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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMITTEE OF ACTION

ADVISORY COMMITTEE ON ELECTRONICS

AND TELECOMMUNICATIONS (ACET)

Proposal for data element standardization to serve as a basis for the creation of an IEC library of technical data elements. Clauses 1 to 6

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Introduction

With reference to the discussions of ACET/WG4 on technical data element standardization and the Chairman's offer to make available the results of work on this subject within his company as a contribution to the creation of an IEC technical data element library for worldwide use, the document is herewith circulated to ACET/WG4 members.

Since at many places development work is done on databases including information on electronic components, the availability of this material was considered urgent to avoid unnecessary duplication of work and as a basis for a harmonization of approaches of individual companies or interest groups and possible centralization of technical data element standardization. This harmonization is essential to avoid that incompatibility in definition and presentation of identical information on electronic components from various sources would cause great discomfort to the users of such databases.

As a consequence of the pressure to submit the proposals now, there was no possibility to "neutralize" the available material to prevent that at several places the name of the company that made this contribution is shown. It was decided that this is acceptable under the present circumstances and will be corrected later.

This document will also be made available to participants in the ACET meeting for their information and to underline the necessity for IEC to undertake action. Wider circulation will also depend on the outcome of the discussions in ACET on the ACET/WG4 report.

For practical reasons, this document has been split into 3 pieces.
This is piece No. 1.

DRAFT STANDARD DATA ELEMENTS

FOR THE

PHILIPS COMPONENT DATABASE

FOREWORD

Computerized systems offering on-line information on electronic and mechanical components have been available for several years now, and many new systems are presently approaching the operational stage. The amount of data they contain grows at an exponential rate.

As the number of sources of data (manufacturers, suppliers) and the number of users (engineers, designers etc.) increases and when different systems are being interconnected, the quality of the data is progressively being jeopardized by lack of discipline at the introduction of new concepts and values in the system.

Many present day systems suffer from ill-defined concepts, often only identified by names, contaminated with synonyms and homonyms, and frequently in conflict with existing international standards. Limited charactersets obstruct the usage of standard letter symbols and mathematical signs familiar to the users. Lack of restrictions at the input results in polluted value sets of the data fields.

Standardization of data elements aims at improving the quality of data by:
- unique identification of the concepts employed
- unambiguous definition of their meaning
- optimum use of existing international standards (IEV etc.)
- extension of the characterset
- restriction of permissible values.

CONTENTS

1. SCOPE AND FIELD OF APPLICATION

This draft standard contains the specifications of technical data elements of electric, electronic and electromechanical components. It is intended to facilitate the communication of meaningful, unambiguous data on components via computerized information systems, from the source to the user, primarily the designer of electronic equipment.

2. DEFINITIONS

For the purpose of this standard the following definitions apply.

Data Daten	A representation of facts, concepts or instructions in a formalized manner suitable for communication, interpretation, or processing by human beings or by automatic means.
Data element Datenelement	A definable and identifiable elementary unit of data representing information about a property of a component. It consists of a data element value, the meaning and representation of which are in conformity with a data element specification.
Data element specification Datenelementspezifikation	An identified set of characteristics defining the meaning, representation and form of a piece of information. It includes the definition of a domain of one or more permissible values to represent information about a fact or event in one or more forms.
Data element values Datenelementwert	The representation of a particular value out of the set of permissible values pertaining to a data element specification.
Data element value format Datenelementwertformat	A specification in character form of the layout of the value of a data element. Note: It specifies the type of characters permissible in each location as well as the maximum number of characters allowed.
Quantitative data element Datenelement Menge	A data element with a numerical value, representing a physical quantity, a quantity of information or a count of objects.
Non-quantitative data element nicht quantifizierbares Datenelement	A data element which identifies or describes an object by means of names, codes, descriptors, references, etc.

3. CHARACTERSET

The characterset used in this standard is the ASCII characterset of ISO 646. In the near future it will be extended to include the technical/scientific characterset of ISO.

4. DATA ELEMENT SPECIFICATION ASPECTS

In this section the various aspects of data elements as encountered in the specifications and indexes are explained (see fig. 1).

