW | 040 | |
| EW | 050 | |
| EW | 060 | |
| EW | 070 | |
| EW | 080 | |
| EW | 090 | |

Table 17 Coding for relay protection in distribution on AIC Level 2

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EW | 100 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. **GENERAL** |
| EW | 110 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Power transformer |
| EW | 120 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Lines |
| EW | 130 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Capacitors |
| EW | 140 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Own consumption |
| EW | 150 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Bus TIE |
| EW | 160 | |
| EW | 170 | |
| EW | 180 | Motor protection |
| EW | 190 | |
| EW | 200 | Differential current Id>, **GENERAL** |
| EW | 210 | Differential current Id>, Power transformer |
| EW | 220 | Differential current Id>, Lines |
| EW | 230 | Differential current Id>, Capacitors |
| EW | 240 | Differential current Id>, Own consumption |
| EW | 250 | |
| EW | 260 | |
| EW | 270 | Bus bar protection |
| EW | 280 | |
| EW | 290 | |
| EW | 300 | Under voltage / over voltage V<, V>, **ALMENNT** |
| EW | 310 | Under voltage / over voltage V<, V>, Power transformers |
| EW | 320 | Under voltage / over voltage V<, V>, Lines |
| EW | 330 | Under voltage / over voltage V<, V>, Capacitors |
| EW | 340 | Under voltage / over voltage V<, V>, Own consumption |
| EW | 350 | |
| EW | 360 | |
| EW | 370 | |
| EW | 380 | |
| EW | 390 | |
| EW | 400 | Under frequency / over frequency f<, f>, **GENERAL** |
| EW | 410 | Under frequency / over frequency f<, f>, Power transformers |
| EW | 420 | Under frequency / over frequency f<, f>, Lines |

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EW | 430 | Under frequency / over frequency f<, f>, Capacitors |
| EW | 440 | Under frequency / over frequency f<, f>, Own consumption |
| EW | 450 | |
| EW | 460 | |
| EW | 470 | |
| EW | 480 | |
| EW | 490 | |
| EW | 500 | Distance protection Z<, >, **GENERAL** |
| EW | 510 | Distance protection Z<, >, Power transformers |
| EW | 520 | Distance protection Z<, >, Lines |
| EW | 530 | |
| EW | 540 | |
| EW | 550 | |
| EW | 560 | |
| EW | 570 | Phase selection relays |
| EW | 580 | Impedance relays for transformers |
| EW | 590 | |
| EW | 600 | Breaker Failure, **GENERAL** |
| EW | 610 | Breaker Failure, Power transformers |
| EW | 620 | Breaker Failure, Lines |
| EW | 630 | Breaker Failure, Capacitors |
| EW | 640 | Breaker Failure, Bus TIE |
| EW | 650 | |
| EW | 660 | |
| EW | 670 | |
| EW | 680 | |
| EW | 690 | |
| EW | 700 | |
| EW | 710 | |
| EW | 720 | |
| EW | 730 | |
| EW | 740 | |
| EW | 750 | |
| EW | 760 | |
| EW | 770 | |
| EW | 780 | |
| EW | 790 | |
| EW | 800 | |

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EW | 810 | |
| EW | 820 | |
| EW | 830 | |
| EW | 840 | |
| EW | 850 | |
| EW | 860 | |
| EW | 870 | |
| EW | 880 | |
| EW | 890 | |
| EW | 900 | Relay protection undefined |
| EW | 910 | Auxiliary relays |
| EW | 920 | Reclosing equipment |
| EW | 930 | Synchro-Check |
| EW | 940 | Synchronizing equipment |
| EW | 950 | Fault location/Registration |
| EW | 960 | Voltage regulation |
| EW | 970 | Communication equipment, isolated |
| EW | 980 | |
| EW | 990 | |

Table 18 Coding for relay protection in transmission on AIC Level 2

## Production

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EX | 000 | Combined relays, such as I>, Z<, Z>, V>, V<,f>, f<, **GENERAL** |
| EX | 010 | |
| EX | 020 | |
| EX | 030 | |
| EX | 040 | |
| EX | 050 | |
| EX | 060 | |
| EX | 070 | |
| EX | 080 | |
| EX | 090 | |
| EX | 100 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. **GENERAL** |
| EX | 110 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Power transformers |

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EX | 120 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Lines |
| EX | 130 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Capacitors |
| EX | 140 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Own consumption |
| EX | 150 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Bus TIE |
| EX | 160 | Over current, I>, I>>, Io>, Io>>, I> -->, Io> -->, I> inv., Io> inv. Generators |
| EX | 170 | Over current, I>, Shaft current |
| EX | 180 | Motor protection |
| EX | 190 | |
| EX | 200 | Differential current Id>, **GENERAL** |
| EX | 210 | Differential current Id>, Power transformer |
| EX | 220 | Differential current Id>, Lines |
| EX | 230 | Differential current Id>, Capacitors |
| EX | 240 | Differential current Id>, Own consumption |
| EX | 250 | Differential current Id>, Generators |
| EX | 260 | Differential current Id>, Generators / Transformers (BLOCK) |
| EX | 270 | Bus bar protection |
| EX | 280 | |
| EX | 290 | |
| EX | 300 | Under voltage / over voltage V<, V>, **GENERAL** |
| EX | 310 | Under voltage / over voltage V<, V>, Power transformers |
| EX | 320 | Under voltage / over voltage V<, V>, Lines |
| EX | 330 | Under voltage / over voltage V<, V>, Capacitors |
| EX | 340 | Under voltage / over voltage V<, V>, Own consumption |
| EX | 350 | Under voltage / over voltage V<, V>, Generators |
| EX | 360 | |
| EX | 370 | |
| EX | 380 | |
| EX | 390 | |
| EX | 400 | Under frequency / over frequency f<, f>, **GENERAL** |
| EX | 410 | Under frequency / over frequency f<, f>, Power transformers |
| EX | 420 | Under frequency / over frequency f<, f>, Lines |
| EX | 430 | Under frequency / over frequency f<, f>, Capacitors |
| EX | 440 | Under frequency / over frequency f<, f>, Own consumption |
| EX | 450 | Under frequency / over frequency f<, f>, Generators |

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EX | 460 | |
| EX | 470 | |
| EX | 480 | |
| EX | 490 | |
| EX | 500 | Distance protection Z<, >, **GENERAL** |
| EX | 510 | Distance protection Z<, >, Power transformers |
| EX | 520 | Distance protection Z<, >, Lines |
| EX | 530 | |
| EX | 540 | |
| EX | 550 | Distance protection Z<, >, Generators |
| EX | 560 | Reverse power P<-- |
| EX | 570 | Phase selection relays |
| EX | 580 | Impedance relays for transformers |
| EX | 590 | |
| EX | 600 | Breaker Failure, **GENERAL** |
| EX | 610 | Breaker Failure, Power transformers |
| EX | 620 | Breaker Failure, Lines |
| EX | 630 | Breaker Failure, Capacitors |
| EX | 640 | Breaker Failure, Bus TIE |
| EX | 650 | Breaker Failure, Generators |
| EX | 660 | |
| EX | 670 | |
| EX | 680 | |
| EX | 690 | |
| EX | 700 | Rotor earth Re<, Stator earth Se, **GENERAL** |
| EX | 710 | Rotor earth Re< |
| EX | 720 | Stator earth Se, 100% inj. |
| EX | 730 | Stator earth Se, 100% 3. Harm. |
| EX | 740 | Stator earth Se, 95% Un |
| EX | 750 | Stator earth Se, 80% Un |
| EX | 760 | |
| EX | 770 | |
| EX | 780 | |
| EX | 790 | |
| EX | 800 | Neg.-Seq Insc>, Therm. Overload θ>, Loss of Ex. Φ<, Over excitation U/f>, Under excitation U/f< **GENERAL** |
| EX | 810 | Neg.-Seq Insc> |
| EX | 820 | Therm. Overload θ> |

| **Relay protection Transmission, KKS coding** | | |
|---|---|---|
| **AIC level 2** | | **Explanation** |
| EX | 830 | Loss of Ex. Φ< |
| EX | 840 | Over excitation U/f> |
| EX | 850 | Under excitation U/f< |
| EX | 860 | |
| EX | 870 | |
| EX | 880 | |
| EX | 890 | |
| EX | 900 | Relay protection undefined |
| EX | 910 | Auxiliary relays |
| EX | 920 | Reclosing equipment |
| EX | 930 | Synchro-Check |
| EX | 940 | Synchronizing equipment |
| EX | 950 | Fault location/Registration |
| EX | 960 | Voltage regulation |
| EX | 970 | Communication equipment, isolated |
| EX | 980 | Ground fault relay |
| EX | 990 | |

