Template for comments and convener's observations

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
GENERAL						
0013 ISO 061 0020 MB IMEKO-013	1.1		ge	Concerning the term “Quantity” vs. “Property”(Comments, related also to the file “VIM4_CD_Significant_changes”) A minimum of clarification should be devoted to the distinction and different meaning of “quantity” and “amount”. In 5.25 “amount of material” is considered equivalent to “material portion”—also in respect to the use of “amount” in the definition of the mole (amount of substance). It looks to me that “amount” means *portion*—i.e. a fraction—of a material, with no direct reference whatsoever to a *quantification* of the relevant property of a material—though the portion could be expressed in terms of a property, e.g., mass or weight or volume “quantity”, but also “spoon” or other *non-quantitative* instances of the portion. In addition there is an idiomatic dependence of the term: the English term “amount” in that case corresponds in French to “montant” (in Italian to “ammontare”): also in these cases it means the (sometimes “total”) portion under consideration of an entity, e.g. of money, with no quantification implied. Conversely, “quantity” becomes clearly derived from “quantification”, whose normal meaning is “quantified by a number”, e.g., as expressed in “quantitative scales” (*scale*: term *not* found in file VIM4_CD_210111). In this respect, it looks like an oxymoron the term used in 1.30 “Ordinal quantity”, where “ordinal <general>” differs from “quantity <general>” (1.1) because, even when numbers are used to indicate *indexes* (see later) in an ordered set, they indicate a mere *position* in an *ordered* list of indexes—possibly bringing an unfortunate confusion—where the meaning of “order” is not specified in the VIM4 (see also 1.19).	See proposals for clause 1.1, (te) later.	A single definition, encompassing both ‘general quantity’ and ‘individual quantity’, has been introduced. Thanks for the analysis about ‘amount’, which possibly not so clearly acknowledges that the amount of something that is not a property (e.g., amount of sand) is not the same as the amount of a property (‘amount of property’ is a controversial concept, actually not used in the VIM, which considers quantities to be specific properties, not amounts of properties). This seems to be language-dependent, however. What “order” means could be considered obvious, but a Note has been added to the relevant entry for clarity.
0018 ISO 066	1.1		te	Although the terms ‘quantity <general>’ and “quantity <individual>’ differentiate between the associated meanings of the original term ‘quantity’, the usage can still cause confusion among the users. To avoid this, two distinct words are proposed in this instance, namely, ‘measure’ and ‘quantity’ respectively. The term ‘measure’ in its noun form can be used as a single word without suffix to denote the ‘kind of quantity’ such as, length or	Measure	Disagreed. A single definition, encompassing both ‘general quantity’ and ‘individual quantity’, has been introduced (we agree that one term for two meanings / entities may be confusing, but this is what has existed, in effect, for centuries. We doubt that adopting an existing term with a new meaning would be an effective move).

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				radius, energy or kinetic energy / heat, electric charge etc. (as given in examples). In place of the term 'quantity <general>', a single word 'measure' in its noun form is proposed to denote the kind of quantity.		
0076 National Measurement Institute, Australia (NMIA)	1.1,1.30,6 .1,6.2	definition	te	Prefer original 1.1: If this is important, recommend that it be expressed in non-mathematical terms, otherwise it is unclear. We think having separate definitions for "general" and "individual" quantity brings in unnecessary complications.	Retain the original	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced.
0086 ISO 071 0087 VNIIM	1.1	definition	ge	Using the word 'reference' in the definition of 'quantity' VIM3 provides opportunity for further expansion of the concept 'quantity', which align with the current tendency of expansion of the concepts 'measurement' and 'quantity', consequently. That is why it is reasonable to keep the word 'reference' in the definition. 'Reference' is widely used in the VIM4 Draft, for an example, in 5.1; 5.21; 5.22; 5.23;5.24;5.27; 6.14; 6.16;6.17 and, moreover, different types of reference are mentioned in Note 4 to the entry 'value of quantity'. A sound explanation of 'reference' is given, for example, in Note1 to 5.22. This explanation can be placed in this entry for clarification, as well as an explanation of the difference between 'quantity' and 'nominal property' in terms of 'reference'.	To keep the VIM 3 definition of 'quantity' or at least to keep the term 'reference' in the definition. Quantity <general> property, whose instances can be compared relating to stated reference.	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced. The VIM4 definition emphasizes empirical relations, not "possibility of expression" as in the VIM3: since quantitative comparisons can be performed without previously identified "reference" quantities (e.g., this length is twice that length), the mention to references is not considered necessary here.
0061 MIRS-OIML	1.1	definition	te	Proposed definition is more explanatory, less restrictive and compatible with other related definitions.	property of a phenomenon, body or substance that can be compared to others of the same kind	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced. The proposed definition does not encompass general quantities (e.g., length is a quantity, and cannot be compared to anything).
0072 ISO 095	1.1 and 1.2	definition	te	The concepts 'general' and 'individual' are *not* opposite poles, making the hierarchical concept system unclear: The opposite of 'general' is not 'individual' but 'specific'. On the other hand, 'individual' implies "cannot be further divided", and its opposite is 'composite' (not 'general'). Respect Newton's concept (se SE6): "same kind" = latin: *ejusdem generis* which is clearly superordinate [Fleischman 1960]FLEISCHMANN, R. 1960, "Einheiteninvariante Größengleichungen, Dimension", *Der Mathematische und Naturwissenschaftliche Unterricht*, **12**, 386 – 99	Rewrite the VIM using the standard terminology and structure of concept systems with a proper division into hierarchical and associate relations. With the proposed (re)definition of Quantity (see SE6), it has to be made clear that separate hierarchies of concepts are needed for each component: "Property", "Entity", and "Measure".For instance, the measured length 1,234·m of a rod AB, today at 09:15 refers to:a specific **measure** of rod ABan instantiation of an **entity** ("rod")an instantiation of a dedicated **property** ("length of rod") = entity quantity [*Sachgrösse*, Fleischman 1960]	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced (the opposite of 'specific' is 'generic', and both refer to concepts, relating to species-genus relations).

