ANSI HISPP MSDS: COMMON DATA TYPES

For Harmonization of Communications Standards in Medical Informatics

FINAL DRAFT

MSDS Subcommittee on Common Data Types
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1.0. DateTime

The DateTime data type provides implementors a means of performing a detailed "time stamp" function. Also see: "Date" and "Time" common data type definitions.

1.1. Reference: ISO-8601:1988

1.2. Rationale: This format is based on an international standard (ISO-8601-1988). It is widely used in ASN1, HL7, ASTM 1238-91 (for transferring clinical observations), ASTM 1467-91 (digital neurophysiological data), ASTM 1239-88 (R-ADT Systems), and CEN. The components of DateTime are arranged in descending order of significance to provide a natural format for chronological sorting and filing of records

1.3. Conventions:

1.3.1. In this character representation of DateTime, the use of colons between hours, minutes, and seconds is prohibited.

1.3.2. The insertion of a "T" between the concatenated Date and Time components is prohibited.

1.3.3. Syntax: CCYYMMDDHHMMSS.FFFFFF

1.3.3.1. Definitions:
In the Date component: CC = Century, YY = Year, MM = Month, and DD = Day. In the Time component, HH = Hour, MM= Minute, SS = Second, and FFFFFF = Fractional Second.

1.3.3.2. Range of Values:
The values of the variables in the DateTime string shall be limited as follows: In the Date component: CCYY = "0000" to "9999"; MM = "01" to "12"; DD = "01" to "28", "29", "30", or "31", depending on the month. In the Time Component: HH = "00" to "23"; MM = "00" to "59"; SS = "00" to "59"; FFFFFF = "000000" to "999999". The daily transition of Date values shall occur at the Time of "000000.000000". Standards developers shall make provision for receiving systems that require less than six digits of precision in the Fractional Second component to ignore any unneeded trailing decimal places without adversely affecting interoperability. (Explanatory note: A receiving application entity that represents Time values with low precision shall not return error messages to a sending application entity that represents Time values with higher precision.)

1.3.4. A 24-hour clock and the Gregorian calendar shall be used.

1.3.5. Standards developers shall make provision for up to six decimal places to be supported in the fractional seconds component. For applications requiring higher precision, standards developers may specify the use of unlimited decimal places.

1.3.6. Fractional seconds shall be separated from seconds by a decimal point.

1.3.7. Trailing null components of DateTime shall be ignored. No default value is implied in the trailing null components.

1.3.8. Non-trailing null components are prohibited.

1.3.9. When sending and receiving systems agree that the offset of local time from Universal Coordinated Time (UCT) must be conveyed, the offset from UCT shall be represented by a Time Offset Suffix appended to the DateTime string of Section 1.3.3. The format of the Time Offset Suffix shall be +/- HHMM, where HHMM = hours (range = "00" to "23"); minutes (range = "00" to "59"). Trailing null components of a Time Offset Suffix shall be ignored. Standards developers shall make provision for receiving systems that do not require the Time Offset Suffix to ignore it without adversely affecting interoperability.

1.4. Example:

19930416115450.5 represents "16 April, 1993, at 11:54:50.5 in the morning".

19930416115450.500000 represents "16 April, 1993, at 11:54:50.500000 in the morning".

2.0. Date

The Date data type provides implementors a means of performing an abbreviated "date stamp" function, when the time component is not required. The usage conventions are identical to the date portion of the DateTime common data type.

2.1. Example:

19930416 represents "16 April, 1993".

3.0. Time

The Time data type provides implementors a means of performing an abbreviated "time stamp" function. The usage conventions are identical to the time portion of the DateTime common data type.

3.1. Example:

115450.500000 represents "11:54:50.500000 in the morning", and the receiving system may elect to truncate any number of trailing components or decimal places, if this action will not adversely affect interoperability.

4.0. Coded Entry

4.1. References:

4.1.1. CEN/TC251/PT005 FFV Document. Health Care Informatics Interchange - Registration of Coding Schemes. Draft 1.2. Registration Procedures for the United States Joint Registration authority (US-JRA) to form U.S. National Registration Authorities. ANSI US Registration Authority Committee and US CCITT Study Group D, Message Handling Systems, Management Domain Subcommittee. Final Proposal Version 2.0.

4.1.2. ASTM E-1238-91.

4.2. Rationale: Three-element coded value representation is already widely embodied in applications based on ASTM, HL7, and CEN/TC251 standards.