4.1 Component class

Each data element applies to a broader or narrower range of components, determined by class, subclass, etc. The class is printed on top of the page, the subclasses (in capitals) between the data elements.
Data elements at higher levels in the hierarchy usually apply to all components at lower levels. Data elements which are valid only for a limited number of subclasses are repeated in each relevant subclass.

4.2 Data element code

Each data element is uniquely identified by a four character code. The codes are issued chronologically and have no relationship with the meaning of the data elements.

4.3 Data element type class code

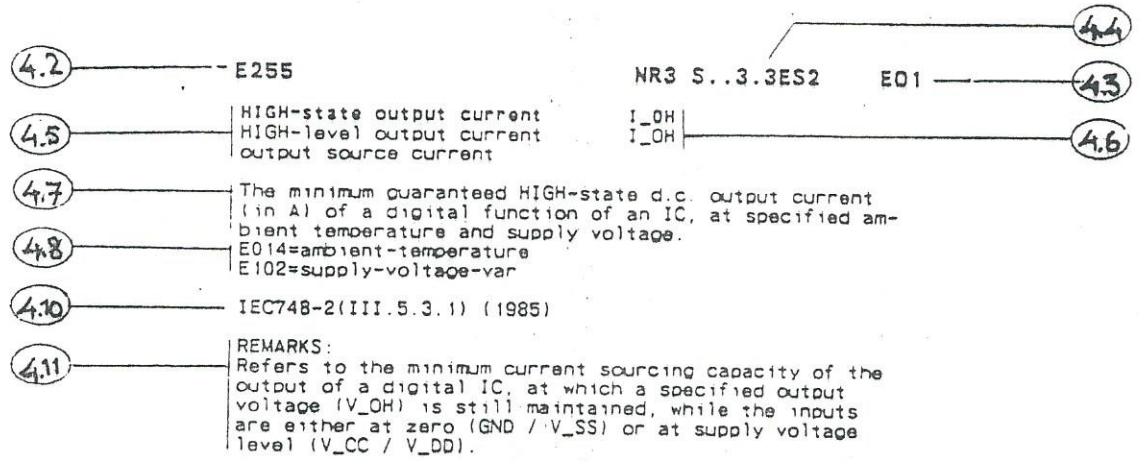
Data elements are classified in main classes and classes, identified by a capital and two digits respectively, according to the kind of data they represent. This has no relation with the component class of 4.1 but it brings together data elements related to same physical quantity e.g. temperature, voltage, capacitance etc. for comparison and maintainability purposes.

The meaning of the main class codes is as follows:

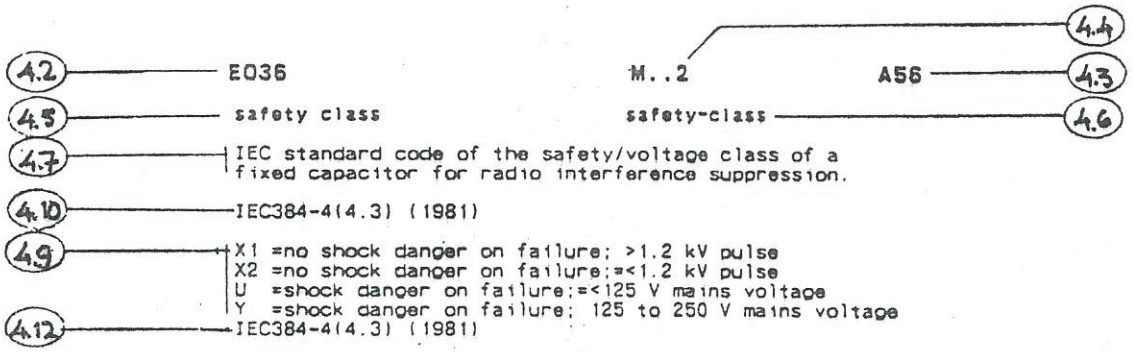
Main classes
A. non-quantitative data elements

All other main classes are related to quantitative data elements of:
C. Physical Chemistry and Molecular Physics
E. Electricity and Magnetism
F. Periodic and related phenomena
G. Acoustics
H. Heat
J. Information
K. Mechanics
L. Light and related Electromagnetic Radiation
Q. Counts
T. Space and Time
U. Atomic and Nuclear Physics
V. Nuclear Reactions and Ionizing Radiations
W. Solid State Physics

The main classes for physical quantities correspond with the chapters of ISO 31 "The International System of Units (SI Units)".
More details of the type classification are given in section 5.