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0073 ISO 094 0078 PTB 0080 PTB-OIML	1.1 and 1.2	definition	te	The refinement of the concept quantity into general quantity and individual quantity provides a more coherent approach. However, the improvement of formal coherency is perhaps less accessible to many readers, and the practical relevance seems limited. The refinement of the concept quantity into general quantity and individual quantity is supported. In addition, the concept is up to now not consistent with the NOTES given in the other definitions.	Keep VIM 3 concept	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced.
KIND OF QUANTITY						
0006 ISO 054 0069 ISO 092 0074 PTB-OIML 0082 ISO 072	1.1	definition	te	Kind of quantity is included in 1.1 but not defined. In VIM 3 there is a definition (1.2)	Keep VIM 3 definition	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced, together with a new definition for the operational concept 'quantities of the same kind' ('kind of X' is a generic concept, whose superordinate is unclear).
0071 ISO 093 0077 ISO 096 0079 PTB 0081 PTB-OIML	1.1 and 1.2	definition	te	The new definition of quantity is too general. It does not define what kind of property is meant.	Keep VIM 3 definition	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced, together with a new definition for the operational concept 'quantities of the same kind' ('kind of X' is a generic concept, whose superordinate is unclear).
0024 ISO 070 0029 EC-014	1.1	definition	te	Deletion of kind of quantity (now somehow included in 1.1 is a bad idea because this hides the issue of identity, which is key in most chemical measurements.	Add the "kind of quantity" again	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced, together with a new definition for the operational concept 'quantities of the same kind' ('kind of X' is a generic concept, whose superordinate is unclear).

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0042 ISO 079	1.1	NOTE 1: Last sentence+ NOTE 2	ge/te	"Kind of quantity" is *not* a synonym for "Quantity" (as proposed in the VIM4 draft definition). It is unfortunate that "Kind of quantity" as an independent concept is proposed with this Draft, without motivation, to disappear from the VIM, thus breaking a 300-year mainstream approach dating from Newton's Universal arithmetic - "same kind of quantity" = latin: *ejusdem generis quantitatem*. "Kind of quantity" is superordinate to "Quantity" [*Grössenart*, Fleischman 1960]. *Universal arithmetick: or, A treatise of arithmetical composition and resolution* by Newton, Isaac, Sir, 1642-1727; Cunn, Mr. (Samuel), ed; Raphson, Joseph, d. 1715 or 16, tr; Wilder, Theaker. https://archive.org/details/universalarithm00wildgoog/page/n21/mode/2up (Eng.); https://archive.org/details/arithmetica01newtuoft/page/n31/mode/2up (Latin) This is a specific use of the word "Kind" (as in taxonomy) and should not be confused with other, more everyday uses in English such as in "all kinds of things".The notes in VIM4 referred to in this comment are rather vague and difficult to understand and are just a couple of examples of the confusion sewn by the proposed removal of "Kind of Quantity" as an independent concept.	Reintroduce from earlier versions of VIM a separate definition of "Kind of quantity", as given in SE-014.Make clear that "Kind of quantity" is a key, independent concept on which are based several other fundamental concepts and their relations, such as: the grouping of units (e.g., radius and circumference both have units of length since they belong to the same kind of quantity) the addition (or subtraction) of quantities (which requires that the quantities belong to the same kind). Dimension analysis is based on the concept of Kind of Quantity.	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced, together with a new definition for the operational concept 'quantities of the same kind' ('kind of X' is a generic concept, whose superordinate is unclear).
INSTANCE						
0068 ISO 091 0070 -019	1.1	term	ge, te	For non-EN native speakers, the term "instance" may not be well-understood. Related to the above, the proposed VIM4 definition of "quantity" introduces ambiguity, both from a linguistic and metrological point of view. For instance, the proposed definition may be read as: Property whose "examples or cases" can be compared by ratio or only by order Property whose "individual quantities" can be compared by ratio or only by order In addition, VIM4 intends to make a systematic distinction between general and individual quantities. Such distinction only merits if both terms are unambiguously defined. The proposed term "individual quantity" (entry 1.2) is a collective term that strangely places distinctly different metrology concepts (e.g., units, measurands, values, etc.) under the same umbrella. Vague definitions	Please consider explaining the term "instance", i.e., "particular examples or cases". Keep the original definition (i.e., VIM3) for the term "quantity". Please carefully consider whether a systematic distinction between general and individual quantities is needed, i.e., delete new entry 1.2 (quantity <individual> and keep current VIM3 entry 1.2 (kind of quantity).	A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced. The new definition does not use the term "instance".

