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Naming Conventions for the Large Hadron Collider Project

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Abstract

This report .gives the procedures for defining standard abbreviations for the various machine components of the Large Hadron Collider (LHC) Project, as well as for the surface buildings and the underground Civil Engineering works of the LHC.

The contents of this report has been approved by the LHC Project Leader and is published in the form of a Project Report in order to allow its immediate implementation. It will be incorporated later in the Quality Assurance Plan of the LHC Project which is under preparation.

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1. Purpose

This document provides rules for defining standard abbreviations for the LHC surface buildings and the various parts of the underground Civil Engineering works, as well as for the LHC machine components. These abbreviated equipment names will be of prime importance as they will be the main key to retrieve all the information of a given equipment in the different databases and will provide a common language for all groups involved in the LHC collider project, inside and outside CERN.

2. Policy

2.1 With the increasing size and complexity of accelerators and storage rings, it is no longer practical to designate the machine components by their functional name and location, as for instance "the third kicker magnet module of the LHC ring2 beam dumping system". It has become customary to replace this long description by a generic abbreviated name, made of a few alphanumeric characters.

2.2 The abbreviated name of an accelerator equipment, a building or an underground works must not lead to confusion. It should be used as a key for retrieving information in the various databases. It must therefore be unique and be used by everybody concerned with the associated equipment, i.e. the Project Engineer in charge of the equipment, hardware Builders, Designers and Drawing Offices, Accelerator Physics Specialists, Operation Crews and the Project Management.

2.3 Identical machine components must have the same generic name. During fabrication and testing they can be distinguished by a serial number appended to the generic name. After installation, the difference between identical components will be obtained by adding to the component generic name a string of alphanumeric characters giving the location of a particular installed component.

2.4 For the existing CERN accelerators, abbreviations are defined according to specific conventions. For the SPS machine, the equipment abbreviation is made of up to four letters and is called the "equipment name", while for LEP, it is known as the "ARCODE", for “article code”. In both cases the letters used in the abbreviation have a more or less well defined meaning which will be kept for the LHC Project as far as possible.

3. Scope

The naming conventions described in the present document apply to:

- surface buildings, pits, underground works and tunnels used for the LHC collider,
- LHC machine components,
- LHC machine layouts and assemblies,
- LHC machine equipment location.

4. Responsibilities

4.1 Change and revision of procedures

Any change or revision of these procedures must first be discussed by the Parameter and Layout Committee and by the Technical Coordination Committee. The revised version must then be approved by the Project Leader or his assistant for Quality Assurance and endorsed by the Technical Committee of the LHC Project before coming into force.

4.2 New abbreviations

The procedure and the responsibilities for defining new abbreviations are given in 5.4 for the buildings and Civil Engineering works, and in 6.4 for the LHC machine components, layouts and assemblies.

5. Civil engineering works

The LHC collider, [1], will be installed in the LEP tunnel and its geometry will closely follow that of the LEP machine. Most of the infrastructure built for LEP will be needed for LHC. In particular, the access points to the tunnel and the service areas on the surface will be concentrated around the existing LEP access points which are numbered from 1 to 8, in the clockwise direction starting with Point 1 located opposite to the main entrance of the Meyrin site, see Fig. 1.

The abbreviation system used for the LEP surface buildings and underground works will therefore be kept for LHC. New works will be identified according to this system, while existing installations will keep their LEP name, even if their usage for LHC is different.

5.1 Abbreviation definition

Naming conventions for LEP buildings and Civil Engineering works are defined in [2] and are reproduced here for convenience. Each name is made of up to six alphanumeric characters, split in two groups of three. The first group is alphabetic and defines the **works type** and the second the **works number**.