Table 19 Coding for relay protection in production on AIC Level 2

## Coding of Electrical Instrumentation and control equipment (GS)

| $A_1$ | $A_2$ | $A_n$ | $A_n$ | $A_n$ | **Equipment** |
|---|---|---|---|---|---|
| G | S | 1 | 0 | 0 | Circuit breakers |
| G | S | 2 | 0 | 0 | Disconnecting switches |
| G | S | 3 | 0 | 0 | Earthing Switch |
| G | S | 4 | 0 | 0 | Recloser |

Table 20 Coding of GS equipment at AIC level 2

## Coding of buildings

| $F_N$ | $F_N$ | Equipment |
|---|---|---|
| 1 | 0 | **Foundation** |
| 2 | 0 | **Building superstructure** |
| 3 | 0 | **Exterior Building Envelope** |
| 3 | 1 | Cladding |
| 3 | 2 | Windows/Doors |
| 3 | 3 | Roof |
| 4 | 0 | **Interior Finishes** |
| 4 | 1 | Bathroom |
| 4 | 2 | Lighting |
| 4 | 3 | Bedrooms |

Table 21 Coding of buildings

### 2.1.6 Hydro Asset Coding

Two examples for asset code creation for Hydro

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Type of data character | A | N | N | N | N | N | N | A | A | A | NN | A | A | NNN | A | A | NN |
| *Hydro example 1* | | | | | | | | | | | | | | | | | |
| Value | P | 1 | 0 | 9 | 0 | 0 | 0 | G | M | A | 01 | A | T | 001 | | | |
| Value Meaning | Twin Gorges (Taltson) Hydro Plant (Taltson River) | | | | Common | | | Water Supply and Disposal, Process Drainage System, Oil Water Separator 01 | | | | Mechanical Equipment, Cleaning, drying, separating & filtering 001 | | | | | |
| AIC | P109000GMA01AT001 | | | | | | | | | | | | | | | | |
| Asset Description | Twin Gorges (Taltson) Hydro Plant (Taltson River), Common, Water Supply and Disposal, Process Drainage System, Oil Water Separator 01, Mechanical Equipment, Cleaning, drying, separating & filtering 001 | | | | | | | | | | | | | | | | |
| Division | Hydro | | | | | | | | | | | | | | | | |

Table 22 Hydro asset coding example 1

| *Hydro example 2* | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | P | 1 | 0 | 9 | 0 | 0 | 1 | M | E | A | 50 | B | N | 001 | | |
| Value Meaning | Twin Gorges (Taltson) Hydro Plant (Taltson River) | | | | G1 | | | Main Machine Sets, Hydraulic Turbine Plant, Turbine 50 | | | | Mechanical Equipment, Jet Pumps / Ejectors / Injectors 001 | | | | |
| AIC | P109001MEA50BN001 | | | | | | | | | | | | | | | |
| Asset Description | Twin Gorges (Taltson) Hydro Plant (Taltson River), G1, Main Machine Sets, Hydraulic Turbine Plant, Turbine 50, Mechanical Equipment, Jet Pumps / Ejectors / Injectors 001 | | | | | | | | | | | | | | | |
| Division | Hydro | | | | | | | | | | | | | | | |

Table 23 Hydro asset coding example 2

### 2.1.7 Thermal Asset Coding

Two examples for asset code creation for Thermal assets:

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Type of data character | A | N | N | N | N | N | N | A | A | A | N N | A | A | NN N | A | A | NN |
| *Thermal example 1* | | | | | | | | | | | | | | | | | |
| Value | P | 1 | 2 | 1 | 0 | 0 | 0 | S | M | A | 01 | A | E | 001 | | | |
| Value Meaning | Fort Simpson Diesel Plant | | | | Common | | | Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01 | | | | Mechanical equipment, Turning driving lifting and slewing gear 001 | | | | | |
| AIC | P121000SMA01AE001 | | | | | | | | | | | | | | | | |
| Asset Description | Fort Simpson Diesel Plant, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 | | | | | | | | | | | | | | | | |
| Division | Thermal | | | | | | | | | | | | | | | | |

Table 24 Thermal asset coding example 1

| *Thermal example 2* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | P | 1 | 2 | 1 | 0 | 0 | 3 | M | K | A | 01 |
| Value Meaning | Fort Simpson Diesel Plant | | | | G3 | | | Main Machine Sets, Generator 01 | | | |
| AIC | P121003MKA01 | | | | | | | | | | |
| Asset Description | Fort Simpson Diesel Plant, G3, Main Machine Sets, Generator 01 | | | | | | | | | | |
| Division | Thermal | | | | | | | | | | |

Table 25 Thermal asset coding example 2

### 2.1.8 Transmission & Distribution Asset Coding

This section describes the asset coding concept for:

1. Distribution;
2. T&D Stations;
3. Transmission (linear assets).

#### 2.1.8.1 Distribution Asset Coding

Two examples for asset code creation for Distribution assets:

*** represents 3 data characters in the following format: A/N A/N A/N to be used to define the tag number of T&D components

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Type of data character | A | N | N | N | N | N | N | A | A | A | NN | A | A | NNN | A | A | *** |
| *Distribution example 1* | | | | | | | | | | | | | | | | | |
| Value | D | 1 | 1 | 0 | 0 | 0 | 1 | A | L | A | 01 | | | | | | |
| Value Meaning | Distribution System Fort Simpson | | | | Feeder 001 | | | Grid & Distribution Systems, 5 kV, Towers & Fixtures | | | | | | | | | |
| AIC | D110001ALA00 | | | | | | | | | | | | | | | | |
| Asset Description | Distribution System Fort Simpson, Feeder 001, Grid & Distribution Systems, 5 kV, Towers & Fixtures | | | | | | | | | | | | | | | | |
| Division | Transmission & Distribution | | | | | | | | | | | | | | | | |

Table 26 Distribution asset coding example 1

| *Distribution example 2* | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | D | 1 | 0 | 6 | 0 | 0 | 1 | A | N | H | 0 1 | [redacted] |
| Value Meaning | Distribution System Fort Smith | | | | Feeder 001 | | | Grid & Distribution Systems, < 1 kV, Streetlights | | | | |
| AIC | D106001ANH00 | | | | | | | | | | | |
| Asset Description | Distribution System Fort Smith, Feeder 001, Grid & Distribution Systems, < 1 kV, Streetlights | | | | | | | | | | | |
| Division | Transmission & Distribution | | | | | | | | | | | |

Table 27 Distribution asset coding example 2

### 2.1.8.2 T&D Station Asset Coding

An exception to the standard AIC data characters for the Component level (level 3) for T&D stations is used to accommodate 3 character drawing numbers. For example, to identify "Switch F3B" as "-SF3B" as per the 2nd example shown below.

Two examples for asset code creation for an asset within a T&D station:
*** represents 3 data characters in the following format: A/N A/N A/N to be used to define the tag number of T&D components

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Type of data character | A | N | N | N | N | N | N | A | A | A | NN | A | A | NNN | A | A | *** |
| *T&D Station example 1* | | | | | | | | | | | | | | | | | |
| Value | S | 1 | 4 | 8 | 1 | 0 | 0 | A | E | L | 01 | G | S | 100 | - | F | 036 |
| Value Meaning | Fort Smith Substation | | | | Transmission | | | Grid & Distribution Systems, 110 - 150 kV, Line 01 | | | | Circuit breakers | | | Protective equipment 036 | | |
| AIC | S148100AEL01GS100-F036 | | | | | | | | | | | | | | | | |
| Asset Description | Fort Smith Substation, Transmission, Grid & Distribution Systems, 110 - 150 kV, Line 01, Circuit breakers, Protective equipment 036 | | | | | | | | | | | | | | | | |
| Division | Transmission & Distribution | | | | | | | | | | | | | | | | |

Table 28 T&D Station coding example 1

| *T&D Station example 2* | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value | S | 1 | 4 | 8 | 2 | 0 | 0 | A | L | L | 01 | G | S | 200 | - | S | F3B |
| Value Meaning | Fort Smith Substation | | | | Distribution | | | Grid and Distribution Systems, 5 kV, Line | | | | Disconnecting switches | | | Switch F3B | | |
| AIC | S148200ALL01GS200-SF3B | | | | | | | | | | | | | | | | |
| Asset Description | Fort Smith Substation, Distribution, Grid and Distribution Systems, 5 kV, Line , Disconnecting switches, Switch F3B | | | | | | | | | | | | | | | | |
| Division | Transmission & Distribution | | | | | | | | | | | | | | | | |

Table 29 T&D Station coding example 2

Note that both transmission stations and distribution assets are coded according to the same concept.