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				for key metrology terms must be avoided as not to complicate their use in practice and minimise interpretational differences.		
0026 IUPAC	1.1	definition	te	'instance' of a general quantity is undefined and carries no clear meaning in normal use. For example, is 'width' an instance of length?	Give examples of 'instances' See also comment on definition 1.2	The new definition does not use the term "instance".
0022 ISO 068	1.1	definition	te	"instance" is confusing because it has too many meanings, but "degree" looks better. Even "magnitude" looks better too.	Please explain specific meaning of "instance", or otherwise should it be changed to "degree", for example.	The new definition does not use the term "instance".
TYPES: INTERVAL ETC						
0023 ISO 069	1.1	definition	te	The definition is incorrect. It omits interval scale comparisons and fails to encompass quantities on other kinds of scale, such as circular scales.	Replace with eg 'property with magnitude'	Partially agreed. The new definition explicitly refers also to comparability by difference as a possible condition for a property to be a quantity. "Circular" quantities, like angular direction, are actually problematic, also considering that they are not ordinal, but the reference to magnitudes has been removed for the reasons explained in the "Significant changes" annex. Note 3 of entry 1.1 has been expanded to acknowledge that the current definition of 'quantity' is not complete.
0025 IUPAC	1.1	definition	te	Definition incorrectly omits comparison by difference [interval scale] and neither of those fully accommodates quantities on circular scales (eg wind direction, where -350 and 10 are not different values but which appear different both by ratio or difference).	Use a more general definition; eg 'property with magnitude'	Partially agreed. The new definition explicitly refers also to comparability by difference as a possible condition for a property to be a quantity. "Circular" quantities, like angular direction, are actually problematic, also considering that they are not ordinal, but the reference to magnitudes has been removed for the reasons explained in the "Significant changes" annex. Note 3 of entry 1.1 has been expanded to acknowledge that the current definition of 'quantity' is not complete.

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0014 ISO 062 0019 MB IMEKO-012	1.1		te	quantity <general>general quantity quantity in the general sense kind of quantity property whose instances can be compared by ratio or only by order NOTE 1 The same term "quantity" is commonly used to refer to both quantities in the general sense, such as length and mass, and individual quantities, such as any given length and any given mass. Acknowledging the importance of this distinction, separate definitions are given in this Vocabulary for quantities in the general sense and individual quantities, but the short term "quantity" is used whenever the linguistic context is sufficient to identify the intended meaning.	a) Includes "quantitative scales" (ratio or interval)—quantitative: term *not* found in file VIM$_CD_210111; b) The suppression of the term "magnitude" does not allow understanding correctly the meaning of the term "ratio"; c) As modified from VIM3, the term "number" lacks: "number should be added as "numerical" to "ratio" (implying that only "ratio scales" are referred to? Different types of scale are not illustrated); d) "of the same kind" is still needed here (compare, e.g., with 1.19); e) The use of "ratio" implicates a reference, i.e., having the same single reference in a scale (term "scale" *not* defined), to compare pairs of instances and the (same) reference, or an instance and a reference; f) "quantitatively" must be added as a specification of "compared".	a) The draft includes an entry for 'measurement scale'. b) The reference to magnitudes has been removed for the reasons explained in the "Significant changes" annex. c) The new definition explicitly refers also to comparability by difference as a possible condition for a property to be a quantity. d) The specification "of the same kind" would be redundant, being of the same kind a necessary condition for properties to be compared. e) Ratios can be relative, e.g., this is twice that. f) Adding "quantitatively" to the definition of 'quantity' would make the definition obviously circular.
0027 NPL, UK	1.1	definition	te	It is not obvious to a non-expert reader that comparison by ratio is a superordinate of comparison by order. This should be clarified in the definition.	"property whose instances can be compared by ratio and by order, or only by order"	Disagreed. The 'or' operator is non-exclusive.
0030 PT/ IPQ	1.1	definition	te	In the current state of the knowledge and of the published reflection leading to it (at least, as we managed to reach it), as there are two kinds of defining comparisons for the quantity, namely "by ratio" and "only by order", using the expression "either or" may make the definition clearer yet.	Replace: "property whose instances can be compared by ratio or only by order" by: "property whose instances can be compared either by ratio or only by order"	Disagreed. Comparisons by ratio assume also comparability by order.
0016 ISO 064	1.1	definition	te	It is not clear why the definition of quantity cannot include nominal properties. Why is nominal properties defined separately in chapter 6?	quantity: property whose instances can be compared by ratio or by order or by equivalence	Disagreed. There is no reason to break a century-long tradition and remove the distinction between quantities and nominal properties.
0036 ISO 075 0037 EC-015	1.1	Note 1, example	ed	Variables in a function notation, i.e. λ(D;Na), are normally not separated by a semi-colon but instead by a comma.	Please consider replacing by: λ(D,Na)	The example has been changed to avoid the ambiguity that the concerned radiation is in fact a doublet.
0038 ISO 076 0063 IEC-DE 2 0007 ISO 055	1.1	NOTE 1, Table last row	ed	There is no space below the table of NOTE 1 and the first line of NOTE 2.	Insert an appropriate space (additional line break) below the table.	Agreed: done.
0040 ISO 078 0062 IEC-DE 4 0009 ISO 057	1.1	Note 1, table, 7th row	te	The entries "amount of substance" and "concentration" are provided in one row. But these are different concepts. The amount of substance is usually a natural number while the concentration is a quotient of two quantities of the same kind and hence a real and probably a rational number. "amount of substance" is related more close to	Provide the entries "amount of substance" and "concentration" separately in two different rows of the table. Nevertheless provide a good example for an "amount of substance" instead of repeating the entry's name. Moreover write "amount of substance" instead of	Disagreed. See the definition in ISO 80000-9:2019, item 12.1. The form "amount-of-substance" is used here because it is in adjectival position, whereas as a noun the form without hyphens is used.