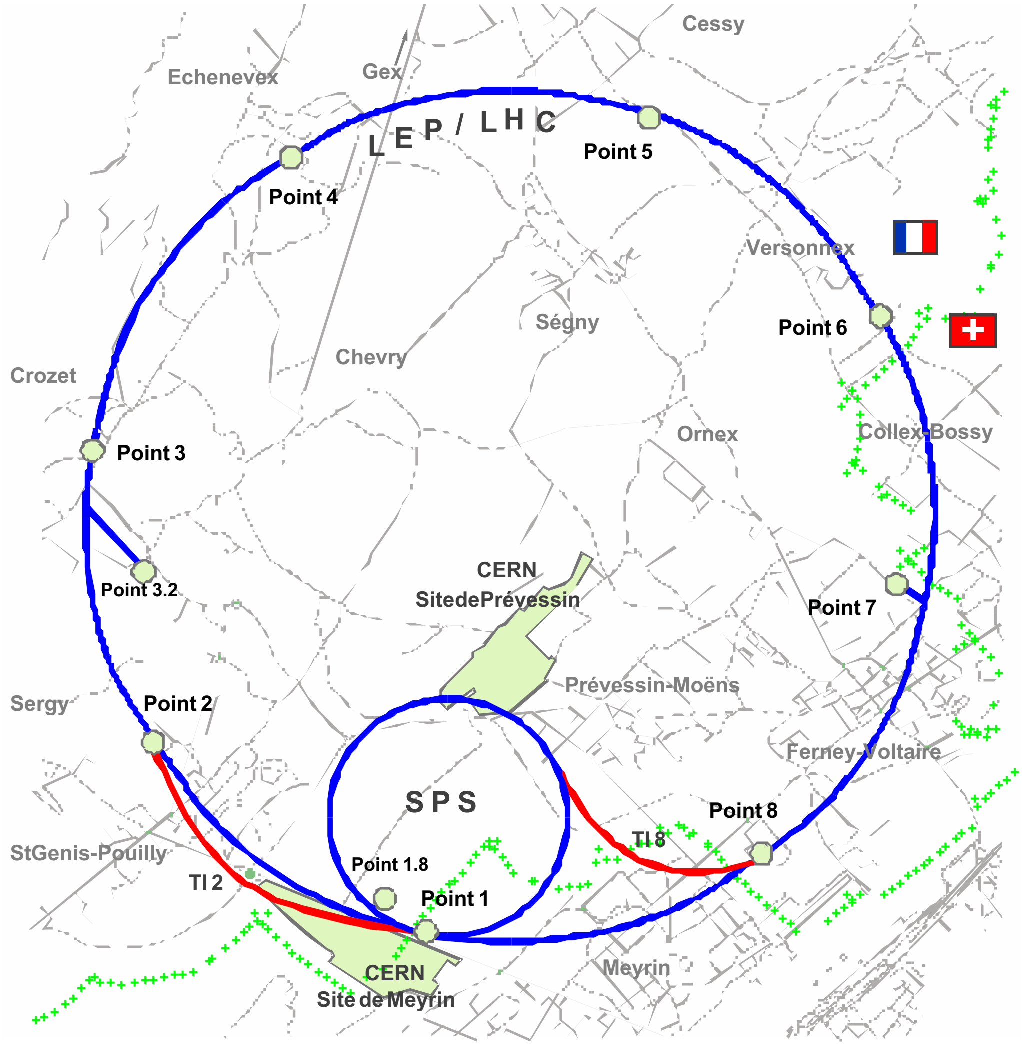

Fig. 1: Overall map of the LEP/LHC tunnel

5.2 Works type

5.2.1 First character

The first character determines the kind of Civil Engineering works, according to the following list:

P	=	pit
R	=	underground works on the beam path
S	=	surface buildings
T	=	tunnels and underground galleries
U	=	other underground works, not directly on the beam path

5.2.2 Second character

The second character indicates the main usage of the building and underground work, according to the following list:

A = acceleration and radio-frequency equipment
B = equipment for low-beta section
C = controls and communications
D = material unloading
E = electricity
F = fluids
G = gas for detectors
H = cryogenics
I = injection
J = junction caverns
L = liaison galleries
M = magnets and other machine equipment
P = personnel protection and fire brigade
R = power converters
S = services
T = beam transfer
U = ventilation
W = water
X = experiments
Y = access control
Z = access

5.2.3 Third character

This character is optional and is used either to be more precise on the usage of the works concerned or to distinguish between the different specific parts of it. Special rules are defined for each case. This facility is mainly used for electrical buildings, for experimental halls or when an existing building has to be extended for LHC. Annex 1 gives the list of abbreviations for the civil engineering works presently in use.

5.3 Works numbering

Up to three numbers follow the works type and are used to localize the works concerned. The first numeric character is the octant number. 0 is used for designing the whole LHC site, while 9 is used for zones outside the CERN domain. The second digit allows a more precise localization with respect to the middle of the octant: this point (the former LEP collision point) is given the number 5 and the octant is split in equal parts, numbered from 1 to 9 in the clockwise direction. The last and optional digit can be used for specifying the floor number of a building for instance or for distinguishing between two neighboring works.

5.4 New abbreviations

New abbreviations for Civil Engineering works are defined by the Infrastructure Section of the EST/ESI Group, under the responsibility of the Section Leader, who must inform the LHC

Project Assistant for Quality Assurance and the Leader of the "Real Estate Data and Drawings" Section of the ST/CE Group. This latter person must also keep up-to-date the dictionary of Works Types.

6. Machine components

6.1 Equipment code

6.1.1 Definition

For the LHC, the abbreviated equipment name is called **equipment code** and is made of up to five letters, arranged in a tree structure.

- The first letter indicates the system to which the equipment belongs and must be chosen according to the list of systems given in 7.1.3.
- The second letter defines the family of the equipment within a given system.
- The last three letters should in principle define the type within a family, the model for a given type and lastly the variant.