### 2.1.8.3 Transmission Asset Coding

As a consequence of the KKS standard being intended for naming power stations at discrete locations, the KKS structure is found to be less applicable for Transmission assets.

NTPC is using the KKS dictionary of keys as much as possible for coding its transmission assets. The NTPC AIC Structure for Transmission differs from the KKS standard and from what NTPC uses for Thermal, Hydro and Distribution assets. The rationale is to use the same dictionary of KKS keys for similar components and to use specific keys for naming NTPC's linear assets and linear sections (levels -1 and 0).

Two examples for asset code creation for a Transmission asset:

*** represents 3 data characters in the following format: A/N A/N A/N to be used to define the tag number of T&D components

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Type of data character | A | N | N | N | N | N | N | A | A | A | NN | A | A | NNN | A | A | *** |
| *Transmission example 1* | | | | | | | | | | | | | | | | | |
| Value | L | 1 | 5 | 0 | 0 | 0 | 1 | U | Z | T | 01 | | | | | | |
| Value Meaning | Twin Gorges (S161) to Pine Point (S157) Xmsn. Line -115 kV | | | | Tower Group 1 (Towers 1-10) | | | Civil Structures, Outdoor Area, Plots of Land and Land Rights | | | | | | | | | |
| AIC | L150001UZT01 | | | | | | | | | | | | | | | | |
| Asset Description | Twin Gorges (S161) to Pine Point (S157) Xmsn. Line -115 kV, Tower Group 1 (Towers 1-10), Civil Structures, Outdoor Area, Plots of Land and Land Rights | | | | | | | | | | | | | | | | |
| Division | Transmission & Distribution | | | | | | | | | | | | | | | | |

Table 30 Transmission coding example 1

| *Transmission example 2* | | | | |
|---|---|---|---|---|
| Value | L 1 5 0 | 0 0 2 | A E A 01 | [redacted] |
| Value Meaning | Twin Gorges (S161) to Pine Point (S157) Xmsn. Line -115 kV | Tower Group 2 (Towers 11-20) | Grid & Distribution Systems, 110 - 150 kV, Towers & Fixtures | |
| AIC | L150002AEA01 | | | |
| Asset Description | Twin Gorges (S161) to Pine Point (S157) Xmsn. Line -115 kV, Tower Group 2 (Towers 11-20), Grid & Distribution Systems, 110 - 150 kV, Towers & Fixtures | | | |
| Division | Transmission & Distribution | | | |

Table 31 Transmission coding example 2

The keys for use in coding Transmission assets are shown below by level.

| **0** | | |
|---|---|---|
| Equipment Group | | |
| **Value Meaning (Transmission)** | **Possible values** | **Notes** |
| Towers 1 to 10 | 001 | Towers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 |
| Towers 11 to 20 | 002 | Towers 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 |
| (…) | (…) | |
| Towers 91 to 100 | 010 | Towers 91, 92, 93, 94, 95, 96, 97, 98, 99 and 100 |
| Towers 101 to 110 | 011 | Towers 101, 102, 103, 104, 105, 106, 107, 108, 109 and 110 |
| (…) | (…) | |
| Towers 981 to 990 | 099 | Towers 981, 982, 983, 984, 985, 986, 987, 988, 989 and 990 |

Table 32 Equipment Group Keys for Transmission

### 2.1.9 Mobile Equipment / Vehicle Asset Coding

For vehicles and other assets that require registration, a custom coding concept is adopted. KKS offers **limited support** for such asset types; hence the following coding structure.

The 4 character numbering system follows a sequential numbering concept with increments of 1 for all mobile equipment assets that are identified for use in the CMMS.

| Type of Mobile Equipment | AIC number range at level -1 |
|---|---|
| Passenger | 2000 |
| Equipment | 3000 |
| Tow-Behind | 4000 |
| Off-Road | 5000 |

Table 33 Mobile Equipment Asset Coding Ranges

The coding for mobile equipment is unique and only uses the break down levels -1 as described above for categorization and level 0 for sequential numbering. There is no further breakdown used at this time, however it can be used in the future.

Examples of asset code creation for mobile equipment / vehicle assets:

| | |
|---|---|
| **Asset Identification Code (AIC)** | 2000 |
| **Level 1 value (sequential numbering)** | 2001 |
| **Asset description** | Mobile Equipment, Passenger (Service Truck) |
| **Location description** | 131 - Fort Simpson |

Table 34 Mobile Equipment Asset Coding example 1

| | |
|---|---|
| **Asset Identification Code (AIC)** | 5000 |
| **Level 0 value (sequential numbering)** | 5002 |
| **Asset description** | Mobile Equipment, Off-Road (Snowmobile) |
| **Location description** | 121 – Snare (Yellowknife) |

Table 35 Mobile Equipment Asset Coding example 2

**Counting with $F_n$, $A_n$ and $B_n$**
To allow for counting over 10 with more than 1 digit, given NTPC's number of functional assets, the $F_n$, $A_n$ and $B_n$ counters are used. The KKS standard's counter $F_0$ is considered less suitable for NTPC as it only allows for 1 digit counting, i.e. from 1 to 9 and is therefore not used.
See below table for the highlighted data characters for counting purposes:

| **Asset Identification Code (AIC) Level** | **-1** | | | | **0** | | | **1** | | | | **2** | | | **3** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name of AIC level | Facility | | | | Equipment Group | | | Function | | | | Equipment Unit | | | Component | | |
| Designation of data character | C | | | | G | | | $F_1$ | $F_2$ | $F_3$ | **$F_n$** | $A_1$ | $A_2$ | **$A_n$** | $B_1$ | $B_2$ | **$B_n$** |
| Type of data character | A | N | N | N | N | N | N | A | A | A | **NN** | A | A | **NNN** | A | A | **NN** |

Table 36 Data characters for counting highlighted in the AIC coding structure

## 2.2 Asset Description Generation Concept

There is one single description field for an asset in the CMMS. The asset description field has a maximum length of 2,000 characters.

The minimum asset description field must be derived from the AIC as the starting point. Further details are stored in the technical data sheet and attribute fields for the asset.

| | |
|---|---|
| **Asset Identification Code (AIC)** | {code} |
| **Asset description,** derived from AIC | {translation from AIC} |

Table 37 Asset Description generation logic

For entry into the CMMS, the AIC and asset description need to be entered.

| | **Values to populate in CMMS** |
|---|---|
| **Asset Identification Code (AIC)** | P121000SMA01AE001 |
| **Asset description** | Fort Simpson Diesel Plant, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 |
| **Location description** | 131 - Fort Simpson |

Table 38 Example of fields that are entered into the CMMS

Figure 2 on the next page shows the AIC field (box right of "Asset") and the Asset description field in the CMMS.