4.3. Conventions:

4.3.1. A Coded Entry shall consist of three parts (also known as a "triplet"): Coding Scheme Designator, Code Value, and Code Meaning. Standards developers shall make provision for support of all three components. The number of these "triplet" groups that may be utilized simultaneously to encode a particular real world item is unrestricted. Coding Scheme Designator is also known as Coding System Designator; Code Value is also known as Code; and Code Meaning is also known as Text Description. CEN terminology and semantics have been adopted for the Coded Entry common data type (Reference CEN/TC251/PT005 FFV Document. Health Care Informatics Interchange - Registration of Coding Schemes. Draft 1.2).

4.3.2. The association of a Coding Scheme Designator with a Code Value might be communicated in several ways (see CEN TC251 PT005 FFV, Draft 1.2, page 6). The method by which a Coding Scheme Designator and a Code Value are associated in an information interchange is not specified by this document. Possible methods include specification of the association: a)within a prior agreement between the parties to the information interchange; b) within message implementation guidelines applicable to all messages of a particular type; c): within an information interchange in such a manner that it is applicable to several messages; d) within individual messages; e) within the representation of the coded value.

4.3.3. When a default coding scheme is specified elsewhere in a message or in the message standard itself, the "Coding Scheme Designator" and the "Code Meaning" components are not required. When a value is defined (transmitted) for both a "Coding Scheme Designator" and a "Code Value", the transmission of a "Code Meaning" is optional. If no value exists (or the value is unknown) for "Coding Scheme Designator", then a "Code Meaning" must be transmitted.

4.3.4. The ANSI HISPP MSDS supports the development of an international health care coding scheme registration authority. Until a Health Care Coding Schemes Register is available, an extended version of the ASTM coding scheme for coding systems shall be used for the Coded Entry and Units of Measure common data types (Tables 4.3.4-1 and 4.3.4-2; Reference: ASTM E-1238-91 and HL7).

> **Note**: Inclusion of a coding scheme in tables 4.3.4-1 or 4.3.4-2 is neither an endorsement of the issuing organization (Source) nor of the coding scheme. The ANSI HISPP MSDS has no control over the content of the coding schemes. The issuing organizations have full responsibility for the maintenance, accuracy, completeness, and integrity of their coding schemes.

TABLE 4.3.4-1. Diagnostic Coding Schemes

Coding Scheme	**Coding Scheme Desig-nator**	**Source**
American College of Radiology Index for Radiological Diagnosis	ACR	Index for Radiological Diagnosis Revised, 3rd Edition 1986, American Radiology finding codes. College of Radiology, Reston, VA.

CEN ECG diagnostic codes	CE	CEN PT007. A quite comprehensive set of codes (abbreviations) and descriptions codes published as a pre-standard by CEN TC251. Available from CEN TC251 secretariate, c/o Georges DeMoor, State University Hospital Gent, De Pintelaan 185-5K3, 9000 Gent, Belgium or Jos Willems, University of Gathuisberg, 49 Herestraat, 3000 Leuven, Belgium.
CLIP	CLIP	Simon Leeming, Beth Israel Hospital, Boston, MA. Codes for radiology reports.
ECG DX	ECGDX	CEN PT007 Georges DeMoor, M.D. State University Hospital Gent De Pintelaan 185-5K3 9000 Gent, Belgium
EUCLIDES	E	Available from Euclides Foundation International nv, Excelsiorlaan 4A, B-1930 Zaventem, Belgium; Phone: 32 2 720 90 60.
ICD9	I9	World Health Publications, Albany, NY.
ICD9-CM	I9C	Commission on Hospital and Professional Activities, 1105 Eisenhower Place, Ann Arbor, MI 48108
ICD-10	I10	World Health Publications, Albany, NY.
Local general code	99zzz	Locally defined codes for purpose of sender or receiver. Local codes can be identified by L (for backward compatibility) or 99zzz (where z is an alphanumeric character).
Local billing code	LB	Local billing codes/names (with extensions if needed).
Read Classification	RC	The Read Clinical Classification of Medicine, Park View Surgery, 26 Leicester Rd., Loughborough LE11 2AG (includes drug procedure and other codes, as well as diagnostic codes).
Systemized Nomenclature of Medicine (SNOMED)	SNM	Systemized Nomenclature of Medicine, 2nd Edition 1984 Vols 1, 2, American College of Pathology, Skokie, IL.
Systemized Nomenclature of Medicine (SNOMED). Version 3.	S3	Systemized Nomenclature of Medicine. Third Edition. American College of Pathology. Skokie, IL.
Unified Medical Language	UML	National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894.