6.1.2 General rules

- An equipment code must be made of at least the first two letters, defining the system to which the equipment belongs and its family.
- If an equipment code can be defined with less than five letters, the remaining empty spaces must be filled with underscores (_) and not left blank, to avoid confusion. However, underscores embedded in an equipment code should be avoided. Similarly, numbers are not allowed for defining equipment codes.
- Equipment codes must be unique within a given accelerator: identical equipment must have the same equipment code, and similar but different equipment must have different equipment codes.
- The meaning of each letter is a function of its position in the equipment code and of the preceding letter(s). It may change from one system to another.
- Differentiating variants of an equipment with letters like N for "new" or for "normal", S for "standard", F for "final",..., must be avoided.

Generally speaking, an equipment which is identified by an equipment code corresponds to an assembly as installed or as it will be installed in a given machine. This equipment may be made of sub-assemblies and components which must then have the same equipment code as the main assembly. Later, if such a component or sub-assembly is used in another equipment, it must not be renamed but has to keep its original equipment code.

6.1.3 List of systems

Letter	System definition	Comments
A	Acceleration	all RF equipment, incl. dampers
B	Beam instrumentation	
C	Controls, communications	
D	Electrical distribution	busbars, quench protection
E	Electricity	electrical equipment
F	Fluids	de-mineralized water excluded
G	Survey and geodesy	girders for the SPS
H	Mechanics, supports	including handling
I	Injection	all transfer lines
J	Infrastructure	included in the machine pits
K	Civil engineering	
L	Layouts	lenses in SPS codes
M	Magnetic elements	
N	Particle sources	
O	NOT TO BE USED	(confusion with zero)
P	Personnel safety	incl. radiation protection
Q	Cryogenic equipment	
R	Power converters	(redresseurs)
S	General safety	supply for SPS
T	Targets and dumps	including collimators
U	Ventilation	including air conditioning
V	Vacuum	
W	NO LONGER USED	(De-mineralized water for LEP)
X	Experiments	
Y	Access system	
Z	Electrostatic systems	Separators and septa

6.1.4 Example

An example of an LHC equipment code can be:

VCSB_

with the following meaning:

- **V** vacuum system
- **C** chamber (family of equipment)
- **S** beam screen type
- **B** model for bending magnets
- **_** variant not defined

Annex 2 gives a list of equipment codes actually used in the LHC Design. An up-to-date list is kept in the CDD database, [3], and can be found on the World Wide Web at http://wwwlhc01.cern.ch:8005/cdd/owa/c4w_equip.home. This list is also compliant with the conventions used for the Technical Data Server, [4], and those used for the electrical installations data base, [5].

6.2 Special cases

6.2.1 Magnet System

The main families of the magnetic system are defined as follows:

- **B** bending magnet,
- **Q** quadrupole family,
- **S** septum magnet, or sextupole (see below)
- **O** octupole,
- **C** closed orbit corrector and higher order multipole corrector
- **K** kicker magnet
- **W** wiggler.

To comply with standard usage at CERN the letter S is reserved for "septum" magnets; for instance, MSI is the injection septum magnet which is an element of the LHC ring and not of the injection line.

The LHC will have two types of sextupoles which will be named as follows:

- The sextupoles for correcting the machine chromaticity are not lumped elements but are nested with the closed orbit correcting dipoles, i.e. the sextupolar and dipolar windings are arranged in two concentric layers around each beam pipe. The equipment code for such a combined corrector will then be **MSCH(V)**, the variant **H(V)** showing that the dipole is used for **horizontal (vertical)** closed orbit correction.

- The small sextupole correctors (so-called "spool pieces") which are installed in each dipole cold mass will be abbreviated as MCS.

The decapole correctors (also called "spool pieces") on the other side of each dipole cold mass are named MCD.

In the case of the dipoles, the third character is reserved and must be filled with:

- S or L, for short (1 m) or long (10 m) magnet models.
- P for magnet prototypes of full length.

An underscore for standard magnets. This character will be used later on to distinguish dipoles with different electrical connections, and eventually their function (arc or dispersion suppressor). The fourth letter will be used to specify the origin of the dipole magnet (initial of the magnet coil manufacturer). The fifth letter is at the disposal of the drawing offices.

- Closed orbit correcting dipoles, not nested with other correctors, as in the insertion regions for instance, will be named MCB_(H,V), where the underscore is replaced by H or V, when the plane in which the corrector acts is fixed.

6.2.2 Layouts

The system letter **L** is reserved for layouts which either describe the assembly units in which several components belonging to different systems are embedded or give a schematic representation of part of the machine.

6.2.2.1 *Layouts of composite equipment*

In this case, the second letter in the equipment code will specify the main component for which the layout is relevant. Example: **LB** will indicate a layout for a dipole in its cryostat, fully equipped with diodes, super-insulation, vacuum beam pipes and beam screens, as it will be installed in the machine ring. **LQ** will similarly indicate a short straight section layout, whose main element is the lattice quadrupole MQ.

6.2.2.2 *Schematic layouts*

Equipment codes for schematic layouts always start with **LS.** The following letter indicates which part of the machine or which system the layout in question is concerned with. The fourth digit may be a number which indicates the octant of the machine. In this case, the last digit is either an underscore or a letter.