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				the entry "number concentration"! And "amount of substance" should be written without "-" in between (cf. https://en.wikipedia.org/wiki/Amount_of_substance). Remind that "number concentration" is also written without "-" in between.	"amount-of-substance".	
0041 IUPAC	1.1	Note 1, Table, wavelength	te	There are two sodium D lines, at 588.9950 and 589.5924 nm; it is not useful to speak of this as a single quantity.	Either refer to only one of the lines (eg D1 or D2) or use a singlet transition – perhaps "the wavelength of the unperturbed ground-state hyperfine transition for caesium"?	Agreed: changed.
0039 ISO 077 0064 IEC-DE 3 0008 ISO 056	1.1	Notes 1 and 2	ed	I would like to recommend to denote the circle by a capital, e. g. A.	Replace "a" by "A" wherever it appears in the first line of the table. And in NOTE 2.	Agreed: changed.
0010 ISO 058 0065 IEC-DE 5	1.1	Note 3	ed	In the table of Note 3, the concept "unit" is in the index but not emphasized in blue ink.	Emphasize the concept "unit" like the others.	Disagreed: there is a previous (emphasized) occurrence of the term.
0049 IUPAC	1.1	Note 3	ed	'commonly' is a considerable overstatement; this is true only in the VIM and rarely implemented in practice. See also comments on 'ordinal quantity'	Remove note 3. If retained, change 'commonly' to 'sometimes' or 'in this Vocabulary'.	Agreed: the note has been completely rewritten, and this recommendation implemented.
0050 IUPAC	1.1	Note 3	ed	In Note 3, "An ordinal quantity has no unit and its instances can be compared by order only." implies than an 'instance' is a point on the relevant measurement scale – that is, a value, and not a property of a particular object.	Consider 'values associated with different instances'.	The note has been completely rewritten.
0084 PTB	1.1	Note 3	ed/te	There is no example for ordinal quantities in NOTE 3 Kind of quantity is included in 1.1 but not defined. In VIM 3 there is a definition (1.2)	Add example for ordinal quantities (e.g. Rockwell C hardness) and show how instances can be compared. Keep VIM 3 definition	Agreed: added.
0017 ISO 065	1.1	Note 4	ed	Need Consistency in writing. At Note 4 on this Clause is written "….ISO 80000 and IEC 80000 series of standards Quantities and units." Meanwhile at Note 1 in Clause 1.6 and Example 2 in Clause 1.27 is written "…ISO 80000 and IEC 80000 series of International Standards Quantities and units."	For consistency change the Note 4 on Clause 1.1…ISO 80000 and IEC 80000 series of **International** Standards Quantities and units.	Agreed: changed.
0053 ISO 085 0054 PT/ IPQ	1.1	Note 4	te	It seems that, according to the *SI Brochure* and ISO 80000-1, the symbols of quantities are mathematical entities and are always written in italic (sloping) type, irrespective of the type used in the rest of the text. Therefore, it should be mentioned here: "The symbols for	Replace: "The symbols for quantities are written in italics." By: "The symbols for quantities are written in italic (sloping) type in mathematical expressions and documents, irrespective of the type used in the rest of the text."	Agreed: added.

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				quantities are written in italics."		
0055 ISO 086 0011 ISO 059 0066 IEC-DE 6	1.1	Note 5	ed	In the table of Note 5, the horizontal bar between the words "System" and "Component" is too long whatever its sense is. Moreover "kind of quantity" should be written without "-" in between (cf. the definition in the document entry 1.1)	Correct it appropriate.	Agreed: changed.
0056 IUPAC	1.1	Note 5	ed	possible missing word; 'format' covers much more than identity	consider '… format for **identification of** quantities in laboratory medicine'	Agreed: changed to "to refer to".
0057 ISO 087 0059 EC-018	1.1	Note 5, Example	ed	"amount-of-substance" According to BIPM, the above SI base unit should be written without hyphens. Note that the above spelling appears multiple times throughout the vocabulary."5.1 mmol/l" The symbol of litre should be "L"	In entry 1.1 and throughout the vocabulary, please replace by: "amount of substance" In entry 1.1, please replace by: "5.1 mmol/L"	Agreed: changed.
0058 ISO 088	1.1	Note 5, Example	ed	The United States prefers the use of the uppercase letter L as the unit symbol for the liter in order to avoid the risk of misinterpretation between the lowercase letter l (el) and the numeral 1 (one). Recommend replacing "mmol/l " with "mmol/L". New emphasis has been placed on *Risk Assessment* within ISO/IEC documentary standards, resulting in increased awareness by metrologists of identifying potential risks and taking action to prevent errors and eliminate risk. When fonts with serifs are used, lowercase l (el) and 1 (numeral one) are almost visually indistinguishable and further deteriorates when sans serif fonts are used. An uppercase letter L cannot be visually confused with the numeral one (1). Using uppercase letter L as the liter unit symbol improves the information legibility and mitigates misinterpretation risk.	"mmol/L " instead of "mmol/l "	Agreed: changed.
0032 NPL, UK	1.1	Note 5, Example	te	'Concentration' is a non-specific term, this should read amount concentration given the example used.	"The glucose amount concentration…"	Agreed: the expression is now "The substance concentration of glucose in blood plasma of a given person at a given time".
0012 ISO 060 0060 ISO 089 0067 IEC-DE 7	1.1	Note 6	ed	The space between "NOTE 6" and its text is smaller than it is the case for the other notes.	Raise the space.	Agreed: fixed.
0088 ILAC	1.2 (removed)		te	Delete this definition and keep the definition in VIM3 for "quantity".	Delete 1.2.	The entry has been removed. Please check the new proposed definition of 'quantity'.