TABLE 4.3.4-2. Procedure Observation/Drug ID/Health Outcomes Coding Schemes

Coding Scheme	**Coding Scheme Desig-nator**	**Source/Description**
ASTM	AS4	American Society for Testing & Materials and CPT4 (see Appendix A of ASTM E1238 and its codes revisions).
Universal		
CPT-4	C4	American Medical Association, P O Box 10946, Chicago, IL 60610.
CPT-5	C5	(under development - same contact as above)

EUCLIDES	E	AFP codes. Available from Euclides Foundation International nv, Excelsiorlaan 4A, B-1930 Zaventem, Belgium; Phone: 32 2 720 90 60.
FDA K10	FDK	Dept. of Health & Human Services, Food & Drug Administration, Rockville, MD 20857. (device & analyte process codes).
HIBCC	HB	Health Industry Business Communications Council, 5110 N. 40th St., Ste 120, Phoenix, AZ 85018.
ICCS	ICS	Commission on Hospital and Professional Activities, 1105 Eisenhower Place, Ann Arbor, MI 48108.
ICD-9CM	I9C	Commission on Hospital and Professional Activities, 1105 Eisenhower Place, Ann Arbor, MI 48108 (includes all procedures and diagnostic tests).
ICHPPC-2	ICHPPC	International Classification of Health Problems in Primary Care, Classification Committee of World Organization of National Colleges, Academies, and Academic Associations of General Practioners (WONCA), 3rd edition. An adaption of ICD9 intended for use in General Medicine. Oxford University Press.
ISBT	IBT	International Society of Blood Transfusion. Blood Group Terminology "1990". VOX Sanquines 1990 58(2):152-169.
IUPAC/IFCC	IUC	Recommendations of Quantities and Units in Clinical Chemistry DRAFT. Henrik Olesen, M.D., D.M.Sc., Chairperson, Department of Clinical Chemistry, KK76.4.2, Rigshospitalet, University Hospital of Copenhagen, DK-2200, Copenhagen.
Local	99zzz	Locally defined codes for purpose of sender or receiver. If multiple local codes exist, the format should be 99zzz, or Lwhere z is an alphanumeric character.
Medicare	MCR	Medicare billing codes/names.
Medicaid	MCD	Medicaid billing codes/names.
NCPDP	NCPDP	National Council for Prescription Drug Programs. 4201 North 24th Street, suite 365, Phoenix, Arizona 85016.
RVS	CRVS	California Relative Value Scale. Billing Codes
UCDS	UC	Uniform Clinical Data Systems. Ms. Michael McMullan, Office of Peer Review Health Care Finance Administration, The Meadows East Bldg., 6325 Security Blvd., Baltimore, MD 21207; (301) 966 6851.
Japanese Chemistry	JC8	Clinical examination classification code. Japan Association of Clinical Pathology. Version 8, 1990. A multiaxial code. including a subject code (e.g., Rubella = 5f395, identification code (e.g., virus ab IGG), a specimen code (e.g., serum = 023) and a method code (e.g., ELISA = 022)
Health Outcomes	HI	Health Outcomes Institute codes for outcome variables available (with responses) from Health Outcomes Institute, 2001 Killebrew Drive, Suite 122, Bloomington, MN 55425; (612) 858 9188. See examples in Appendix A.