6.2.2.3 *Installation layouts*

These specific layouts show the schematic installation of equipment in the actual tunnel shape and will be identified with an equipment code starting with **LJ**, while the third digit gives the LHC point number and the fourth indicates which part of the machine is concerned.

6.3 Links with mechanical and installation drawings

A general drawing numbering system has been defined for all mechanical and installation engineering drawings and is in use since 1990. As it can be seen on the sketch below, the label which is marked on each drawing incorporates the equipment code, just after the machine code and before the drawing number.

L H C	V C S B _	0 0 1 4

The equipment code must be defined and registered in the CERN Drawings Directory (CDD), [3], before any mechanical engineering work can start. All the tools for filing, archiving and retrieving the drawings implemented in CDD are based on the equipment codes and the CDD administrator will issue regularly dictionaries of all equipment codes used in a given machine.

6.4 New equipment codes

New equipment codes are defined under the responsibility of the Group Leader concerned or the person he has assigned to this task. Annex 3 gives the current list of the relevant persons. The request for a new equipment code is then forwarded to the CDD Manager in the EST/ISS Group, who checks for name consistency and adds it to the database.

The CDD Manager in the EST/ISS Group keeps the chairman of the Parameter and Layout Committee and the LHC Project Assistant for Quality Assurance informed of newly created equipment codes. He also maintains the dictionary of equipment codes up-to-date.

7. Equipment location

7.1 Machine layout and definitions

The LHC, [1], will make use of two counter-rotating beams, in separate vacuum chambers but embedded in the same magnetic system. By definition, the beam which circulates clockwise is **Beam 1**, while the anti-clockwise beam is **Beam 2**. The LHC rings are made of eight regular **arcs**, separated by eight **long-straight sections**. The center of each long straight section coincides with the LEP points defined in Fig. 1. The two LHC rings physically cross at Points 1, 2, 5 and 8, where experiments are installed.

An LHC **sector** is the part of the machine in between two successive points. There are four even sectors, labeled S12, S34, S56, S78, and four odd sectors S23, S45, S67, S78.

An **octant** starts from the middle of an arc and ends in the middle of the following arc. Each octant bears the same number as the point which is at its middle, see Fig. 2.

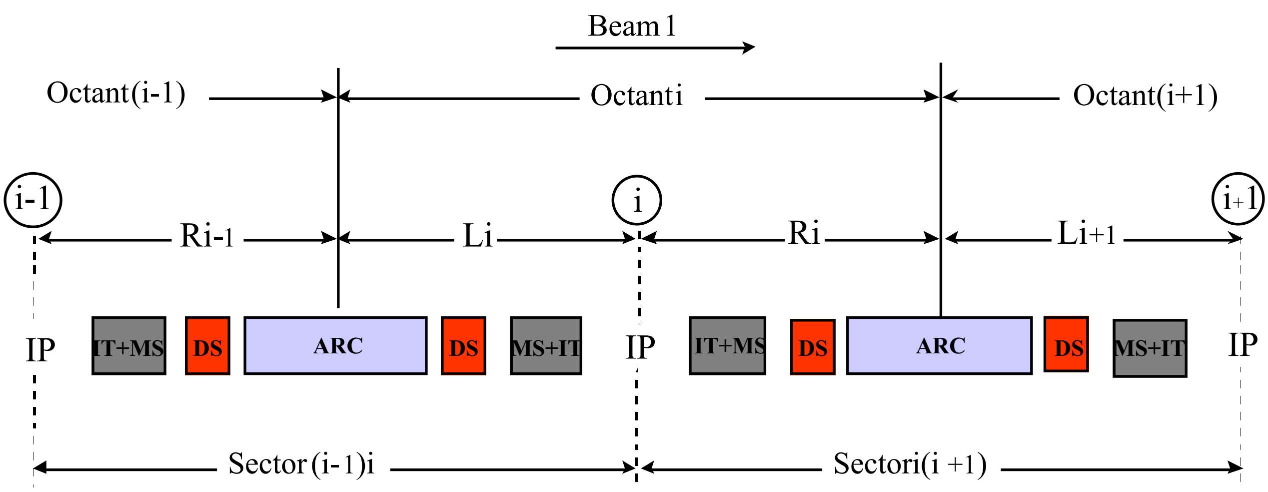

Fig. 2: Definition of the LHC ring subdivisions

The LHC lattice in the regular part of the arcs is made of 23 identical **cells** of the FODO type. A cell is in turn subdivided into two half-cells, each of which is being made of a **short-straight**

section (SSS), which houses the lattice quadrupole, and three dipoles. Quadrupoles are alternatively focusing and defocusing in each SSS. A quadrupole focusing for Ring 1 is defocusing for Ring 2 and vice versa. Reference is made to Ring 1 for fixing the polarity of a quadrupole and of its associated short straight section.