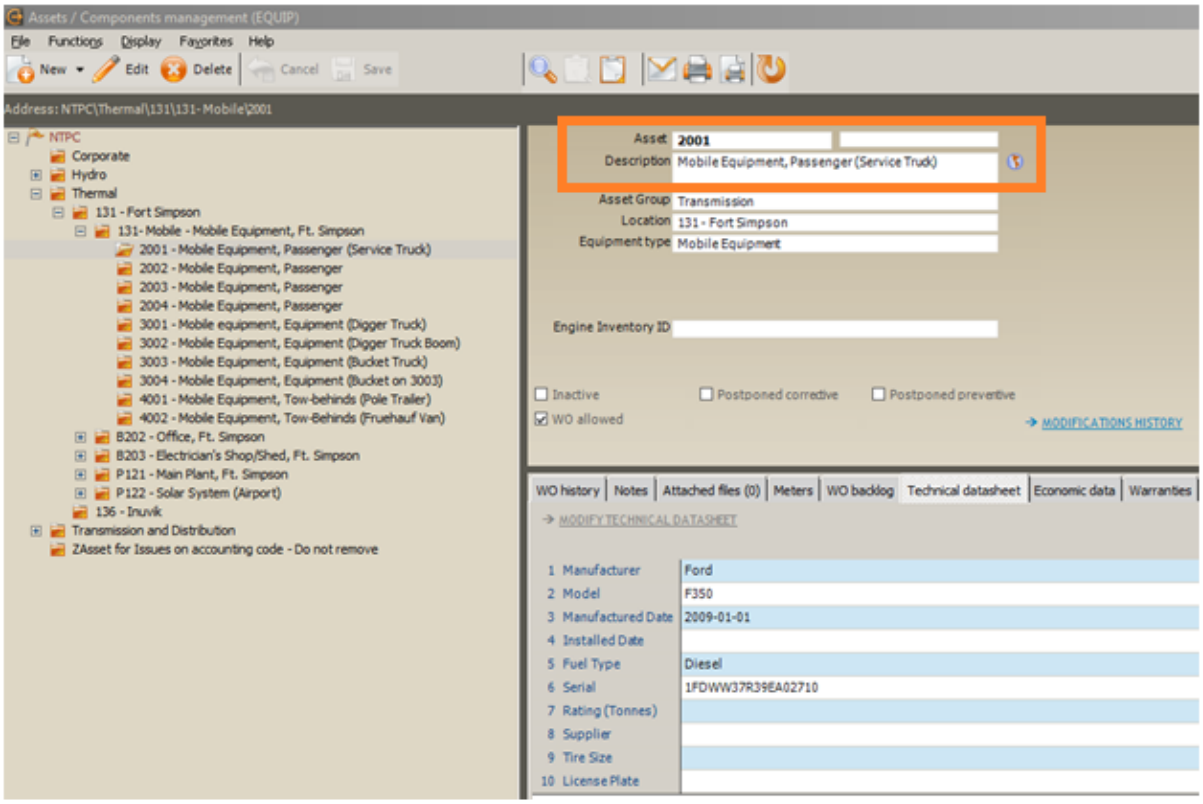


**Figure 2 Screenshot of CMMS showing the Asset Code field (for the AIC) and Asset Description fields in the highlighted box**

### 2.2.1 Asset description generation examples

Example **Hydro**:

| | |
|---|---|
| **Asset Identification Code (AIC)** | P109000GMA01AT001 |
| **Asset description,** derived from AIC | Twin Gorges (Taltson) Hydro Plant (Taltson River), Common, Water Supply and Disposal, Process Drainage System, Oil Water Separator 01, Mechanical Equipment, Cleaning, drying, separating & filtering 001 |
| **Location description** | 129 (Taltson) |
| **Division** | Hydro |

Table 39 Hydro Asset Description generation example

Example **Thermal**:

| | |
|---|---|
| **Asset Identification Code (AIC)** | P121000SMA01AE001 |
| **Asset description,** derived from AIC | Fort Simpson Diesel Plant, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 |
| **Location description** | 131 (Fort Simpson) |
| **Division** | Thermal |

Table 40 Thermal Asset Description generation example

Example **Distribution**:

| | |
|---|---|
| **Asset Identification Code (AIC)** | D110001ALA00 |
| **Asset description,** derived from AIC | Distribution System Fort Simpson, Feeder 001, Grid & Distribution Systems, 5 kV, Towers & Fixtures |
| **Location description** | 131 (Fort Simpson) |
| **Division** | Distribution |

Table 41 Distribution Asset Description generation example

Example **T&D Station**:

| | |
|---|---|
| **Asset Identification Code (AIC)** | S148001UAG01 |
| **Asset description,** derived from AIC | Fort Smith Substation, Foundation T1, Civil Structures, Structures for Grid and Distribution Systems, Structure for Transformers 01 |
| **Location description** | 128 (Fort Smith) |
| **Division** | T&D Station |

Table 42 T&D Station Asset Description generation example

Example **Transmission**:

| | |
|---|---|
| **Asset Identification Code (AIC)** | L150001UZT01 |
| **Asset description,** derived from AIC | Twin Gorges (S161) to Pine Point (S157) Xmsn. Line -115 kV, Tower Group 1 (Towers 1-10), Civil Structures, Outdoor Area, Plots of Land and Land Rights |
| **Location description** | T01 |
| **Division** | Transmission |

Table 43 Transmission Asset Description generation example

# 3 Governance and Change Management

This section describes how ongoing operational maintenance of asset locations in case of transfers between locations and maintenance of the KKS keys and naming conventions are to be applied.

## 3.1 Transferring assets between locations

When discrete assets are transferred from one Community to another, both the 3-digit Community code in the "Asset Location" field **and** the 4 character alphanumeric Facility code in the AIC must be updated in the CMMS.

The CMMS uses a system generated unique sequential number as the database key (e.g. *00000000000000000000010*) which is the true source of tracking an asset. Therefore, the CMMS supports updates to the AIC for the purpose of transfers between Communities or for other reasons, e.g. updates to keys used in the AIC.

The following fields need to be updated when transferring an asset:

- Asset Identification Code;
- Asset description;
- Location description field.

An example of an asset transfer is provided in the following 2 tables. The asset code structure remains the same, except for the Community code and the Facility code.

| | Community | Community name |
|---|---|---|
| **Transfer from** | 131 | Fort Simpson |
| **Transfer to** | 128 | Fort Smith |

Table 44 Asset transfer example #1: from one community to another community

| | AIC | Asset description | Location |
|---|---|---|---|
| **Old values** | **P121**000SMA01AE001 | **Fort Simpson Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 | **131** |
| **New values** | **P108**000SMA01AE001 | **Fort Smith Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 | **128** |

Table 45 Asset transfer example #1: old and new AICs, asset description and location field values

In case a similar asset already exists in the new Facility / Community, then the numbering in the new AIC must be sequential and follow after the existing numbered assets.

| | AIC | Asset description | Location |
|---|---|---|---|
| **Old values of asset for transfer** | **P121**000SMA01AE001 | **Fort Simpson Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear 001 | **131** |
| *Existing asset* | **P108**000SMA01AE**001** | **Fort Smith Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear **001** | **128** |
| *Existing asset* | **P108**000SMA01AE**002** | **Fort Smith Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear **002** | **128** |
| **New values of transferred asset** | **P108**000SMA01AE**003** | **Fort Smith Diesel Plant**, Common, Ancillary Systems, Cranes Stationary Hoists and Conveying Appliances, Building Crane 01, Mechanical equipment, Turning driving lifting and slewing gear **003** | **128** |

Table 46 Asset transfer example #2: old and new AICs, asset description and location field values in case similar assets already exist in the Facility where an asset is transferred to.

Transferring assets between locations does not impact the GP fixed asset ID associated with the AIC. Hence, the GP fixed asset ID in the CMMS for an asset that is being transferred, does **not** need to be updated as part of the transfer.

## 3.2 Code and Naming Convention Governance

The NTPC Asset Managers are responsible for the unique asset naming convention and the maintenance of the valid values that can be used in the coding of new assets.

Any requests for new KKS keys to be used in function, equipment unit and component coding need to be reviewed by the asset managers prior to use.

The KKS Standard's dictionary of keys is the starting point to select keys from. If no suitable key can be found, a new specific key can be suggested aligned with the KKS extension rules and is to be discussed with the respective asset manager to use in AICs.

## 3.3 Mapping table of AICs to GP fixed asset IDs

As described in 1Appendix B, there can be multiple AICs in the CMMS that are linked to one and the same GP fixed asset ID in the ERP system.

As the creation of assets in the CMMS takes place based on this handbook, it is recommended to create a mapping table that lists which AICs link to which GP fixed asset IDs.

That mapping table enables validating and maintaining the relationships between AIC and GP fixed asset IDs to support correct reporting of, for example, FERC codes by AIC.

# Appendices

## Appendix A CMMS field characteristics

Data fields in the CMMS are defined in a list by CoGep including field name, details, examples and size (maximum number of characters per field). Below is an excerpt of the complete list, focused on the key asset fields related to the asset code and asset description.