Euclides Lab method codes	E6	Available from Euclides Foundation International nv, Excelsiorlaan 4A, B-1930 Zaventem, Belgium; Phone: 32 2 720 90 60.
Euclides Lab equipment codes	E7	Available from Euclides Foundation International nv (see above)
Euclides kind of quantity codes	E5	Available from Euclides Foundation International nv (see above)
Drug codes:		
British Approved Names	BAN	
Chemical abstract codes	CAS	These include unique codes for each unique chemical, including all generic drugs. The codes do not distinguish among different dosing forms. When multiple equivalent CAS numbers exist, use the first one listed in USAN. USAN 1990 and the USP dictionary of drug names, William M. Heller, Ph.D., Executive Editor, United States Pharmacopeial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852.
French-approved nonproprietary names	DCF	
International nonproprietary name	INN	
National drug codes	NDC	These provide unique codes for each distinct drug, dosing form, manufacturer, and packaging. (Available from the National Drug Code Directory, FDA, Rockville, MD, and other sources.)
WHO rec# drug codes	W1 W2	World Health organization record number code. A unique sequential number is assigned to each unique single component drug and to each multi-component drug. Eight digits are allotted to each such code, six to identify the active agent, and 2 to identify the salt, of single content drugs. Six digits are assigned to each unique combination of drugs in a dispensing unit. The six digit code is identified by W1, the 8 digit code by W2.
WHO rec#	W4	With ASTM extensions (see appendix A of ASTM 1238-91), the WHO codes can be used to report serum (and other) levels, patient compliance with ASTM ext. with drug usage instructions, average daily doses and more (see Appendix A of ASTM 1238-91)
WHO ATC	WC	WHO's ATC codes provide a hierarchial classification of drugs by therapeutic class. They are linked to the record number code codes listed above.
Device Code		
MDNS	UMD	Universal Medical Device Nomenclature System. ECRI, 5200 Butler Pike, Plymouth Meeting, PA 19462 USA. Phone: 215-825-6000, Fax: 215-834-1275.

4.4. Examples:

4.4.1. The sending and receiving systems have no default Coding Scheme for a Coded Entry.
Example: The ICD9-CM code for “gastric ulcer in lesser curvature” (531.3)

Encoding: The sending system transmits two components: The Code Value and the Coding Scheme Designator. The Code Value is "531.3" and the Coding Scheme Designator is "I9C".

4.4.2. The sending and receiving systems have agreed on a default Coding Scheme for a Coded Entry.
Example: The ICD9-CM code for "gastric ulcer in lesser curvature" (531.3)
Encoding: The sending system is required to transmit only one component: The Code Value. The Coding Scheme Designator and the Code Meaning are optional. The Code Value is "531.3"

4.4.3. Locally defined Coding Scheme.
Example: A locally defined Coding Scheme Designator (99EHB). A locally defined code for "gastric ulder in lesser curvature" (GI-2.2.7)
Encoding: Locally defined coding scheme designators must have the format specified in Tables 4.3.4-1 and 4.3.4-2. Local codes can be identified by "L" (for backward compatibility) or "99zzz" (where "z" is an alphanumeric character). If no default Coding Scheme is defined, the sending system transmits at least two components: The Code Value and the Coding Scheme Designator. The Code Value is "GI-2.2.7" and the Coding Scheme Designator is "99EHB". If locally defined coding scheme 99EHB is the agreed-upon default coding scheme, then the sending system is required to transmit only one component: The Code Value ("GI-2.2.7"). Transmission of the optional Code Meaning component may improve interoperability, especially when the sending system employs a locally defined Coding Scheme.

5.0. Units of Measure

5.1. References: ISO 2955-83, ASTM E-1238, ANSI X3.50.

5.2. Rationale: Units of measure are a specialization of the "Coded Entry" common data type. Similar usage is specified by ASTM (ISO+).

5.3. Conventions:

5.3.1. The default coding scheme of the ANSI HISPP MSDS Units of Measure Common Data type shall be the union of the ISO 2955-83 case insensitive limited ASCII character set (lower case) coding scheme, ISO derived units, code values of the ANSI X3.50-1986 coding scheme that do not collide with ISO, and ASTM "ANSI+" ISO extensions that do not collide with ANSI or ISO code values.

5.3.2. The "Code Value" component shall be defined (is mandatory) whenever a Units of Measure is encoded.

5.3.3. When a default Coding Scheme Designator is specified elsewhere in a message or in the message standard itself, only the "Code Value" component shall be encoded. The method by which a coding scheme designator and a code value are associated in an information interchange is not specified in this document. Possible methods include specification of the association: a) within a prior agreement between the parties to the information interchange; b) within message implementation guidelines applicable to all messages of a particular type; c) within an information interchange in such a manner that it is applicable to several messages; d) within individual messages; e) within the representation of the coded value. (Ref: CEN TC251 PT005 FFV, Draft 1.2)

5.3.4. When US customary units or other local units are utilized, then a complete three part (triplet) coded entry representation shall be used: Code Value, Coding Scheme Designator, and Code Meaning.