Each arc starts and ends with four special shorter half-cells which form what is called the **dispersion suppressor**. The magnetic elements contained in the straight part in between dispersion suppressors of an octant define the **Insertion**. The exact layout of this region depends on the specific use of the insertion: physics, injection, beam dumping, beam cleaning. Experimental insertions at Points 1, 2, 5 and 8 are anti-symmetric with respect to the collision point and can be split in **inner triplets** and **matching sections**, see Fig. 2.

7.2 Element identification

Any element installed in the LHC machine will be identified uniquely as follows:

Hardware Name • **Position** • **Family**

where • is a separator.

The **Hardware Name** is normally the equipment code defined in chapter 6 above. When there is no risk of confusion, it can be reduced to the so-called “custom name”, made of the first two or three letters of the equipment code which define the type of equipment.

The **Position** is a string of alphanumeric characters which is built following the rules given in the next paragraph and which allows to locate unambiguously any specific equipment in the machine.

The **Family** refers to the operational parameters or to the power supply to which a particular element is connected in series with other similar elements. For example, all focusing (defocusing) quadrupoles of Ring 1 are powered in series and belong to the same family.

7.3 Element position

7.3.1 Main quadrupoles

For each complete half octant of the machine, the main quadrupoles of the lattice are numbered continuously from 1 to 34, from the interaction point IP to the MIDARC position, see Fig. 3. In turn, each half octant will be localized by its left **L** or right **R** position with respect to the interaction point. Any main quadrupole will then be identified with the following string:

MQ•jLi or **MQ•jRi** , (j=1,34 and i=1,8)

Index j will not start at j=1 for i=3,4,6 and 7 but at j=3 for i=3,4 & 7 and at j=4 for i=6, in such a way that the lattice quadrupole at MIDARC position always bear the index j=34.

Quadrupole 34 of each arc is then special in the sense that its left half belongs to the half octant Ri, while its right part belongs to half octant L(i+1).

Identical quadrupoles, installed side by side and powered in series, will be distinguished by adding one letter, **A**, **B**, ... in front of index j. For instance, the twin modules of the central quadrupole of the left(right) inner triplet in a high luminosity insertion are labeled:

MQX•A2L(R)i and **MQX•B2L(R)i** , (i=1,2,5,8)

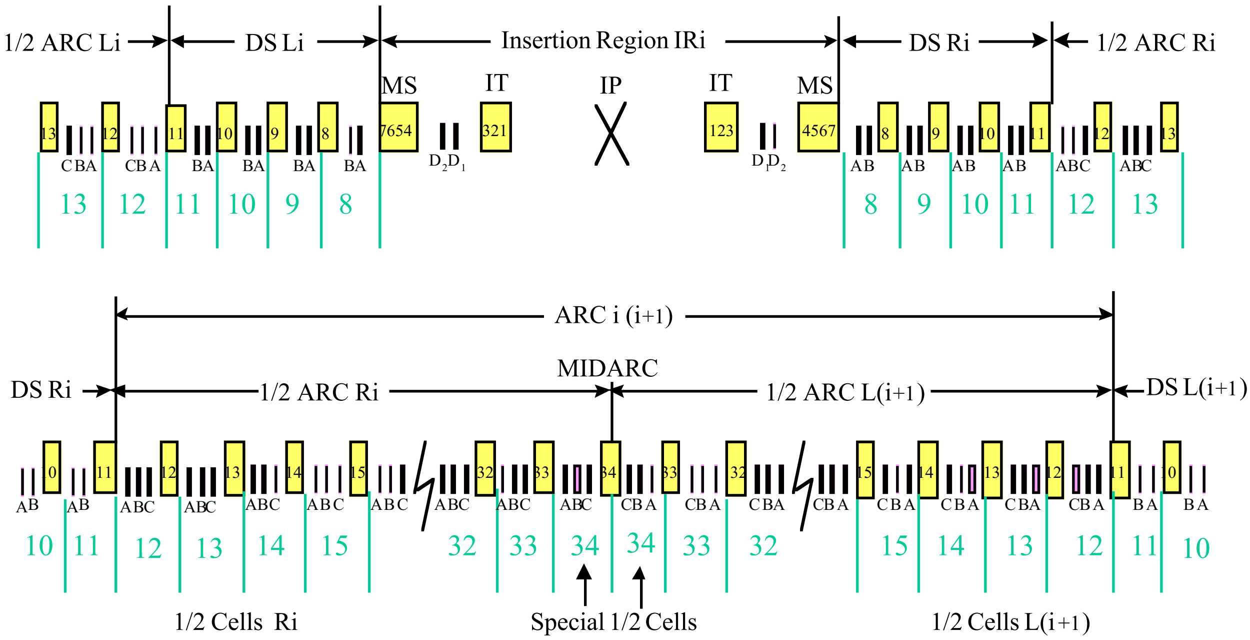

Fig. 3: Element localization in an arc

7.3.2 Half cells

In each dispersion suppressor and half arc on the left of an interaction point, the half cells will bear the same position identifier as the quadrupole on their left, while half cells of this octant but situated on the other side of the same interaction point will be referenced to the quadrupole on their right (Fig. 3). Half cells **34Ri** and **34L(i+1)** are special as they have only one half lattice quadrupole.