With respect to the asset code field, the maximum size for the asset code is 60 characters. Symbols, dash or period can be used as characters in the asset code field.

| Field | Details | Size |
|---|---|---|
| **Asset** | | |
| **Asset (Code)** | **Asset Code**<br>***(AIC = Asset Identification Code)*** | **60** |
| **Asset (Description)** | **Description of the asset in language #1**<br>***(English)*** | **2,000** |
| Asset (Description) | Description of the asset in language #2<br>*(not used)* | 2,000 |
| Asset (Description) | Description of the asset in language #3<br>*(not used)* | 2,000 |
| **Asset (Alternate asset code)** | ***Planned for storing the "GP fixed asset ID"*** | **60** |
| **Asset header** | | |
| **Asset Group** | ***Used for storing Division, 5 options, mandatory:***<br>***1 Hydro***<br>***2 Thermal***<br>***3 Transmission & Distribution***<br>***4 Finance***<br>***5 Information Technology*** | **200** |
| **Location (Description)** | ***Used for storing the 3-digit Location code as defined by the NTPC Chart of Accounts*** | **200** |

Table 47 Selection of key field characteristics in the CMMS

## Appendix B Background on CMMS and ERP system

NTPC's Enterprise Resource Planning (ERP) system, Microsoft Dynamics Great Plains (GP), holds the master list of fixed assets. GP also holds the Federal Energy Regulatory Commission's (FERC) code and sub FERC code for the fixed assets. The primary purposes of the ERP system are financial reporting on fixed assets and FERC-light regulatory compliance reporting related to fixed assets. Sub FERC code fields in the ERP system are available for future planning processes. The key identifier in the ERP system is the GP fixed asset ID.

The CMMS holds the fixed assets for maintenance planning and work order management purposes. The key identifier in the CMMS is the AIC. This handbook describes how the AIC for the CMMS is defined.

Key asset identifiers in the context of NTPC's CMMS and ERP system are:
1 The GP fixed asset ID: consists of 5 digits;
2 FERC code: consist of 3 digits (e.g. code 344 relates to generators);
3 Asset Identification Code: (the AIC).

The AIC and GP fixed asset ID are linked by storing the GP fixed asset ID from the ERP system in a designated CMMS field.

Multiple AICs can be related to a single GP fixed asset ID in the ERP system. The FERC code for assets can be referenced through the fixed asset ID link.. For the scope of this asset identification handbook, it is important to note that FERC codes will **not** be stored in the CMMS to avoid data duplication and to avoid additional data maintenance efforts.

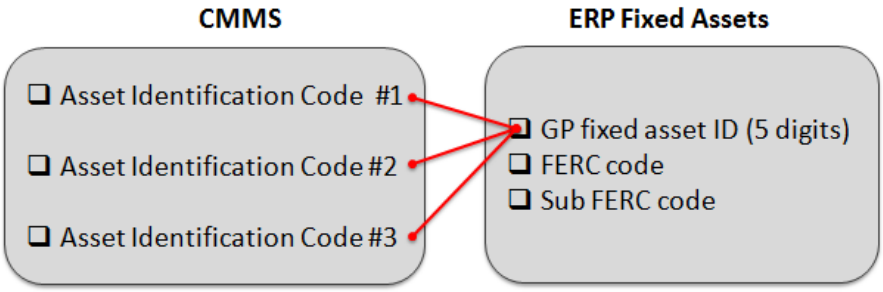


Figure 3 Relationship between assets in the CMMS and ERP system

Integration between the CMMS and the ERP system represents a future phase of the CMMS implementation, and is not defined in the current edition of this handbook.

**Location in CMMS**

NTPC uses 3-digit discrete codes to identify operating locations, for example "131" stands for Fort Simpson. These codes are defined in the *NTPC Chart of Accounts.*

The 3-digit location code is not considered part of the AIC. For reporting and sorting purposes within the CMMS system, the "Location description" field under the Asset Header in the CMMS holds the location code as part of a dropdown list (i.e. not free text).

- The inclusion of the 4 character alphanumeric Facility code in the AIC supports searching, sorting and filtering identical assets that exist at multiple Facilities;

- The inclusion of the 3-digit plant code in the location field supports reporting by location.

A more granular asset location determination method such as Global Positioning System (GPS) for linear assets may be assessed for potential adoption by NTPC in the future. GPS location information is not in scope of this handbook in relation to the initial asset creation and set up process in the CMMS. A suitable attribute field for GPS coordinates of assets will need to be assessed when planning future use of GPS coordinates of linear assets.

GPS coordinates should not be stored in the "Location description" field in the CMMS as per GuideTi's design and the present use of location codes as dropdown list values in the "Location description" field. The technical data sheet section in the CMMS offers fields that can be customized for additional types of data as required.

# Appendix C Community Codes

## Community codes

The following 3-digit location codes are used by NTPC to refer to discrete locations in the identified Guide Ti asset parameter.

| Community | Location | | Community | Location |
|---|---|---|---|---|
| 120 | Jackfish - Yellowknife | | 139 | Fort McPherson |
| 121 | Snare - Yellowknife | | 140 | Aklavik |
| 122 | Bluefish - Yellowknife | | 141 | Deline |
| 123 | Wha Ti | | 142 | Fort Good Hope |
| 124 | Gameti (Rae Lakes) | | 143 | Paulatuk |
| 125 | Behchoko (Rae/Edzo) | | 144 | Sachs Harbour |
| 126 | Dettah | | 145 | Tsiigehtchic |
| 127 | Lutsel K'e | | 146 | Colville Lake |
| 128 | Fort Smith | | 147 | Ulukhaktok |
| 129 | Taltson | | 148 | Tulita |
| 130 | Fort Resolution | | 350 | Hay River |
| 131 | Fort Simpson | | | |
| 132 | Fort Liard | | | |
| 133 | Wrigley | | | |
| 134 | Nahanni Butte | | | |
| 135 | Jean Marie River | | | |
| 136 | Inuvik | | | |
| 137 | Norman Wells | | | |
| 138 | Tuktoyaktuk | | | |

Table 48 NTPC 3-digit Community codes (ordered by 3-digit code)

# Appendix D Codes from Record Drawing Numbering System

## Power Plants (P in level -1)

The following power plants are sorted alphabetically. A numerical list follows after the alphabetical list. Only currently operating plants are shown in this list. For a complete list of assigned plant numbers, refer to the *NTPC Record Drawing Numbering System* documentation.

| Location | Plant No. |
|---|---|
| Aklavik 2007 Diesel Plant | P156 |
| Bluefish Hydro Plant No. 1 (G1) | P107 |
| Bluefish Hydro Plant No. 2 (G2) | P106 |
| Buffalo Junction Diesel Plant (Not owned by NTPC) | P114 |
| Colville Lake Diesel Plant **Old Plant** | P243 |
| Colville Lake Diesel Plant | P245 |
| Deline Diesel Plant | P174 |
| Deline Diesel Plant 1986 | P175 |
| Fort Liard 1975 Diesel Plant | P223 |
| Fort McPherson 2004 Diesel Plant | P151 |
| Fort Resolution Standby Diesel Plant | P111 |
| Fort Simpson Diesel Plant | P121 |
| Fort Smith Diesel Plant | P108 |
| Frank's Channel Diesel Plant | P237 |
| Inuvik 1970 Natural Gas Plant (K-Plant) | P136 |
| Inuvik 1984 Diesel Plant (EMD) | P137 |
| Jackfish Diesel Plant No.1 (kV 16) | P101 |
| Jackfish Diesel Plant No.3 (1992) (CAT) | P231 |
| Jackfish Lake Diesel Plant No. 2 (1974) (EMD) | P232 |
| Jackfish Lake Diesel Plant No.4 (1995) (Ruston) | P105 |
| Jean Marie River Diesel Plant | P226 |
| K'asho Got'ine (Fort Good Hope) Diesel Plant | P172 |
| Lutsel K'e Diesel Plant | P113 |
| Nahanni Butte 1973 Diesel Plant | P229 |
| Norman Wells Diesel Plant | P165 |
| Paulatuk 1999 Diesel Plant | P230 |
| Gameti 1975 Diesel Plant | P227 |
| Sachs Harbour 1975 Diesel Plant | P217 |
| Snare Cascades Hydro Plant | P242 |
| Snare Falls Hydro Plant | P102 |
| Snare Forks Hydro Plant | P104 |
| Snare Rapids Hydro Plant | P103 |
| Tsiigethchic 1973 Diesel Plant | P240 |
| Tuktoyaktuk 1992 Diesel Plant | P142 |
| Tulita Diesel Plant | P176 |
| Taltson Hydro Plant (Twin Gorges) | P109 |

| Location | Plant No. |
|---|---|
| Uluhaktok 1975 Diesel Plant | P241 |
| Wha Ti Diesel Plant | P112 |
| Wrigley Diesel Plant | P222 |