5.3.5. A unit can be raised to an exponential power. Positive exponents shall be represented by a number immediately following a unit's abbreviation, i.e., a square meter shall be denoted by m2. Negative exponents shall be signified by a negative number following the base unit, e.g., "$1/m^2$ shall be represented by as "m-2". Fractional exponents shall be represented by a positive or negative decimal number beginning with a zero (n, where 0<n<1), immediately following the unit. The multiplication of units shall be signified by a period (.) between the units, e.g., meters X seconds would be denoted "m.s". Spaces are prohibited in code values. Division shall be signified by a slash (/) between two units, e.g. meters per second shall be denoted as "m/s". Algebraic combinations of ISO unit abbreviations constructed by dividing, multiplying, or exponentiating base ISO units, also shall be valid ISO abbreviations units.

5.3.6. The ASTM “ANSI+” coding scheme is, with few exceptions, the union of ANSI X3.50-1986 U.S. Customary Units and ASTM extensions of the ANSI set that do not conflict with the lower case ISO abbreviations. The ASTM “ISO+” is the union of the lower case ISO and the ANSI+ coding schemes. The Units of Measure Common Data type coding scheme therefore is nearly equivalent to the “ISO+” scheme. The variances of the common data type from the ASTM “ISO+” coding scheme are as follows:

5.3.6.1. The ISO has defined a unique abbreviation for “minutes of arc” and “minutes of time” that differ from the ANSI X3.50-1986 abbreviations. ANSI X3.50-1986 does not distinguish “minutes of arc” from “minutes of time”. Since the ANSI X3.50-1986 code values for minutes of arc and time are ambiguous, the ISO lower case abbreviation “mnt” shall be the mandatory code value for “minutes of arc” in the Units of Measure common data type coding scheme.

5.3.6.2. The ISO abbreviation for the pascal (“pal”) differs from ANSI X3.50-1986 (“pa”). The ANSI X3.50-1986 code value collides with the ISO code value for “picoamperes” (“pa” -- used in clinical neurophysiology). Only the lower case ISO abbreviation for the pascal shall be included in the Units of Measure common data type code element set.

5.3.6.3. The ISO abbreviation for year (“ann”) differs from the ANSI X3.50-1986 (“yr”). The ANSI X3.50-1986 abbreviation shall be the preferred form. However, both the lower case ISO code value and the ANSI X3.50-1986 code value shall be included in the Units of Measure common data type code element set.

5.3.6.4. The ANSI+ code value “rad” for the code meaning “RAD” is identical to the lower case ISO code value for the code meaning “radian”. The lower case ISO code value “rad” shall correspond to the code meaning “radian”, and the code value “r” shall correspond to the code meaning “RAD” in the Units of Measure common data type coding scheme.

5.3.6.5. The ANSI+ code value “mrad” could be misinterpreted as “milliradian”. Therefore the code value “mr” shall correspond to the code meaning “millirad” in the Units of Measure common data type coding scheme.

5.3.6.6. The ANSI X3.50-1986 code value “gr (avoid)” contains a (prohibited) space. Therefore, the code value “gr(avoid)” shall correspond to the code meaning “grain” in the Units of Measure common data type coding scheme.

5.3.6.7. The ANSI+ code value “deg f” contains a (prohibited) space. Therefore, the code value “deg(f)” shall correspond to the code meaning “degrees Farenheit” in the Units of Measure common data type coding scheme.

5.3.6.8. The unit “each” (meaning “per item”) is added as a permitted value in the Units of Measure common data type because of the frequency of its use in clinical pharmacy applications.

5.3.6.8. **Caution**: The lower case ISO units for femtotesla (“ft”) and picotesla (“pt”), used in magnetoencephalography, are identical to the ANSI X3.50-1986 units for “foot” and “pint”. The default code meaning of “ft” in the Units of Measure common data type shall be “femtotesla”. The default code meaning of “pt” in the Units of Measure common data type shall be “picotesla”. Because of the markedly different usage contexts of ISO “femtotesla” and “picotesla” from ANSI “foot” and “pint”, the probability of collision is low. However, to distinguish the ANSI abbreviations from the ISO abbreviations, the Code Meaning component shall be mandatory (in other words, the full “triplet” coded entry shall be mandatory) whenever the ANSI code values for “foot” and “pint” are conveyed using the Units of Measure common data type.

5.3.6.9. The ISO abbreviation for “second of time” and “second of arc” (“s”) differs from the ANSI X3.50-1986 (“sec”). The lower case ISO unit “s” shall be the mandatory form of the code value in the Units of Measure common data type. **Caution**: To reduce the chance of error when the unit of arc measurement rather than time measurement is conveyed, the Code Meaning “second of arc” is mandatory (in other words, the full “triplet” coded entry shall be mandatory) in the Units of Measure common data type.