7.3.3 Elements in half cells

Elements inside half cells are localized with their hardware name and the position identifier of the half cell they are belonging to. Identical elements powered in series will be differentiated by adding a letter, A, B, C in front of index j. Example:

MB•A(B,C)jL(R)i Bending magnet in the arcs , (j=11,34 and i=1,8)

MB•A(B)jL(R)i, Bending magnet in the dispersion suppressor, (j=7,10 and i=1,8)

8. Related Documentation

[1] The Large Hadron Collider, Conceptual Design, The LHC Study Group, CERN/AC/95-05, 20 October 1995.

[2] Installation du LEP - Plan d'Hygiène et deSécurité - Règlement de Chantier, CERN 1982.

[3] CDD, the CERN Drawing Directory, User Manual, by C. Delamare, I. Fernandez, F. Jeanin, S. Petit, CERN, EST/ISS, 15 May 1996 see also the CDD information page on WWW at http://wwwlhc01.cern.ch:8005/doc/cdd_info.html.

[4] TDS Tagnaming Convention, H. Laeger, P. Ninin, CERN ST/CM/96-12 A1, September 1996.

[5] Base de Données pour les Installations Electriques, Annex C3, J.C. Guillaume, Note ST-IE/91-460, December 1991.

Appendix 1
List of Works Types

A1 - 1. Pits

Works Type	Description
PGC	Pit for civil engineering work
PM	Machine pit
PMI	Pit for machine installation
PX	Access pit for experiment (material)
PZ	Personnel access pit for experiment

A1 - 2. Ring parts

Works Type	Description
R	Ring tunnel, standard diameter 3.80 m
RA	Ring tunnel, part for accelerating cavities, diameter 4.40 m
RB	Ring tunnel, low beta insertion region, diameter 4.40 m
RE	Electrical alcove
RI	Ring tunnel, diameter enlarged to 4.40 m
RM	Ring tunnel, enlargement for reference magnets
RT	Ring tunnel, diameter enlarged to 5.50 m
RZ	Ring tunnel, local enlargement to 5.50 m

A1 - 3. Surface buildings

Works Type	Description
SA	Surface building, radio-frequency equipment
SD	Surface building, material unloading on top of PM pits
SDH	Building for surface cryogenic boxes
SDI	Surface building, material unloading on top of PMI 2

A1 - 3. Surface buildings (Cont'd)

Works Type	Description
SDX	Surface building, on top of PX pits
SE	Electrical sub-station
SEE	Electrical sub-station, EdF part, 20 kV
SEF	Electrical sub-station, active filters
SEM	Electrical sub-station, medium voltage distribution
SEQ	Electrical sub-station, compensator bldg
SES	Electrical sub-station, safety
SF	Pumping station and cooling towers
SG	Surface building, gas mixing
SHE	Platform for gas helium storage
SHM	Helium compressor building, machine
SHX	Helium compressor building, experiment
SL	Liaison gallery
SLU	Aerial liaison gallery
SM	Magnet assembly hall
SMI	Magnet preparation hall beside SDI
SP	Fire brigade building
SR	Surface building, power converters
SRK	Housing for klystron HV transformers
SU	Surface building, cooling and ventilation
SUP	Temporary building for ventilation
SUX	Ventilation of SX building
SW	General purpose building
SX	Building for experiment
SXC	Building for experiment, controls
SY	Access control
SZ	Personnel access

A1 - 4. Tunnels

Works Type	Description
TD	Tunnel for beam dump
TI	Transfer tunnel, injection
TU	Ventilation gallery
TX	Liaison with Experiment
TZ	Access gallery

A1 - 5. Underground works

Works Type	Description
UA	Klystron gallery
UD	Cavern for beam dump
UJ	Junction chamber
UL	Liaison gallery between underground works
ULX	Liaison gallery for Experiment
UP	Liaison gallery for personal
UPX	Liaison gallery for experiment
UR	Cavern for power converters
US	Service cavern
USA	Service cavern for Atlas
USC	Service cavern for CMS
UW	Underground cooling station
UX	Underground experimental hall

Appendix 2

List of Equipment Codes

Letters in parenthesis indicate other options for the preceding digit

A2 - 1. Acceleration

Equipment Code	Description
ABD	Beam pick-up for dampers and RF control
ABW	Wideband pickup for RF control
ACS	Superconducting cavity
ADL	Longitudinal damper
ADT	Transverse damper