Table 49 Power Plants from Record Drawing Numbering System, Revised April 2009 (alphabetical)

Power plants (numerical):

| Plant No. | Location |
|---|---|
| P101 | Jackfish Diesel Plant No.1 (kV 16) |
| P102 | Snare Falls Hydro Plant |
| P103 | Snare Rapids Hydro Plant |
| P104 | Snare Forks Hydro Plant |
| P105 | Jackfish Lake Diesel Plant No.4 (1995) (Ruston) |
| P106 | Bluefish Hydro Plant No. 2 (G2) |
| P107 | Bluefish Hydro Plant No. 1 (G1) |
| P108 | Fort Smith Diesel Plant |
| P109 | Taltson Hydro Plant (Twin Gorges) |
| P111 | Fort Resolution Standby Diesel Plant |
| P112 | Wha Ti Diesel Plant |
| P113 | Lutsel K'e Diesel Plant |
| P114 | Buffalo Junction Diesel Plant (Not owned by NTPC) |
| P121 | Fort Simpson Diesel Plant |
| P136 | Inuvik 1970 Natural Gas Plant (K-Plant) |
| P137 | Inuvik 1984 Diesel Plant (EMD) |
| P142 | Tuktoyaktuk 1992 Diesel Plant |
| P151 | Fort McPherson 2004 Diesel Plant |
| P156 | Aklavik 2007 Diesel Plant |
| P165 | Norman Wells Diesel Plant |
| P172 | K'asho Got'ine (Fort Good Hope) Diesel Plant |
| P174 | DelineDiesel Plant |
| P175 | Deline Diesel Plant 1986 |
| P176 | Tulita Diesel Plant |
| P217 | Sachs Harbour 1975 Diesel Plant |
| P222 | Wrigley Diesel Plant |
| P223 | Fort Liard 1975 Diesel Plant |
| P226 | Jean Marie River Diesel Plant |
| P227 | Gameti 1975 Diesel Plant |
| P229 | Nahanni Butte 1973 Diesel Plant |
| P230 | Paulatuk 1999 Diesel Plant |
| P231 | Jackfish Diesel Plant No.3 (1992) (CAT) |
| P232 | Jackfish Lake Diesel Plant No. 2 (1974) (EMD) |
| P237 | Frank's Channel Diesel Plant |
| P240 | Tsiigethchic 1973 Diesel Plant |
| P241 | Uluhaktok 1975 Diesel Plant |
| P242 | Snare Cascades Hydro Plant |

| Plant No. | Location |
|---|---|
| P243 | Colville Lake Diesel Plant **OLD Plant** |
| P245 | Colville Lake Diesel Plant |

**Table 50 Power Plants from Record Drawing Numbering System, Revised April 2009 (numerical)**

**Distribution Systems (D in level -1)**

The following distribution systems are sorted alphabetically. Only systems currently operated and maintained by NTPC are included in this document. For a full list of assigned distribution system codes, refer to NTPC's *Record Drawing Numbering System* documentation. A numerical list follows the alphabetical list.

| Location | Distribution System No. |
|---|---|
| Aklavik | D125 |
| Bluefish | D108 |
| Colville Lake | D243 |
| Dettah | D103 |
| Duncan Lake | D255 |
| Edzo (Behchoko) | D102 |
| Enterprise | D130 |
| Deline | D147 |
| Fort Liard | D197 |
| Fort McPherson | D119 |
| Fort Providence | D109 |
| Fort Resolution | D123 |
| Fort Simpson | D110 |
| Fort Smith | D106 |
| Frank Channel | D126 |
| Gameti | D122 |
| Inuvik | D115 |
| Jackfish Lake | D107 |
| Jean Marie River | D203 |
| Fort Good Hope | D143 |
| Lutselk'e | D124 |
| Nahanni Butte | D205 |
| Norman Wells | D137 |
| Rae (Behchoko) | D101 |
| Snare Cascades | D242 |
| Snare Falls | D104 |
| Snare Forks | D114 |
| Snare Lakes | D112 |
| Snare Rapids | D105 |
| Snare River | D113 |
| Strutt Lake | D116 |
| Taltson | D128 |
| Tsiigehtchic | D157 |
| Tuktoyaktuk | D145 |
| Tulita | D149 |
| Ulukhaktok | D173 |
| WhaTi | D201 |
| Whittiker Falls | D120 |
| Wrigley | D195 |

| Location | Distribution System No. |
|---|---|
| Yellowknife | D100 |

Table 51 Distribution Systems from Record Drawing Numbering System, Revised April 2009 (alphabetical)

Distribution systems (numerical):

| Distribution System No. | Location |
|---|---|
| D100 | Yellowknife |
| D101 | Rae (Behchoko) |
| D102 | Edzo (Behchoko) |
| D103 | Dettah |
| D104 | Snare Falls |
| D105 | Snare Rapids |
| D106 | Fort Smith |
| D107 | Jackfish Lake |
| D108 | Bluefish |
| D109 | Fort Providence |
| D110 | Fort Simpson |
| D112 | Snare Lakes |
| D113 | Snare River |
| D114 | Snare Forks |
| D115 | Inuvik |
| D116 | Strutt Lake |
| D119 | Fort McPherson |
| D120 | Whittiker Falls |
| D122 | Gameti |
| D123 | Fort Resolution |
| D124 | Lutselk'e |
| D125 | Aklavik |
| D126 | Frank Channel |
| D128 | Taltson |
| D130 | Enterprise |
| D137 | Norman Wells |
| D143 | Fort Good Hope |
| D145 | Tuktoyaktuk |
| D147 | Deline |
| D149 | Tulita |
| D157 | Tsiigehtchic |
| D173 | Ulukhaktok |
| D195 | Wrigley |
| D197 | Fort Liard |
| D201 | WhaTi |
| D203 | Jean Marie River |
| D205 | Nahanni Butte |
| D242 | Snare Cascades |
| D243 | Colville Lake |

| Distribution System No. | Location |
|---|---|
| D255 | Duncan Lake |

Table 52 Distribution Systems from Record Drawing Numbering System, Revised April 2009 (numerical)

**Substations (S in level -1)**

The following substations are sorted alphabetically by location. A numerical list follows the alphabetical list. Only systems currently operated and maintained by NTPC are included in this document. For a full list of assigned substation codes, refer to NTPC's *Record Drawing Numbering System* documentation.

| | Location | Voltage Class |
|---|---|---|
| S357 | Dettah Village Substation | 34.5kV – 7.5kV |
| S456 | D.O.T. Monitoring Site Substation in Alberta | 12 kV -600 V |
| S356 | Fort Resolution Single Phase Ground Return Substation | 34.5 -2.4 kV |
| S452 | Fort Simpson Airport Substation | 4.16 -12 kV |
| S455 | Fort Smith Feeder 4 Substation (D.O.T. Line) | 4.16 kV |
| S148 | Fort Smith Substation | 115 -4.16 kV |
| S160 | Frank's Channel Substation | 115 -12 kV |
| S300 | Inuvik Powerhouse Substation | 5 – 25 kV |
| S301 | Inuvik Airport Substation | 25 – 5kV |
| S352 | Jackfish Lake Substation | 4.16 -34.5 kV |
| S172 | Jackfish Lake Substation | 34.5 kV Ring Bus |
| S460 | Norman Wells NTPC Substation | 4.16 -12 kV |
| S461 | Norman Wells Esso Substation | 12 -4.16 kV |
| S343 | P.W.G. & E. Substation No. 400 | 34.5 -4.16 kV |
| S451 | Rae Town site Substation | 12 -4.16 kV |
| S345 | Rat Lake Substation No. 500 | 4.16 -34.5 kV |
| S344 | Rat Lake Substation No. 600 | 4.16 -34.5 kV |
| S151 | Sass River C.N.T. Tap-off & Substation (On Fort Smith/Pine Point Line) | 66.4 kV -120/240V |
| S174 | Smiley Lake Substation | 115 KV |
| S444 | Snare Falls C.N.T. Substation (Isolating) | 6.9 -6.9 kV |
| S159 | Snare Falls Substation | 6.9 -115 kV |
| S173 | Snare Falls Substation | 115 kV Ring Bus |
| S169 | Snare Forks Substation | 12 -115 kV |
| S158 | Snare Rapids Substation | 6.9 -115 kV |
| S170 | Snare Rapids Tie Point Substation | 115 kV |
| S170 | Snare Rapids Tie Point Substation | 115kV |
| S458 | Tuktoyaktuk Substation | 4160/120/208 V |
| S161 | Twin Gorges (Taltson) Substation | 6.9 -115 kV |
| S156 | Yellowknife Terminal Station | 115 -34.5 kV |

