

NAMING AND NUMBERING CONVENTION FOR THE NICA PROJECTS*

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In every big scientific project, human influence creates disorder. For an investment as big as NICA (Nuclotron-based Ion Collider fAcility), it is crucial to organize all the elements and minimize the chaos. One of the ways to achieve this goal is to create an Equipment Database (EqDb). Each component in the EqDb will receive its individual Part Identifier. Naming and Numbering Convention was proposed for Part Identifier creation. It was based on the existing model from CERN. The Part Id is a 16-character alpha-numeric code composed of a 7-character prefix and 9-character identifier field. These Part Identifiers will simplify component identification at the location.

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1. Introduction

This paper outlines a standard convention for an assignment of a unique Part Identifier for components in the NICA [2] project. The idea of introducing a convention for naming and numbering experiment components was taken from a similar standard used in the ALICE experiment at the LHC in CERN [1].

The concept of a commonly accepted naming convention is of special importance in view of the distributed production of the detectors and systems. The convention should allow for an independent Part Identifier generation on-site, with enough built-in protection to assure that the generated Id is not duplicated elsewhere. During the construction phase, Part Identifiers will

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simplify the installation of the parts, and will allow the creation of a centralized part repository from the individual parts repositories. It will also facilitate traceability of components used in the detector during operation and part replacement.

This information should be saved in EqDb to ensure the traceability of parts holding the **Part Id** throughout the experiment. EqDb (Equipment Database [3, 4]) is a database system created for NICA-MPD (Multi-Purpose Detector) and intended to support construction, assembly and operation of NICA.

2. NICA Part Identifier structure

The **Part Id** is a fixed length, 16-character alpha-numeric code (see Table I) composed of a 7-character prefix and 9-character identifier field, which contains one special character (method code) and an 8-digit serial number.

TABLE I

Part Identifier structure (EC — experiment code, SD/SS — sub-detector/sub-system code, GC — group code, M — method of serial number generation, SN — serial number).

Part	Prefix — namespace							Identifier								
Example	M	T	O	F	W	U	T	9	1	2	3	4	5	6	7	8
Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Meaning	EC	SD/SS			GC			M	SN							

The prefix plays the role of a namespace, *i.e.* a space of unique part numbers. The main role of the prefix is therefore to assure that all **Part Ids** issued by sub-detector groups are unique. The prefix provides information on the part origin and its initial sub-detector association. It means the origin rather than an actual state, so if a part, which already has its **Part Id** assigned, is transferred to another group, sub-detector or even to another experiment, its **Part Id** should not change.

The prefix is codified and can only contain a fixed set of codes. The first character encodes the experiment: **M** means MPD, **S** — SPD, and **B** — BM@N. The next three characters mean sub-system or sub-detector, *e.g.* **TOF** — Time of Flight, **EMC** — Electro Magnetic Calorimeter, **EQD** — Equipment Database, *etc.* The complete set of codes is specified in [5]. The last part of the prefix means the group that assigned the identifier, *e.g.* **JIN** — JINR Dubna, **WUT** — Warsaw Univ. of Technology group, **KUR** — Moscow Kurchatov Institute group, *etc.*

In the example shown in Table I, the part was registered for the Time-of-Flight sub-detector of MPD experiment by the Warsaw University of Technology group.

An identifier field begins with a 1-digit Method Code, which specifies whether the Part Id is generated automatically by EqDb, or it is attributed “by hand”. The automatic method is symbolized by 0, and manual — by 9.

The rest of the identifier is an 8-digit serial number, generated by EqDb or given “manually”, according to the Method Code. If it is created by EqDb, it equals to the internal EqDb Object Id, which makes it easier to manage identifiers and search components in the database. If the serial number is created in any other way, this should be sufficiently documented by its creator, and — whenever possible — be entered into EqDb. Two methods of Part Identifiers creation allow for the specific number attribution to the element if needed.

3. NICA Part Identifier generation and usage

Any indivisible logical component or an assembly of the components, being a part of the sub-detector, should get a Part Id. Its set of characteristics should be stored and easily retrievable for subsequent use. For example: electronics crate, power supply, signal cable, gas or water pipe, pump.

The decision to assign Part Id to the object is the responsibility of the detectors and systems manufacturers (Group Managers), because the trivial objects and bulk parts (*e.g.* screws) do not require such identification.

It is recommended to generate Part Id using EqDb, which provides an appropriate component registration service (see Table I).

The image shows a web interface for registering components. The main form is titled "Register component" and contains several fields: "Object Id" (2201), "Component nature" (S - Software), "Component kind" (CS - Codes Software: all the codes written for the project), "Object Class" (/COMPONENT/SOFTWARE), "Name" (EqDb - Equipment Database), "Lot No", "Serial No", and "Inventory No". A modal window titled "Create Part Identifier" is open, showing "Object Id" (2201), "Object Descriptor" (EqDb - Equipment Database), "Experiment Code" (Multi-Purpose Detector (MPD) M), "Subsystem" (EQD-Equipment Database (subsystem)), and "Group" (WUT-Warsaw University of Technology). Buttons for "Cancel" and "Apply Changes" are visible in the modal, and a "Create Part Identifier" button is at the bottom right of the main form.

Fig. 1. Component registration form in EqDb: Part Id = MEQDWUT000002201 is created.

It will often be necessary to encode the **Part Id** into a bar code or QR code for a specific part. The most commonly used bar code standard is UCC/EAN-128 [6]. The QR code format 21×21 can also be used. The use of bar codes or QR codes for part labeling should be mandatory and will facilitate operation and book-keeping. Elements on which printed identification sticker is impossible to place might receive RFID tags with the encoded **Part Id**.

NICA **Part Ids** generated and/or stored in EqDb can easily be sent to a specialized sticker printer and printed as bar code or QR code stickers.

4. Additional component classifications

As described above, a NICA **Part Identifier** consists only of a namespace (prefix) describing the origin of the identifier, and a semantically empty number. The serial number should not describe the type or class, or any other feature of the part it identifies, since it is a bad practice to include in the identifier characteristics other than the unique number or code itself, and possibly a namespace. The features of the object may, after all, change or require correction, but the identifier should not be changed.

Additional component features and classifications can be stored in EqDb, as exemplified in Fig. 1, but should not be included in the identifier.

5. Conclusion

So far, the naming and numbering convention has been introduced for the **Part Identifiers** of the EqDb, but such conventions are required for the proper working of the entire project. Similar conventions should be applied to the Detectors and Detector Modules naming in order to unify the NICA sub-systems. The numbering scheme proposed in this paper has already been introduced at the Joint Institute for Nuclear Research in Dubna and will be extended to the elements mentioned before.

Any changes in the numbering convention will be introduced to the MPD Collaboration group, and any other groups participating in the project, in a written form.

As all naming conventions, this one will be effective only if adopted by all institutes and laboratories participating in the project. All components, groups of detector components or systems should be named in accordance with this convention.

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