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0089 ISO 097	1.2 (removed)		te	Note 1 states that measurement units and measurement values are examples of an individual quantity. This is not consistent with definition 1.1 and 1.21ff where the part named “individual quantity” is only an instant of the general quantity, e.g. radius of a circle, which in the presentation still comprises a value (size) and a unit (meter). Also, in NOTE 3 of definition 1.8 “units and values” are mentioned as part of quantities and not as “independent” individual quantities.	Keep VIM 3 concept, or change NOTE 1 of 1.1 to show also units and measured values as individual quantity in the table, or (preferred) remove measurement units and measured values from the list in NOTE 1.	The entry has been removed. Please check the new proposed definition of ‘quantity’.
0090 ISO 098 0092 MB IMEKO-020	1.2 (removed)		te	quantity <individual>instance of a general quantity NOTE 1 Measurement units, measurands, values of quantities, and measured values are all examples of individual quantities. NOTE 2 In English sometimes “magnitude” is used to refer to individual quantities. Due to the fact that the term has different, incompatible meanings and that it is not always easy to translate it into other languages, the term “magnitude” is not used in this vocabulary.	a) The definition exclude the quantitative *scales* b) The “individual quantities” here are *not* the ones indicated in 1.19, where a scale (1.19, 1.32) is formed of “individual quantities of the *same kind*”, i.e., of instances of the *same* quantity, not of a *general* quantity. c) On NOTE 1, the four indicated terms (in plural) are NOT individual quantities (not even always “sets of”), but *attributes of* the property; d) On NOTE 2: the term “magnitude” is useful and needed, it is enough to eliminate its present ambiguity. It has NOT the meaning indicated in VIM4_CD_Significant_changes” pag. 3.	The entry has been removed. Please check the new proposed definition of ‘quantity’.
0091 ISO 099	1.2 (removed)		te	In continuation of comments at entry 1.1, the term ‘quantity’ is proposed to denote the specific quantity which is of interest. Thus the term ‘quantity’ could now mean the specific quantity which is being measured such as, radius of a circle (length), kinetic energy of a particle / heat of vaporization of water, electric charge of the proton etc, (as given in examples). In place of the term ‘quantity <individual>’, a single word ‘quantity’ is proposed to denote the specific quantity which is of interest.	Quantity.	The entry has been removed. Please check the new proposed definition of ‘quantity’.
0112 PTB-OIML	1.2 (removed)	definition	te	There is no need to distinguish between quantity and individual quantity.	Delete “individual”	The entry has been removed. Please check the new proposed definition of ‘quantity’.
0093 ISO 100	1.2 (removed)	definition	te	‘instance’ (here and in 1.1) has no clear meaning among, for example, particular concept, particular observation etc etc – it is not appropriate as a defining characteristic	define as property associated with a particular object or system.	Partially agreed: the entry has been removed. Please check the new proposed definition of ‘quantity’.
0094 IUPAC	1.2 (removed)	definition	te	‘instance’ has no clear meaning. Does it mean a particular observation, a particular concept, a point on a measurement scale, a particular object …?	consider ‘distinct property that has magnitude and that is associated with a particular object or system’ See also comment on 1.1	Partially agreed: the definition does not refer to ‘magnitude’ as explained / justified in the Introduction and the “Significant changes” annex.
0095 RNMF_FR	1.2 (removed)	definition	ge	See comment on “general” and “individual” §1.1.	See proposal on “general” and “individual” §1.1	The entry has been removed. Please check the new proposed definition of ‘quantity’.

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
0096 IUPAC	1.2 (removed)	Note 1	te	Values of quantities cannot possibly be instances of quantities [see also comment on 1.20] In addition, *none* of the 'instances' presented in Note 1 of 1.1 are 'values'. All are quantities that *have* values.	delete 'values of quantities'	The entry has been removed. Please check the new proposed definition of 'quantity'. About values being individual quantities please see the "Significant changes" annex.
0097 PT/ IPQ	1.2 (removed)	Note 1	te	As ordinal quantities have neither units nor dimensions, measurement unit is not an example of individual ordinal quantity, and it should be specified by NOTE 1.	Replace: "NOTE 1 Measurement units, measurands, values of quantities, and measured values are all examples of individual quantities." By: "NOTE 1 Measurands, values of quantities, and measured values are examples of all individual quantities, and measurement units, examples of quantities having a unit."	The entry has been removed. Please check the new proposed definition of 'quantity'.
0098 PT/ IPQ	1.2 (removed)	Note 1	te	The JCGM – WG 2 proposed NOTE 1 of entry 1.31 shall be located as a new NOTE in the entry 1.2.	In this entry, insert the JCGM – WG 2 proposed NOTE 1 of entry 1.31, namely: "Ordinal quantities can enter into empirical relations only and have neither units nor dimensions. Differences and ratios of ordinal quantities have no physical meaning."	The entry has been removed. Please check the new proposed definition of 'quantity'.
0099 ISO 101 0104 EC-021	1.2 (removed)	Note 2	te	The given statement is only correct for "values of individual quantities" The term "magnitude" is for obvious reasons only applicable to measurable quantities (i.e., ratio scales) and not to values of nominal properties.	Please correct accordingly	The entry has been removed. Please check the new proposed definition of 'quantity'.
0100 ISO 102 0103 PT/ IPQ	1.2 (removed)	Note 2	te	The affirmation "Due to the fact that the term has different, incompatible meanings and that it is not always easy to translate it into other languages" is partly true, because it seems linked to VIM 3. As referred in the "Significant changes of the VIM4 with respect to VIM3", 2021-01-11, JCGM-WG2-CD-03, this problem is solved by the entries 1.1 and 1.2 of VIM4, making it unnecessary reference to magnitude in VIM4, and this NOTE2 as well.	Delete NOTE 2.	The entry has been removed. Please check the new proposed definition of 'quantity'.
0101 IUPAC	1.2 (removed)	Note 2	te	"magnitude" in normal use does not generally refer to an individual quantity (other than in specific contexts); it simply carries the sense of "size" and is an inextricable – perhaps even defining - attribute of all quantities. Further, while there may not be a direct 1:1 transliteration of 'magnitude' in all languages, there are surely few languages that have no near translation (the word has a Latin root, has a direct Russian translation, and is an adopted word in, for example, Japanese). Even if that were not so, a competent translator should normally be able to select a suitable term in the target language even without direct 1:1 transliteration. In short, lack of direct transliteration into every language should never prevent use of the most appropriate English word in the English text. If it did, few terms would survive.	Remove this Note and use 'magnitude' freely where appropriate in the document.	The entry has been removed. This Vocabulary does not refer to 'magnitude' as explained / justified in the Introduction and the "Significant changes" annex.