A2 - 2. Beam instrumentation

Equipment Code	Description
BCT	Beam current transformer
BCW	Wall current monitor
BEGH(V)	Secondary emission grid, horizontal (vertical)
BEUV	Synchrotron radiation telescope
BEWH(V)	Wire scanner horizontal (vertical)
BLM	Beam loss monitor
BPH(V)	Beam position monitor, horizontal, (vertical)
BPIH(V)	Beam position monitor, injection line, horizontal, (vertical)
BPIM	Beam position monitor, injection line, horizontal & vertical
BPM	Beam position monitor horizontal and vertical
BPMD	Beam position monitor horizontal and vertical, directional
BPME	Beam position monitor horizontal and vertical, enlarged
BSH(L,V)	Schottky monitor, horizontal, (longitudinal, vertical)
BTV	Screen and TV camera

A2 - 3. Communication and controls

Equipment Code	Description
CC	Crate, connected to field buses
CF	Field bus, communication equipment below hosts
CH	Host computer, connected to control network
CI	Intercom and public address system
CN	Control network
CR	Radio, wireless communication
CS	Slow timing system
CT	Telephone, cabled
CV	Video system

A2 - 4. Electrical distribution and quench protection

Equipment Code	Description
DC	Cold bus bar
DCB	Super-conducting bus bars for dipole circuit
DCC	Super-conducting bus bar, auxiliary circuits
DCQ	Super-conducting bus bar for quadrupole circuit
DF	Electrical feed system
DFB	Electrical feed box
DFL	Current lead
DQ	Quench protection systems
DQD	Quench protection diode
DQR	Quench extraction resistor
DQS	Quench extraction switch
DW	Warm bus bar

A2 - 5. AC Electrical Distribution

Equipment Code	Description
EA	380V, no-break supply
EB	380V, normal network, general services

Equipment Code	Description
EC	48 Volts DC for controls
ED	Reserved for DC magnets supply
EE	20 kV network from EdF
EF	18 kV security
EH	High-voltage network, (66kV, 130 kV, 400 kV)
EK	3.3 kV network for compressors
EM	18 kV network (medium voltage)
EP	220 V, anti-panic lightening
ER	380 V supply for rectifiers
ES	380 V, safe network (not cut by emergency stop)
ET	Reserved for telecommunication
EU	Emergency stop network
EV	Auxiliaries for vacuum
EX	380 V for experiments
EZ	380 V for RF power plants

A2 - 6. Fluids

Equipment Code	Description
FA	Compressed air
FB	Raw water
FC	Hot industrial water
FF	Cold industrial water
FG	Chilled water
FL	Chilled water with glycol
FM	Mixed water
FP	Primary water
FR	Raw water
FU	Rejected water
FW	Demineralized water

A2 - 7. Supports

Equipment Code	Description
HQB	Warm support, cryostat dipole
HQQ	Warm support, cryostat short-straight section

A2 - 8. Layouts

A2 - 8.1 Assembly layouts

Equipment Code	Description
LBA_(X)	Arc cryo-dipole (manufactured by X)
LBD_(X)	Cryo-dipole, dispersion supp. type (manufactured by X)
LBM	Dipole cold mass
LI	Cryo-magnet interconnection
LQA_(O,S,T)	Arc short straight section, with corrector(1)
LQD_(O,S,T)	Short-straight section, dispersion sup. type, with corrector(1)
LQM	Short-straight section cold mass
LV	Vacuum assembly layout

(1) The last letter refers to the corrector installed in the short straight section: Octupole, Skew or Tuning quadrupole, ...

A2 - 8.2 Installation layouts

Equipment Code	Description
LJ	General installation layouts
LJnP(R, S ,T, U)	Installation layouts at point n (n=1,2,...,8), P = Pit (R = Ring, S = Surface, T = Tunnel, U = Underground)

A2 - 8.3 Schematic layouts

Equipment Code	Description
LSA	Arc layout
LSC	Cell or half-cell layout
LSD	DC electrical distribution
LSE	AC electrical distribution (mains)

Equipment Code	Description
LSI	Injection lines layouts
LSL	General machine layout
LSQ	Cryogenic distribution layout
LSS	Dispersion suppressor layout
LST	Ejection and dump layout
LSV	Vacuum layout
LSX_(1,2,...,8)	Insertion layouts at points 1,2,...,8

A2 - 9 Magnet system

A2 - 9.1 Dipole magnets

Equipment Code	Description
MB_	Main dipole, (3rd digit reserved)
MBRS	Separation dipole, RF insertion, single aperture
MBRT	Separation dipole, RF insertion, twin aperture
MBT	Separation dipole, twin aperture
MBW	Separation dipole, warm, single aperture (cleaning insertion)
MBX	Separation dipole, cold, single aperture
MBI	Dipole for injection line
MBIT	Dipole for injection line, tilted
MBL	Dipole magnet model, long (10 m)
MBP	Dipole magnet prototype, full length
MBS	Dipole magnet model, short (1 m)

A 2 - 9.2 Quadrupole magnets

Equipment Code	Description
MQ_	Lattice quadrupole in the arc, (3rd digit reserved)
MQI	Injection line quadrupole
MQR	Quadrupole for RF Insertion
MQS	Skew quadrupole
MQT	Tuning quadrupole