Table 53 Substations from Record Drawing Numbering System, Revised April 2009 (alphabetical)

Substations (numerical):

| Substation No. | Location | Voltage Class |
|---|---|---|
| S148 | Fort Smith Substation | 115 -4.16 kV |
| S151 | Sass River C.N.T. Tap-off & Substation (On Fort Smith/Pine Point Line) | 66.4 kV -120/240V |
| S156 | Yellowknife Terminal Station | 115 -34.5 kV |
| S157 | Pine Point Substation | 115 kV – 12.5 kV |
| S158 | Snare Rapids Substation | 6.9 -115 kV |
| S159 | Snare Falls Substation | 6.9 -115 kV |
| S160 | Frank Channel Substation | 115 -12 kV |
| S161 | Twin Gorges (Taltson) Substation | 6.9 -115 kV |
| S169 | Snare Forks Substation | 12 -115 kV |
| S170 | Snare Rapids Tie Point Substation | 115 kV |
| S170 | Snare Rapids Tie Point Substation | 115kV |
| S172 | Jackfish Lake Substation | 34.5 kV Ring Bus |
| S173 | Snare Falls Substation | 115 kV Ring Bus |
| S174 | Smiley Lake Substation | 115 KV |
| S252 | Inuvik Substation (Out of Service) | 4.16 -69 kV |
| S253 | Tuktoyaktuk Substation (Out of Service) | 6.9 -4.16 kV |
| S301 | Inuvik Airport Substation | 25 – 5kV |
| S344 | Rat Lake Substation No. 600 | 4.16 -34.5 kV |
| S345 | Rat Lake Substation No. 500 | 4.16 -34.5 kV |
| S352 | Jackfish Lake Substation | 4.16 -34.5 kV |
| S353 | Pine Point Cominco Sub #3 (Ruston Plant) | 7.2 -34.5 kV |
| S356 | Fort Resolution Single Phase Ground Return Substation | 34.5 -2.4 kV |
| S357 | Dettah Village Substation | 34.5kV – 7.5kV |
| S444 | Snare Falls C.N.T. Substation (Isolating) | 6.9 -6.9 kV |
| S452 | Fort Simpson Airport Substation | 4.16 -12 kV |
| S455 | Fort Smith Feeder 4 Substation (D.O.T. Line) | 4.16 kV |
| S456 | D.O.T. Monitoring Site Substation in Alberta | 12 kV -600 V |
| S460 | Norman Wells NTPC Substation | 4.16 -12 kV |
| S461 | Norman Wells Esso Substation | 12 -4.16 kV |

**Table 54 Substations from Record Drawing Numbering System, Revised April 2009 (numerical)**

### Transmission lines (L in level -1)

The following transmission lines are sorted numerically by voltage class.

### Transmission lines, 115 to 138 kV class:

| Transmission Line No. | Location & Voltage |
|---|---|
| L142 | Twin Falls – Taltson S/S |
| L150 | Twin Gorges (S161) to Pine Point (S157) -115 kV |
| L190 | Snare Rapids (S158) to Yellowknife Terminal Station (S156) - 115 kV |
| L191 | Snare Falls (S159) to Snare Rapids Tie Point (L190) -115 kV |
| L192 | Smiley Lake (L190) to Frank Channel Sub (S160) -115 kV |
| L193 | Snare Forks (S169) to Snare Falls (S159) Xmsn. Line -115 kV |
| L196 | Snare Tie Sub (S173) to Snare Falls Substation (S159) – 115 kV |
| L199 | Yellowknife to Snare (1989) - 161 kV |

Table 55 Transmission line codes (115 to 138 kV) from Record Drawing Numbering System, Revised April 2009

### Transmission lines, Max Voltage @ 69 kV:

| Transmission Line No. | Location & Voltage |
|---|---|
| L200 | Ingraham Trail (S201) to Bluefish Hydro (S200)– 46 kV |

Table 56 Transmission line codes (Max Voltage @ 69 kV) from Record Drawing Numbering System, Revised April 2009

### Transmission lines, 23 to 34.5 kV class:

| Transmission Line No. | Location & Voltage |
|---|---|
| L350 | Pine Point (S353) to Fort Resolution (S356) Single Phase Ground Return -34.5 kV |
| L352 | Yellowknife Terminal Station (S156) to P.W.G. & E. Sub. No.100 (S352) and Jackfish Diesel Plant (S352 -34.5 kV |
| L354 | C.M. & S. Xmsn. Line from C.M. & S. Bluefish Hydro Plant (S354) to C.M. & S. Mines (S355) to -34.5 kV |
| L355 | Jackfish Lake Substation (S172) to Con Miramar Mine (Rob Shaft) – 34.5 kV |
| L359 | Giant Bluefish Tie Line GT 89-1 to GT89-2 inclusive – 34.5 kV |

Table 57 Transmission line codes (23 to 34.5 kV) from Record Drawing Numbering System, Revised April 2009

### Transmission lines, 6.9 to 15 kV class:

| Transmission Line No. | Location & Voltage |
|---|---|
| L450 | Frank Channel (S160) to Rae Town Site (S451) -12 kV |
| L451 | Frank Channel (S160) to Edzo Town Site (D102) & C.N.T. Repeater Xmsn. Line -7.2 kV |
| L452 | C.M. & S. Xmsn. Line (L354) to Ptarmigan Indian Village (D103) Xmsn. Line-7.2 kV |
| L454 | Fort Simpson Town Site (S452) to Airport -12 kV |
| L458 | Ft. Smith Feeder 4 Sub. (S455) to D.O.T. Monitoring Site (S456) -12 kV |
| L460 | Fort Smith to Salt River Single Phase Ground Return -7.2 kV |
| L461 | Snare Falls Hydro Plant (S444) to C.N.T. Site -6.9 kV |
| L464 | Snare Rapids Tie-Point to Spillway 5B -6.9 kV |

Table 58 Transmission line codes (6.9 to 15 kV) from Record Drawing Numbering System, Revised April 2009

**Buildings (B in level -1)**

The following building codes are sorted alphabetically by Community and numerically by building number. The building number ranges by Community are listed in the next table.

| Community | Building No. | Description |
|---|---|---|
| Aklavik | B001 | Office/Garage |
| Bluefish | B026 | Transient House |
| | B027 | Garage |
| | B028 | New Trailer |
| | B029 | Old Trailer |
| | B030 | Employees Residence |
| | B031 | Head Gate Building |
| | B032 | Duncan Lake Dam |
| | B033 | Radio Building |
| | B034 | Spillway Gate Building |
| Deline | B076 | Staff Residence |
| Behchoko | B101 | Storage Area |
| | B102 | Office Trailer |
| | B103 | Radio Building |
| Ft. Liard | B126 | Office/Transient Trailer |
| | B127 | Heated Sea-Can |
| Fort Resolution | B176 | Office/Transient Trailer |
| | B177 | Radio Building |
| | B178 | Switchgear Building |
| Fort Simpson | B201 | Garage Warehouse & Office |
| | B202 | Office Complex |
| | B203 | Electrician Shop/Shed |
| Fort Smith | B226 | Equipment Building |
| | B227 | Staff House - Retired |
| | B228 | Control Center |
| | B229 | Line Vehicle Garage & Storage |
| | B230 | Building Lot |
| | B231 | Lineman Office |
| | B232 | Storage Building |
| | B233 | Substation Control Building |
| Gameti | B276 | New Office/Transient Trailer |
| | B277 | Warehouse |
| Hay River | B301 | Head Office |
| | B302 | Warehouse |
| Ulukhaktok | B326 | Staff Quarters |
| Inuvik | B351 | Composite Building |
| Inuvik | B352 | Warehouse |
| | B353 | Cold Storage Warehouse |