Quantitative data element



Non-quantitative data element

4.2 Data element code
4.3 Data element type class code
4.4 Data element value format
4.5 Preferred name and synonym names
4.6 Short name and symbols
4.7 Formal definition
4.8 Conditions, qualifiers, reference data elements
4.9 Values
4.10 Source document of definition
4.11 Remarks
4.12 Source document of values

Fig. 1 Layout of data element specifications in section 7 (numbers refer to paragraphs of section 4).

4.4 Data element value format

The format specifies the type and length of the representation of the data element values. It is intended as a maximum format for communication and data base storage.

The meaning of the format indications is as follows:

a. **Non-quantitative data**
   A = alphabetic, letters only
   M = mixed, all characters allowed
   X = alphanumeric

b. **Quantitative data**
   According to ISO 6093: "Representation of numerical values in character strings for information interchange".
   NR1 = integers
   NR2 = rational numbers with decimal-mark (reals)
   NR3 = rational numbers with decimal-mark and exponent-mark (floating point)
   S = signed (positive or negative)
   . = decimal-mark
   E = exponent-mark, base 10: (A)E(B) represents the value $Ax10^B$

c. **Field length**
   Indicated by a single digit or by the sum of the digits and other characters. Two dots before the first digit indicates fields of variable length.
   The following standard formats have been defined:
   M..6
   NR1..4
   NR1 S..4
   NR2..3.3
   NR2 S..3.3
   NR2..3.3.ES2
   NR3 S..3.3ES2

M..6
NR1 3 5 stod.-
NR2 3.3 5
NR3 3.3 5 2

4.5 Names

The preferred name, printed in bold, is usually identical to the name in international standards, if available. For practical purposes up to three synonyms are allowed and printed below the preferred name. The maximum length of all names is 30 characters.

4.6 Short names/symbols

The short name, printed in bold, is a name of 15 characters maximum used for presentation of data on screens in two column layout. Its character set is limited to alphanumeric characters and some special signs: - _ / @ # &. Spaces are not allowed. The first character is always a letter. The preferred and synonym symbols printed below the short name are intended to be identical to the international standard letter symbols with Greek letters, subscripts, superscripts, etc. To this aim the character set will be extended in the near future, to include all characters of the ISO scientific/technical set.

4.7 Definition

This is a definition of the meaning of the data element, corresponding to a definition in an International Standard, if available. It is a formal definition in the sense that is must be complete and unambiguous, and that all significant words are free from hononymy and synonymy. These words are stored as standard terms in a data dictionary.

For formal reasons the definition may differ slightly from the original IEC or ISO definition. Some tentative definitions contain the phrase: "Philips standard code ...". They will be adapted as soon as agreement is reached on international codes.

4.8 Conditions, qualifiers, reference data elements

Many quantitative data elements have values which depend on the values of one or more independent variables or conditions. These conditions are defined as separate data elements and their codes are listed below the definition in which they occur. The definitions of conditions always contain the phrase "as a variable".
Qualifiers are non-quantitative "conditions" which give a generic data element a specific meaning e.g. E682 = level, with values maximum, nominal etc.
Reference data elements are fixed conditions (e.g. E017 = reference temperature) or denominators to which ratios and levels (in % or dB) are referred.

4.9 Values

Most non-quantitative and some quantitative data elements have a restricted set of "permissible values". If those value sets contain names, they are abbreviated for communication efficiency, and stored as standard terms in the thesaurus.

4.10 Source document of definition

This is a reference to the source document, generally an International Standard, from which the data element definition was derived.

4.11 Remarks

Free text remarks may be added, to further clarify the meaning of the data element.

4.12 Source document of values

This is a reference to the document which defines the meaning of the values (codes).