5.3.7. ISO units are constructed from 7 base dimensions measured as meters, kilograms, seconds, amperes, kelvins, moles and candelas. Other ISO units can be derived from these by adding a prefix (Table 5.3.7-1, Reference: ASTM E1238-91 and HL7) to change the scale and/or by creating an algebraic combination of two or more base or derived units. The use of a “multiplier” prefix is prohibited for non-ISO units. Solitary prefixes and compound prefixes are prohibited in the Units of Measure common data type. Note that some derived units have acquired their own abbreviations.

TABLE 5.3.7-1. ISO Single Case Abbreviations for "Multiplier" Prefixes

Prefix	**Exp**	**Abbr**
exa	10^{18}	ex
peta	10^{15}	pe
tera	10^{12}	t
giga	10^{9}	g
mega	10^{6}	ma
kilo	10^{3}	k
hecto	10^{2}	h
deca	10^{1}	da
deci	10^{-1}	d
centi	10^{-2}	c
milli	10^{-3}	m
micro	10^{-6}	u
nano	10^{-9}	n
pico	10^{-12}	p
femto	10^{-15}	f
atto	10^{-18}	a

The code element set of the Units common data type is not an exhaustive compendium of all possible units of measurement. However, the units most commonly used in clinical care measurement are included

(Table 5.3.7-2, Reference: ASTM E1238-91 and HL7). Refer to ANSI X3.50-1986, Table 1, for other metric and standard U.S. units and to ISO 2955-1983 for full set of lower case ISO units.

TABLE 5.3.7-2. Units of Measure common data type coding scheme

Units	**Abbr**
1/L	/l
1/milliliter	1/ml
10^3/Liter	10*3/l
10^3/milliliter	10*3/ml
10^6/Liter	10*6/l
10^6/milliliter	10*6/ml
10^9/Liter	10*9/l
10^9/milliliter	10*9/ml
1000 red blood cells	10*3(rbc)
10^{12}/Liter	10*12/l
ampere	a
atomic mass unit	u
Beats Per Min	/min
bel	b
Bodansky U	(bdsk_u)
body surface area	(bsa)
British thermal unit	btu
calories	(cal)
candela	cd
catalytic fraction	1
cells/liter	/l
cm of water	cm (h20)
colony forming units	(cfu)
coulomb	c
cubic feet/min	cft/min
cubic foot	cft
cubic inch	cin
cubic yard	cyd
day	d
decibel	db
decibels a scale	dba
decibels	db
degree Celsius	cel
degrees of angle	deg
degrees Farenheit	deg(f)
dram	dr
farad	f
feet/min	ft/min
femtogram	fg
femtoliter	fl
femtomole	fmol
femtotesla	ft
fibers/ml	/ml
foot	ft
gallon	gal
grain	gr(avoid)
gram	g
gram/deciliter	g/dl
gram/liter	g/l
grams creatinine	g(creat)
grams hemoglobin	g(hgb)
grams total nitrogen	g(tot_nit)
grams total protein	g(tot_prot)
grams wet weight tissue	g(wet_tis)
grey	gy
henry	h
hertz	hz
hour	hr
inch	in
international unit/day	iu/d
international unit/liter	iu/l
international unit/milliliter	iu/ml
international units	iu
joule	j
katal	kat
katal/kilogram	kat/kg
katal/liter	kat/l
kelvin	k
kg body weight	kg(body_wt)
kilocalories	(kcal)
kilogram	kg
kilogram/liter	kg/l
kilograms	kg
kunkel u	(knk_u)
liter	l
lumen	lm
lumen per square meter	lm/m2
lumen	lm
lux	lx
maclagan u	(mclg_u)
meter	m
meters/second	m/s
meters/second^2	m/s2
micro international unit	uiu
micro katel	ukat
micro meter (micron)	um
micro mole	umol
micro second	us
microequivalents	ueq
microgram	ug
microgram/day	ug/d
microgram/deciliter	ug/dl
microgram/gram	ug/g
microgram/liter	ug/l
microgram/ minute	ug/min
mile (statute)	mi
milliequivalents	meq
milliequivalents/liter	meq/l
milligram	mg
milligram/day	mg/d
milligram/ deciliter	mg/dl
milligram/liter	mg/l
milligram/min	mg/min
milligrams/cubic meter	mg/m3
milliliter	ml
milliliter/minute	ml/min
milliliter/second	ml/s
millimeter (hg)	mm(hg)
millimeter	mm
millimeter/hr	mm/hr
millimole/liter	mmol/l
millimoles/day	mmol/d
milliosmols/liter	mosm/l
millirad	mr
milliunits/ milliliter	miu/ml