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0102 IUPAC	1.2 (removed)	Note 2	te	Note 2 of 1.2 is not relevant to any part of the proposed term or definition in 1.2. If this purely informative point must be made (and see other, adverse, comments on this point) it should be in the introduction, not in the notes to a term to which it does not relate.	Delete note 2. If this (ill-advised) policy is maintained, state it in the introduction or, perhaps, in relation to 'value'.	The entry has been removed. Please check the new proposed definition of 'quantity'.
0105 UK-OIML	1.2 (removed)	Note	te	In 1.2 individual quantity, the Note1 is stated "Measurement units, measurands, values of quantities, and measured values are all examples of individual quantities". This is not consistent with NOTE 2 in 1.2 which states that " any individual quantity is an instance of a general quantity…".	Proposal: Align with NOTE 1 of 1.1 to include also Measurement units, measurands, values of quantities, and measured values.	The entry has been removed. Please check the new proposed definition of 'quantity'.
0106 MIRS-OIML	1.2 (removed)		te	Proposed definition is concise and non-restrictive, being compatible with other related definitions. A note adds a description of term's practical implementation.	expression of a quantity in terms of a reference NOTE: A quantity value is typically the product of a number and a unit or a position on an ordinal scale.	The entry has been removed. Please check the new proposed definition of 'quantity'.
0107 ISO 104 0108 EC-022	1.2 (removed)	Whole section	te	The idea and introduction of "individual quantity" should be re-discussed. Note 1 (strangely) places distinctly different (and even incompatible) metrology concepts under the same umbrella (which is only possible because of the vague definition of quantity).	Please reconsider whether a distinction between general and individual quantities is needed (i.e., keep the VIM3 definitions entries 1.1 and 1.2).	The entry has been removed. Please check the new proposed definition of 'quantity'.
0109 ISO 103 0110 PTB 0111 PTB-OIML	1.2 (removed)	Note	te	Note1 states that a measurement units and measurement values are examples of an individual quantity. This is not consistent with definition 1.1 and 1.21ff where the part named "individual quantity" is only an instant of the general quantity, e.g. radius of a circle, which in the presentation still comprises a value (size) **and** a unit (meter). Also, in NOTE 3 of definition 1.8 "units and values" are mentioned as part of quantities and not as "independent" individual quantities.	Keep VIM 3 concept, or change NOTE 1 of 1.1 to show also units and measured values as individual quantity in the table, or (preferred) remove measurement units and measured values from the list in NOTE 1.	The entry has been removed. Please check the new proposed definition of 'quantity'.
0113 IEC-DE 8 0114 ISO 105	1.3 (now 1.5)	definition	ge	The definition is not precise.	Write "set of general quantities …".	Agreed in principle, but for consistency the specification is put in a Note.
0115 IUPAC	1.3 (now 1.5)	definition	te	'non-contradictory' seems an unnecessary qualification; while it may be needed for an internally consistent or coherent system, these are subsets of a larger class which could include *in*consistent systems.	delete 'non-contradictory'.	Disagreed. The specification 'non-contradictory' was already part of the definition in the VIM3, exactly to guarantee the consistency of an entity to be called a "system of quantities".
0116 UO	1.3 (now 1.5)	definition	ge	Is the word "non-contradictory" needed?	"...with a set of equations relating..."	Disagreed. The specification 'non-contradictory' was already part of the definition in the VIM3, exactly to guarantee the consistency of an entity to be called a "system of quantities".