4.13 Layout of sections 6-10

Section 6 : contains a survey of data elements, sorted alphabetically according to:
a. component class (see 4.1)
b. data element type class (see 4.3)
c. preferred name (see 4.5)
Column 3 in the survey of data elements in section 6 contains an indication of the release status with the following meaning:
0 = preliminary
1 = approved by component expert
2 = circulated for comments to PCD Release Board
3 = change proposal pending
4 = approved by PCD Release Board
5 = approved by Office of Data Element Standards

Section 7 : contains the data element specifications, sorted in the same way as section 6

Section 8 : is an index on data element codes (see 4.2)

Section 9 : is an alphabetical index on shortnames and symbols (see 4.6)

Section 10: is a KWIC index on significant words from preferred names and synonym names (see 4.5)

5. DATA ELEMENT TYPE CLASSIFICATION

5.1 Survey of issued type classification codes of non quantitative element types (main class A)

Type classification code	Description
A11	Geographical Units (greater than a place)
A12	Geographical Locations (place or smaller)
A13	Geographical Routes and Networks
A21	Organizations
A22	Functionaries
A31	Dates and Time Periods
A32	Times of Day
A41	Private Persons
A51	Products
A52	Product Classes
A53	Product Batches and Packages (types)
A54	Transport-modes, -means and -units
A55	Manufacturing Processes and Technology
A56	Product Function and Application
A57	Material
A58	Product-geometry, -shape, - size
A59	Product-quality, -performance, -test

Type classification code	Description
A61	Documents and Messages
A62	Information Elements and Information Groups
A63	Data Media and Transmission Units
A71	Measuring Units
A79	Types of Measurement
A81	Accounts
A82	Projects, Project Activities
A83	Procedures
A91	Abstract Identifications such as language, colour etc.
A93	Clauses
A99	Other Identifications, not classified elsewhere

5.2 Structure of the classification of information and physical quantities

The classification of physical quantity data elements closely follows the structure of International Standard ISO 31: "The International System of Units (SI Units)", using the following general rules:

a. The classification has two levels: main classes and classes identified by a single capital and two digits respectively.
b. The main classes correspond to the chapters of ISO 31 reflecting main areas of physics, e.g. "Space and Time", "Mechanics", Heat", etc.
c. The main classes are subdivided into classes of physical quantities exactly as in ISO 31 e.g. T09: "velocity", K01: "mass", H12: "thermal resistance".

In addition the following specific rules apply:

d. For quantities occurring in various parts of ISO 31, their physical aspect is decisive for the classification, e.g. wavelengths of light and sound are classified in class L03 or G05 respectively.
e. ISO classes containing a physical constant are not used, e.g. E32/L05: "speed of light", L15: "Stefan-Boltzmann constant".
f. Dimensionless ratios of identical quantities, expressed as fractions or percentages are classified in the same class as the quantity from which they originate e.g. "current-gain of a transistor" in class E01, "resistance tolerance of a resistor" in class E33.
This is different from the business quantities, where ratios are classified separately in main class R.
g. Derived quantities not occurring in ISO 31 are classified in the class of the numerator, e.g. "steepness of a voltage pulse" (in V/s) in class E06.

Information quantity data elements are classified in main class J and subdivided into classes based on definitions from ISO 2382 "Data Processing Vocabulary".
The type classification code is J followed by two digits.

5.3 Survey of type classification codes of quantitative data element types

In this survey the complete classification and title per main class are given in alphabetical order of main class code.

C PHYSICAL CHEMISTRY AND MOLECULAR PHYSICS

No type classification codes allocated.

E QUANTITIES OF ELECTRICITY AND MAGNETISM (ISO 31 part 5)

E01	current	A
E02	charge	C
E03	volume density of charge	C/m^3
E04	surface density of charge	C/m^2
E05	electric field strength	V/m
E06	voltage	V
E07	electric flux density	C/m^2
E08	electric flux	C
E09	capacitance	F
E10	permittivity	F/m
E11	relative permittivity	-
E12	electric susceptibility	-
E13	electric polarization	C/m^2
E14	electric dipole moment	Cm
E15	current density	A/m^2
E16	linear current density	A/m
E17	magnetic field strength	A/m
E18	magnetic potential difference	A
E19	magnetic flux density	T
E20	magnetic flux	Wb
E21	magnetic vector potential	Wb/m
E22	self inductance, mutual inductance	H
E23	coupling coefficient, leakage coefficient	-
E24	permeability	H/m
E25	relative permeability	-
E26	magnetic susceptibility	-
E27	magnetic moment	Am^2
E28	magnetization	A/m
E29	magnetic polarization	T
E30	electromagnetic energy density	J/m^3
E31	Poynting vector	W/m^2
E32	not used	
E33	d.c. resistance	ohm
E34	d.c. conductance	S
E35	resistivity	ohm.m
E36	conductivity	S/m
E37	reluctance	H^{-1}
E38	permeance	H
E39	not used	
E40	phase difference	rad
E41	impedance, modulus of impedance, reactance, resistance	ohm
E42	quality factor	-
E43	admittance, modulus of admittance, susceptance, conductance	S
E44	power	W