minute (time)	min
minute of arc	mnt
mole	mol
moles/kilogram	mol/kg
moles/liter	mol/l
moles/second	mol/s
month	mo
nanogram	ng
nanogram/liter	ng/l
nanogram/ milliliter	ng/ml
nanokatel	nkat
nanometer	nm
nanomoles/ second	nmol/s
nanosecond	ns
nautical mile	nmi
newton	n
o.d. (optical density)	(od)
ohm	ohm
ounce (fluid)	foz
ounce (weight)	oz
p.u.	(pu)
pa	(pa)

particles/cubic meter	/m3
particles/liter	/l
particles/total count	/(tot)
parts per billion	(ppb)
parts per million	(ppm)
pascal	pal
picoampere	pa
per high power field	/(hpf)
percent	%
ph	(ph)
picogram	pg
picogram/liter	pg/l
picogram/ milliliter	pg/ml
picokatel	pkat
picometer	pm
picomole	pmol
picotesla	pt
picosecond	ps
pint	pt
pound	lb
quart	qt

RAD	r
radian	rad
rod	rod
second of arc	s
second (time)	s
siemens	sie
square foot	sqf
square inch	sin
square yard	syd
steradian	sr
tablespoon	tbs
teaspoon	tsp
tesla	t
todd u	(td_u)
volt	v
volume fraction	1
watt	w
weber	wb
week	wk
yard	yd
year	ann
year	yr

5.4. Examples:

5.4.1. Use of the default Units of Measure common data type Coding Scheme
Example: An MRI pixel size of 0.8 millimeters..
Encoding of units in an ordered representation: “mm”
Note: [The unit value itself is the “Code Value”. The default ISO system of units (Coding Scheme) is omitted. The text description of the default ISO Code Meaning is omitted. In an ordered representation, the delimiters for Coding Scheme Designator and Code Meaning may be omitted.]

5.4.2. Usage of prefixes
Examples: The single case abbreviation for kilo (x1000) is "k". A unit consisting of 1000 seconds would be abbreviated as "ks", 1000 grams as "kg", 1000 meters as "km", and so on.
Note: [Prefixes ranging from 10^{-18} to 10^{18} are available.]

5.4.3. Prohibition of solitary prefixes
Example: "f" always means farad, "ff" would mean 10^{-15} of a farad.
Note: [Some prefixes share the abbreviation of a base unit. Farad and femto (10^{-15}), for example, both have the abbreviation of "f".]

5.4.4. Prohibition of spaces in code values
Example: Degrees Farenheit
Encoding: deg(f)
Note: [The ASTM+ “deg f” code value is prohibited in the Units of Measure common data type.]

6.0. Person Name

6.1. Reference: ASTM E-1238-91.

6.2. Rationale: The common data type supports the frequently used convention of given (first), middle, and family (last) names, as well as a wide variety of international naming conventions, and synthetic and composite name forms. In the context of multiple entries allowed for "First name", "Middle name" is less important; however, we have retained "Middle name" because it is so conventional in Anglo-Saxon usage. The person name representation systems of ASTM and HL7 consist of six components. Other systems range from one to five components. One of the ASTM and HL7 components is redundant ("Degree"). Thus, a five component format (with provision for multiple entries in each component) is sufficient.

6.3. Conventions

6.3.1. The Person Name common data type shall have the following five components:

Family name (equivalent to ASTM and HL7 last name)
Given name (similar to ASTM and HL7 first name)
Middle name
Prefix
Suffix

6.3.2. Multiple entries shall be permitted in each component.

6.3.3. Entries shall be encoded as literal text strings, according to the preference of the named person. **Caution**: One may not be able to extract surnames with surname prefixes (such as Von, De, and Dalla) and certain complex prefixes and suffixes accurately from the encoded literal strings, since the common data type does not specify delimiters to distinguish multiple entries within Person Name components.

6.3.4. Name components ("Family name", "Given name", "Middle name", etc.) shall be delimited by carats (^) in ordered representation systems.

6.3.5. Delimiters (placeholders) shall be used (are mandatory) to represent interior null components in the Person Name common data type in ordered representation systems.