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0117 IEC-DE 9 0118 ISO 106	1.3 (now 1.5)	Note 1	te	There is no quantity mentioned in the definition. There are only quantities mentioned.	Rewrite Note 1 as follows: "Each quantity of a system of quantities possesses an independent unit."	Agreed, though fixed in a simpler way.
0119 IUPAC	1.3 (now 1.5)	Note 1	te	Is it essential that all quantities in a system of quantities have a unit? Do derived quantities have "a" unit? Do the units necessarily exist before any system that uses them?	Delete 'having a unit' Alternatively, if this is considered an essential characteristic, it should appear in the definition	Agreed. The specification has been changed – here and elsewhere – in reference to ratio or interval quantities.
0120 IUPAC	1.3 (now 1.5)	Note 2	te	See comments on 'ordinal quantity' relating to Rockwell hardness – it can be argued that Rockwell hardness, unlike Moh's scale, is not ordinal.	Replace Rockwell hardness with 'hardness on Moh's scale'	Agreed: changed by merging the two Notes.
0121 ISO 107 0122 IEC-DE 10	1.3 and 1.4 (now 1.5 and 1.6)	definition	ed	In order to avoid the concept of a subset in definition 1.4 one may better post a general statement. We believe that the statement holds only for non-empty subsets. One may also allow the empty subset. In this case the only derived quantities is number.	Add a note "Each non-empty subset of a system of quantities is also a system of quantities."	Agreed. However, the adopted solution has been to simplify definition 1.4 (now 1.6).
0123 IEC-DE 12 0124 ISO 108	1.4 (now 1.6)	Note 1	ed	This note may be deleted because it is clear by definition 1.3.	Delete this note and renumber the other notes.	Partially agreed. This Note has been rephrased, as it is considered a helpful clarification.
0125 IUPAC	1.4 (now 1.6)	Note 1	te	See comment on 1.3	Delete 'having a unit'	Agreed. The specification has been changed – here and elsewhere – in reference to ratio or interval quantities.
0126 IEC-DE 13 0127 ISO 109	1.4 (now 1.6)	Note 2	ed	This note 2 may be deleted if definition 1.3 is extended by the statement on subsets.	Note 2 may only contain the text of its example in case of the extended definition 1.3.	Partially agreed. The definition has been simplified, by removing the reference to subsets, and therefore the content of this Note is now clearer.
0128 CMI	1.4 (now 1.6)	Note 4	te	„The quantity number of entities can be regarded as a base quantity in any system of quantities." This statement (the identical note is in VIM3) is true but rather narrow. Any „quantity with the unit 1" (e.g. refractive index) is a base unit in any system of quantities. See also 1.8.	„The quantity with the unit 1 can be regarded as a base quantity in any system of quantities."	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0129 IEC-DE 14 0130 ISO 110	1.4 (now 1.6)	Note 4	te	It is not clear if note 4 really expresses what should be said. "Number of entities" may only be natural numbers!	Write "The quantity number can be ..."	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in

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						reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0131 NPL, UK	1.4 (now 1.6)	Note 4	te	This statement is perhaps true, but number of entities is a rather different base quantity, not having a ‘dimension’ in the same way the other base quantities do. The text should reflect this.	“The quantity number of entities is a neutral element of any system of units, necessary and present automatically, and as such may be regarded as a base quantity.”	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0132 ISO 111 0133 IEC-DE 11	1.4 and 1.5 (now 1.6 and 1.7)	definition	ed	The definitions are not necessary but optional.	Write “general quantity ...”	The comment is unclear, whether it proposes to remove the two definitions or something else.
0134 IUPAC	1.5 (now 1.7)	definition	te	There is a mild possibility that this could be read as inclusive of base quantities (length can be ‘defined in terms of the base quantities’ for the SI), whereas a derived quantity is usually thought of as a product of base quantities	Consider ‘quantity in a system of quantities defined as a product of base quantities’ Alternatively, consider adding a note to the effect that a system of quantities consists of the set of base quantities together with the set of derived quantities, or just saying that the definition should be read as excluding base quantities	Agreed (thanks for the analytical comment…). A Note has been added to make this clear.
0135 IUPAC	1.5 (now 1.7)	Example	ed	Consider including an example like area, in which the product is of two instances (??) of the same base quantity	Add “Example 2: In a system of quantities having length as a base quantity, area is a derived quantity defined as the product of two instances of length	Agreed: the example has been extended accordingly.
0136 IEC-DE 15	1.5 (now 1.7)	Note (now Note 1)	ed	The note may be deleted.	Delete the note.	Partially agreed: the Note has been rephrased, as it is considered a helpful clarification.
0137 ISO 112	1.5 (now 1.7)	Note (now Note 1)	ed	The note may be deleted because it does not add any additional value.	Delete the note.	Partially agreed: the Note has been rephrased, as it is considered a helpful clarification.
0138 IUPAC	1.5 (now 1.7)	Note (now Note 1)	te	See comment on 1.3	Delete ‘having a unit’	Agreed: the Note has been rephrased, as it is considered a helpful clarification.
0139 RNMF_FR	1.6 (now 1.8)	Note 2	ed/ge	Note 2: May be the base quantities of the ISQ have been chosen according historically to the base units of the SI	To change Note 2 as follows “The base units of the SI are the units defined for the base quantities of the ISQ”	Disagreed: please see 9th SI Brochure, 2.3.
0141 BelGIM	1.6 (now 1.8)	Note 2	ge	It should be clarified whether the SI base units only are now supposed in the current SI to correspond to the base quantities of the ISQ. What has happened to the SI derived units: don't they correspond to the ISQ derived quantities anymore? Or should the current SI be no longer based on the ISQ?	Note 2 from VIM3 should be restored: "The International System of Units (SI) is based on the ISQ."	Disagreed: please see 9th SI Brochure, 2.3, first paragraph, which makes reference to the ISQ, via the ISO/IEC 80000 Series, but it does not say that the SI is still based on the ISQ.