Equipment Code	Description
MQTL	Tuning quadrupole, long
MQW	Warm quadrupole for cleaning (twin aperture)
MQX	Inner triplet quadrupole (single aperture)
MQXT	Inner triplet quadrupole (single aperture), trim
MQY	Wide aperture quadrupole (twin aperture)

A2 - 9.3 Corrector magnets

Equipment Code	Description
MCB(H,V)	Closed orbit corrector (horizontal, vertical)
MCIB(H,V)	Injection line orbit corrector (horizontal, vertical)
MCBW	Warm dipole corrector
MCBX	Inner triplet dipole corrector
MCBY	Wide aperture dipole corrector
MCD	Decapole corrector (spool piece)
MCQS	Inner triplet skew quadrupole corrector
MCS	Sextupole corrector (spool piece)
MCT	Inner triplet duo-decapole corrector
MCTS	Inner triplet duo-decapole skew corrector
MO	Octupole corrector
MSCB(H,V)	Combined sextupole-dipole corrector (horizontal, vertical)

A2 - 9.4 Miscellaneous

Equipment Code	Description
MKBH(V)	Diluter pulsed magnet, horizontal(vertical)
MKD	Ejection dump kicker
MKI	Injection kicker
MM	Magnet measurement
MSD	Ejection dump septum
MSI	Injection septum

A2 - 10 Cryogenics

A2 - 10.1 Cryoplants

Equipment Code	Description
QRI	Interconnection box, ring tunnel
QRL	Cryoline distribution system, ring tunnel
QRS	Super-conducting bus bar assembly line, ring tunnel
QSC	Surface compressor
QSR	Surface refrigerator
QUI	Underground interconnecting box
QUF	Underground cryo-feedbox
QUR	Underground refrigerator
QURC	Underground refrigerator and compressor unit
QUS	Underground super-conducting bus bar assembly line

A2 - 10.2 Machine cryostats

Equipment Code	Description
QB_(A,D,X)	Cryostat for dipole (arc, disp. suppressor, insertion)
QBH	Cold support post for dipole
QQ_(A,D,X)	Cryostat for SSS or quadrupole (arc, disp. supp., insertion)
QQH	Cold support post for SSS
QQS	Cryostat for SSS, technical service module
QQV	Vacuum barrier

A2 - 11 General safety

Equipment Code	Description
SE	Evacuation
SF	Fire detection
SG	Flammable gas detection
SL	Lift
SO	Oxygen deficiency
SR	Red telephones

Equipment Code	Description
SU	Emergency stops
SW	Water leak detection
SX	Emergency exit

A2 - 12 Targets and collimators

Equipment Code	Description
TAN	Beam absorber (neutrals)
TAS	Beam absorber (secondaries)
TCA	Secondary collimator for cleaning, 30° phase shift
TCB	Secondary collimator for cleaning, 90° phase shift
TCC	Secondary collimator for cleaning, 150° phase shift
TCI	Collimator, injection line
TCPH(V;S)	Primary collimator for cleaning, horizontal (vertical, skew)
TDE	Dump for ejected beam, external
TDI	Beam stopper for injection

A2 - 13 Ventilation and air conditioning

Equipment Code	Description
UA	Air conditioning
UC	Heating
UR	Water cooling

A2 - 14 Vacuum

Equipment Code	Description
VCCB	Cold bore, dipole
VCCQ	Cold bore, quadrupole
VCSB	Internal beam screen, dipole
VCSQ	Internal beam screen, short straight section
VVP	Vacuum valve and pumping station
VVPE	Vacuum valve and pumping station, enlarged version

Appendix 3

List of persons in charge of equipment codes

Equipment code starting with	System Definition	Person in charge
A	Acceleration	T. Linnecar
B	Beam instrumentation	C. Fischer
C	Controls, communications	R. Lauckner
D	Electrical distribution	P. Proudlock, L. Coull
E	Electricity	J.C. Guillaume
F,U	Fluids, ventilation and water	M. Wilhelmsson
G	Survey and geodesy	J.P. Quesnel
H	Mechanics, supports	M. Mathieu
I	Injection	A. Hilaire
J	Infrastructure	C. Ferigoule
K	Civil engineering	L. Symons
LJ LS LB,LQ	Layouts	C. Ferigoule P. Lefèvre A. Poncet
MB, MQ MC MQX	Main ring magnetic elements Harmonic correctors Insertions magnets	C. Wyss A. Ijspeert R. Ostojic
QR,QS,QU QB,QQ	Cryogenic equipment	U. Wagner A. Poncet
R	Power converters	P. Proudlock, G. Fernqvist
P	Personnel and radiation protection	G.R. Stevenson
S	General safety	L. Henny
T	Targets	A. Hilaire, J.B. Jeanneret
V	Vacuum	P. Strubin
X	Experiments	tbd
Y	Access system	P. Ciriani

End