| Community | Building No. | Description |
|---|---|---|
| | B354 | Filter Building |
| | B355 | NCPC 6 Bay Garage |
| | B356 | Water Treatment Plant |
| | B357 | Garage at Airport Road |
| | B358 | Double Garage |
| | B359 | Storage Area |
| | B360 | Office Building |
| | B361 | 14 Unit Staff Quarters |
| | B362 | Admin Building |
| | B363 | Apartment |
| | B364 | Community Center |
| | B365 | Skidded Lift Station |
| | B366 | 8 Spruce Hill |
| | B367 | 15 Raven Row House |
| | B368 | 17 Raven Row House |
| Jackfish | B376 | Line Shop |
| | B377 | New Office Addition |
| | B378 | Extension of Building B1 |
| | B379 | Control Center |
| | B380 | Warehouse |
| | B381 | Communications Tower Ingraham Trail |
| | B382 | Radio Building |
| Jean Marie River | B401 | Office/Staff Quarters |
| | B402 | Storage Container |
| Fort Good Hope | B426 | Detached Residence |
| | B427 | Transient Trailer |
| | B428 | Generating Station |
| | B429 | Cold Storage Container Sea-Can |
| | B430 | Heated Storage Container |
| Lutselk'e | B451 | Transient Trailer |
| | B452 | Office Trailer/Line Shack |
| | B453 | Warehouse |
| | B454 | Storage Container Sea-Can |
| Nahanni Butte | B476 | Four Man Transient |
| | B477 | Storage Container Sea-Can |
| Norman Wells | B501 | Transient Trailer |
| | B502 | Office Trailer |
| | B503 | Atco House |
| | B504 | Warehouse |
| | B505 | Detached Residence |
| Paulatuk | B526 | Garage/Workshop |
| | B527 | 3 Bedroom Staff Quarters |
| Pine Point | B551 | Warehouse |
| | B552 | PCB Storage Area |

| Community | Building No. | Description |
|---|---|---|
| Sachs Harbour | B601 | Office/Transient Trailer |
| Snare Cascades | | |
| Snare Falls | B651 | Parking Garage |
| | B652 | Spillway Gate Structure |
| | B653 | Gate Hoist Building |
| | B654 | Radio Building |
| | B655 | Radio Building CN Hill |
| | B656 | Main Tie Sub Building |
| Snare Forks | B676 | Water Treatment Plant |
| | B677 | Gate Hoist Building |
| | B678 | Radio Building |
| Snare Rapids | B701 | Portable Sleeper Residence |
| | B702 | Garage |
| | B703 | Staff House |
| | B704 | 8 Man Wet Sleeper |
| | B705 | 3 Bay Garage |
| | B706 | Gate Hoist Building |
| | B707 | New Building - Knob Hill |
| | B708 | Camp |
| | B709 | 5B Spillway Gate Structure |
| | B710 | Radio Building, |
| | B711 | Water Treatment Plant |
| | B712 | Carpenter Shop |
| Taltson | B726 | Staff House |
| | B727 | Transient Quarter Residence |
| | B728 | Garage |
| | B729 | Storage Building |
| | B730 | Head Gate Building |
| | B731 | Radio Building, |
| Tsiigehtchic | B751 | Trailer /Staff Quarters |
| | B752 | Heated Sea-Can |
| Tuktoyaktuk | B776 | Warehouse |
| Tulita | B801 | Trailer/Staff Quarters |
| Wha Ti | B826 | Transient Trailer |
| Wrigley | B851 | Trailer/Staff Quarters |
| Yellowknife | | |

Table 59 Building codes by Community

## Building code ranges:

| Community | Building No. |
|---|---|
| Aklavik | B001-B025 |
| Bluefish | B026-B050 |

| Community | Building No. |
|---|---|
| Colville Lake | B051-B075 |
| Deline | B076-B100 |
| Edzo | B101-B125 |
| Ft. Liard | B126-B150 |
| Ft. McPherson | B151-B175 |
| Ft. Resolution | B176-B200 |
| Ft. Simpson | B201-B225 |
| Ft. Smith | B226-B250 |
| Frank's Channel | B251-B275 |
| Gameti | B276-B300 |
| Hay River | B301-B325 |
| Ulukhaktok | B326-B350 |
| Inuvik | B351-B375 |
| Jackfish | B376-B400 |
| Jean Marie River | B401-B425 |
| K'asho Got'ine | B426-B450 |
| Lutselk'e | B451-B475 |
| Nahanni Butte | B476-B500 |
| Norman Wells | B501-B525 |
| Paulatuk | B526-B550 |
| Pine Point | B551-B575 |
| Rae | B576-B600 |
| Sachs Harbour | B601-B625 |
| Snare Cascades | B626-B650 |
| Snare Falls | B651-B675 |
| Snare Forks | B676-B700 |
| Snare Rapids | B701-B725 |
| Taltson | B726-B750 |
| Tsiigehtchic | B751-B775 |
| Tuktoyaktuk | B756-B800 |
| Tulita | B801-B825 |
| Wha Ti | B826-B850 |
| Wrigley | B851-B875 |
| Yellowknife | B876-B900 |

Table 60 Building code ranges by Community

## Authors, reviewers and approvers

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## Change Tracking

| Version | Date | By Whom | Pages Altered/Comments |
|---|---|---|---|
| 1.1 | July 31, 2019 | Leah Plett | New building codes added |
| 1.0 | Jun 13, 2019 | Leah Plett | Updated Building List, new function code (ATA). Removed DRAFT from name. |
| 0.16 | Sep 11, 2018 | Leah Plett | Addition of new function codes (UEL, UAB, BFC, CYV) Updated descriptions (GR, BVA) |
| 0.15 | Dec 30 2015 | CJ Consulting | Added Keys for asset coding & building numbers |
| 0.14 | April 02, 2015 | CJ Consulting | Review of manual, added asset numbers |
| 0.13 | June 27, 2014 | Hugo van Hoogstraten | Updated section 3.2 on counting as T&D indicated no need to have an extra character for transmission assets. |

| Version | Date | By Whom | Pages Altered/Comments |
|---|---|---|---|
| 0.12 | June 27, 2014 | Hugo van Hoogstraten | Updates based on review with Finance and authors, reviewers and approvers. |
| 0.11 | April 23, 2014 | Hugo van Hoogstraten | Included minor revisions regarding title and T&D component data structure from Dipankar Chakrabarti. |
| 0.10 | April 14, 2014 | Hugo van Hoogstraten | Included T&D asset coding examples from Dipankar Chakrabarti. Included decade counting principles from Eileen Hendry and highlighted new asset identifier codes used in those counting principles in yellow. Sent to project committee for review on April 15 by Dean Hendrickson with responses requested by April 22. |
| 0.9 | April 9, 2014 | Hugo van Hoogstraten | Processed comments from Eileen Hendry and Dipankar Chakrabarti including building codes, AIC definitions, vehicle coding and reviewed appendices. Pending updating of T&D asset coding section (3.1.9). |
| 0.8 | April 1, 2014 | Hugo van Hoogstraten | Processed comments from Eileen Hendry, Dean Hendrickson, Stuart Robinson, Morris Callahan and Dipankar Chakrabarti from review sessions on April 1. Highlighted yellow sections for further improvement. |
| 0.7 | March 31, 2014 | Hugo van Hoogstraten | Updated asset coding examples based on sample of assets coded by the CMMS project team according to the updated coding concept. Inserted placeholder for mobile equipment and key |

| Version | Date | By Whom | Pages Altered/Comments |
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| | | | definition to be completed. Took out previous custom keys (saved in separate notes and actions file). |
| 0.6 | March 24, 2014 | Hugo van Hoogstraten | Processed comments from Eileen Hendry regarding customization of asset code levels. Indicated highlights in turquoise and yellow for discussion on March 25. |
| 0.5 | March 4, 2014 | Hugo van Hoogstraten | Processed comments from reviewers regarding asset parameters, technical data sheets, substation coding and Thermal and Hydro keys. |
| 0.4 | February 27, 2014 | Hugo van Hoogstraten | Processed comments from reviewers. Pending review of Hydro/Thermal keys, CMMS fields confirmation, Finance confirmation of financial asset ID. |
| 0.3 | February 26, 2014 | Hugo van Hoogstraten | Processed part of comments from reviewers. |
| 0.2 | February 26, 2014 | Hugo van Hoogstraten | Processed comments from David Cheng. Pending review of Hydro/Thermal keys and description generation. |
| 0.1 | February 25, 2014 | Hugo van Hoogstraten | First draft. |