6.3.6. Trailing null components shall be ignored (and their delimiters may be omitted by the sender) in the Person Name common data type in ordered representation systems.

6.3.7. The "Degree" component of the ASTM E-1238-91 Person Name is absorbed into the "Suffix" component of the Person Name common data type.

6.4. Examples:

6.4.1. Middle name absorbed into "Given name" component. Multiple suffixes.
Example: Rev. John Robert Quincy Adams, B.A. M.Div.
Encoding of an ordered representation: "Adams^John Robert Quincy^^Rev.^B.A. M.Div."
Note: [One family name; three given names; no middle name; one prefix; two suffixes.]

6.4.2. Mandatory presence of interior null components
Example: Susan Morrison-Jones, Ph.D., Chief Executive Officer
Encoding of an ordered representation: "Morrison-Jones^Susan^^^Ph.D., Chief Executive Officer"
Note: [Two family names; one given name; no middle name; no prefix; two suffixes.]

6.4.3. Omission of trailing null components by the sender
Example: John Doe
Encoding of an ordered representation: “Doe^John”
Note: [One family name; one given name; no middle name, prefix, or suffix. Delimiters have been omitted for the three trailing null components in this ordered representation.]

7.0. References And Related Documents

7.1. ANSI Standards

7.1.1. ANSI X3.30 -1985 Representation for calendar date and ordinal date
7.1.2. ANSI X3.4 -1986 Coded character sets - American National Standard code for information interchange (7bit ASCII)
7.1.3. ANSI X3.43 -1986 Information systems representaiton of local time of day for information interchange
7.1.4. ANSI X3.50 -1986 Representations for U.S. customary, SI, and other units to be used in systems with limited character sets
7.1.5. ANSI X3.51 -1986 Representations of universal time, local time differentials, and United States time zone references for information interchange

7.2. ISO Standards

7.2.1. ISO 5218-1977 Information Interchange-Representation of Human Sexes
7.2.2. ISO 1000-1981 SI Units and Recommendations for the use of their multiples and of certain other units
7.2.3. ISO 2955-1983 Information processing-Representation of SI and other units in systems with limited character sets
7.2.4. ISO 8072-1986 Network Standards
7.2.5. ISO 8601-1988 Data elements and interchange formats - information interchange (representation of dates and times)
7.2.6. ISO 8859-1988 Information Processing- 8-bit single-byte coded graphic character sets

7.3. Other Standards

7.3.1. ACR-NEMA DICOM Version 3.0 (Draft)
7.3.2. ANSI ASC X12 data interchange standard
7.3.3. ASTM E1238
7.3.4. ASTM E31.12 Draft Dec 1990 - A Standard Specification for Representing Clinical Laboratory Test and Analyte Names
7.3.5. ASTM E1467.91 Standard Specification for Transferring Digital Neurophysiological Data Between Independent Computer Systems
7.3.6. ASTM E1394 A Standard Specification for Transferring Information Between Clinical Instruments and Computer Systems
7.3.7. ASTM E1381 Standard Specification for the Low-level Protocol to Transfer Messages between Clinical Instruments and Computer Systems
7.3.8. Health Level Seven (HL7) Version 2.1 1990.
7.3.9. IEEE MEDIX P-1157.
7.3.10. National Council for Prescription Drug Programs, Telecommunication Standard Format Version 3 Release 2, 1992.

7.4. Coding Schemes

7.4.1. CPT4 Current Procedural Terminology
7.4.2. EUCLIDES European standard for clinical laboratory data exchange
7.4.3. SNOMED Systemized Nomenclature of Medicine
7.4.4. ICD-9 International Classification of Diseases, 9th Revision
7.4.5. ICD9-CM International Classification of Diseases, Clinical Modification
7.4.6. ACR Index for Radiological Diagnosis, Revised 3rd Edition
7.4.7. NLM Unified Medical Language
7.4.8. Read Clinical Classification of Medicine
7.4.9. Manual of Clinical Microbiology
7.4.10. CAS USAN 1990 and the USP dictionary of drug names
7.4.11. NDC National drug codes

7.5. Registration of Coding Schemes

7.5.1. CEN TC251 PT005 FFV: Registration of Coding Systems. Draft 1.2. 1993-01-22.
7.5.2. Registration Procedures for the United States Joint Registration authority (US-JRA) to form U.S. National Registration Authorities. ANSI US Registration Authority Committee and US CCITT Study Group D, Message Handling Systems, Management Domain Subcommittee. Final Proposal Version 2.0.