F QUANTITIES OF PERIODIC AND RELATED PHENOMENA (ISO 31 part 2)

F01	period, periodic time	s
F02	time constant of an exponentially varying quantity	s
F03	frequency, rotational frequency	Hz, s^{-1} r/min r/s
F04	angular frequency, circular frequency	rad/s s^{-1}
F05	wavelength	m
F06	wave number, circular wave number	m^{-1}
F07	amplitude level difference, field level difference	Np dB
F08	power level difference	Np, dB
F09	damping coefficient	s^{-1}, Np/s
F10	logarithmic decrement	Np
F11	attenuation coefficient, phase coefficient, propagation coefficient	m^{-1}

G QUANTITIES OF ACOUSTICS (ISO 31 part 7)

G01	period, periodic time	s	G18	acoustic impedance	$Pa.s/m^3$
G02	frequency	Hz	G19	mechanical impedance	N.s/m
G03	frequency interval	octave	G20	sound pressure level	dB
G04	angular frequency	s^{-1}	G21	sound power level	dB
G05	wavelength	m	G22	damping coefficient	s^{-1}
G06	circular wave number	m^{-1}	G23	time constant, relaxation time	s
G07	density (mass density)	kg/m^3	G24	logarithmic decrement	Np
G08	static pressure, sound pressure	Pa	G25	attenuation coefficient, phase coefficient, propagation coefficient	m^{-1}
G09	sound particle displacement	m	G26	dissipation coefficient, reflection coefficient, transmission coefficient, acoustic absorption coefficient	-
G10	sound particle velocity	m/s			
G11	sound particle acceleration	m/s^2			
G12	volume flow rate, volume velocity	m^3/s			
G13	velocity of sound	m/s	G27	sound reduction index, sound transmission loss	dB
G14	sound energy density	J/m^3	G28	equivalent absorption area of a surface or object	m^2
G15	sound energy flux, sound power	W	G29	reverberation time	s
G16	sound intensity	W/m^2	G30	loudness level	phon
G17	characteristic impedance of a medium, specific acoustic impedance	Pa.s/m	G31	loudness	sone

H QUANTITIES OF HEAT (ISO 31 part 4)

H01	thermodynamic temperature	K	H16	ratio of specific heat capacities, isentropic exponent	-
H02	Celsius temperature	°C			
H03	temperature coefficient	K^{-1}			
H04	pressure coefficient	Pa/K	H17	entropy	J/K
H05	compressibility	Pa^{-1}	H18	specific entropy	J/kg.K
H06	quantity of heat, heat	J	H19	internal energy, enthalpy, Helmholtz free energy, Helmholtz function, Gibbs free energy, Gibbs function	J
H07	heat flow rate	W			
H08	density of heat flow rate	W/m^2			
H09	thermal conductivity	W/m.K			
H10	coefficient of heat transfer	W/m^2K	H20	specific internal energy, specific enthalpy, specific Helmholtz free energy, specific Helmholtz function, specific Gibbs energy, specific Gibbs function	J/kg
H11	thermal insulance, coefficient of thermal insulation	m^2K/W			
H12	thermal resistance	K/W			
H13	thermal diffusivity	m^2/s			
H14	heat capacity	J/K			
H15	specific heat capacity at: constant pressure, constant volume, saturation	J/kg.K	H21	Massieu function	J/K
			H22	Planck function	J/K

J QUANTITIES OF INFORMATION

J01	wordlength, storage capacity, register length	bit, byte, word	J04	volume storage density	bit/m^3
			J05	transmission rate	bit/s, Bd
J02	linear storage density	bit/m	J06	error rate, code rate, efficiency	-
J03	surface storage density	bit/m^2			