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0142 CMI	1.6 (now 1.8)	Note 2	te	Whereas the note is now valid, in the past the situation was just the opposite one. ISO 31, the predecessor of ISO 80000, is from the beginning of the nineties when the system of base units was fully established for a long time.	Only a general remark that those two systems are interconnected.	Ok, thank you.
0140 RNMF_FR	1.6 (now 1.8)	Note 3	ed/ge	Note 3: The note should conclude: which one is the general quantity? it seems both.	Note 3 : … (add to present text). Only the latter can be compared by ratio.	Partially agreed: a related clarification has been added by rephrasing the Note.
0143 ISO 113 0145 PTB 0146 PTB-OIML	1.6 (now 1.8)	Note 3	ed	The additional third note (with respect to VIM3) "NOTE 3: The term "time" is sometimes used for referring to an instant of time (for example 7:00 UTC) and sometimes to a duration, i.e., the range of a time interval" is not related to the context of the definition 1.6 but to the context of definition 1.7.	Shift the text of NOTE 3 to the entry 1.7 as NOTE 7.	Disagreed: time is explicitly referred to in the definition, and a clarification may be helpful.
0144 IUPAC	1.6 (now 1.8)	Note 3	te	The statement that 'time' can mean (at least) two different things is not helpful when, in this context, it is referring to the base quantity and not to either an instant of time or to an interval of time.	Delete note 3	Disagreed: time as a base quantity of ISQ is indeed time duration.
0148 IUPAC	1.7 (now 1.9)	definition	te	The introduction of 'factor' here is unhelpful (the word has multiple meanings), and the 'power' of a product is not usually the product itself, just the exponent. A product of powers in a system of quantities would accordingly often – indeed usually - be 0	shorten to 'relation of a quantity to the base quantities of a system of quantities as a product of base quantities [only]' (or, for easier readability, 'product of base quantities [only], giving the relation of a quantity to the base quantities of a system of quantities') ['only' indicates that numerical factors are not part of 'dimension', but if one says 'product of base quantities' that does not implicitly include numerical multipliers]	Partially agreed: the expression "a product of the base quantities each raised to a power" has been adopted, which hopefully removes any ambiguity.
0149 ISO 115 0152 IEC-DE 16	1.7 (now 1.9)	Example 2	ed	The space after the headers in EXAMPLE 1 and EXAMPLE 3 is too small if compared with EXAMPLE 2	Raise the space.	Agreed: done.
0150 IEC-DE 17 0151 ISO 116	1.7 (now 1.9)	Example 3	ed	The first and the second formula must be set on one central line!	Adjust the vertical alignment.	Agreed: done.
0154 IUPAC	1.7 (now 1.9)	Note 1	te	See comment on 1.3	Delete 'having a unit'	Agreed: the Note has been rephrased.
0155 IUPAC	1.7 (now 1.9)	Note 2	te	the 'power' is usually the value of the exponent – not the product itself as stated here. (eg x^y is x to the power y – not 'the power x^y')	Delete note 2	Agreed. The Note has been deleted, as in the definition, the expression "a product of the base quantities each raised to a power" has been adopted, which hopefully removes any ambiguity.
0156 UO	1.7 (now 1.9)	Notes 3 and 6 (now 2 and 5)	ed	Why are the symbols in the Table (NOTE 6) in normal font while in the examples and equations symbols appear	Check and revise if appropriate.	Nothing to change: symbols of dimensions are roman.

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				in italics on the left-hand side?		
0157 INRIM	1.7 (now 1.9)	Note 4 (now 3)	te	Vectors are sometime used to pack quantities of different kinds linked together in a specific context. For example, in a geometrical inverse problem where unknown parameters are derived by best fitting to data, the unknowns are likely a combination of lengths and angles. They are usually packed together in a single vector, referred to as the vector of the unknowns.	Clarify that the components of a vector must be of the same kind for the vector to be a quantity.	Agreed: added the specification.
0147 ISO 114	1.7 (now 1.9)	Note 5 (now 4)	ge	NOTE 5 In a given system of quantities, quantities of the same kind have the same dimension, quantities of different dimensions are always of different kinds, and quantities having the same dimension are not necessarily of the same kind. Examples for the last information of the note would be helpful for clarity.	Provide examples for NOTE 5: quantities of the same kind have the same dimension, quantities of different dimensions are always of different kinds, and quantities having the same dimension are not necessarily of the same kind. For examples, torque and work or energy have same dimensions [M L^2 T^{-2}] and angular velocity and frequency have same dimensions [T^{-1}].	Agreed: done.
0153 RNMF_FR	1.7 (now 1.9)	Note 6 (now 5)	ed	Note 6: As the examples show, the exponents may be non-integer. Furthermore positive and negative are adjectives and zero is a name… Change the end.	To modify Note 6 as follows:"….Thus, the dimension of a quantity Q is denoted by dim Q = …, where the exponents, named "dimensional exponents", are positive or negative numbers, or zero".	Agreed: changed.
0175 ILAC	1.8 (now 1.10)	term	te	We do not feel that it is defensible to claim that a number can be a unit.	Revert to the previous term "quantity of dimension one" and remove all references to 'the unit one' in other definitions and Notes.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0176 ISO 121	1.8 (now 1.10)	term	te	'quantity with unit one' is an unhelpful and contradictory term that is not in common use. The term for this concept is still 'dimensionless quantity'. Note also that the historical VIM term is 'quantity of *dimension* one' – already misleading but not as indefensible as claiming that a number is a unit.	Delete the 'preferred' term and replace with "dimensionless quantity" If it is considered essential to retain 'quantity of *dimension* one' for historical reasons, include 'quantity of dimension one' as a permitted alternative.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0177 IUPAC	1.8 (now 1.10)	term	te	'quantity with unit one' is a fictitious invention and is not in common use. By far the most common term for this concept is still 'dimensionless quantity'; the historical VIM term is 'quantity of *dimension* one'.	Delete the preferred term and replace with "dimensionless quantity" If it is considered essential to retain 'quantity of *dimension* one' for historical reasons, include 'quantity of dimension one' as a permitted alternative.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and

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						to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0162 ISO 119 0163 PT/ IPQ	1.8 (now 1.10)	Entry Note 2 Note 3 Note 4	te	1. It is clumsy to design an entry with a term that has been designed yet in the document: Entry 1.8 is designated by “quantity with unit one”, whereas the term “unit” is defined in entry 1.9.2. As rightly mentioned by NOTE 2, all quantities have a dimension, therefore maintain the expression “dimensionless quantity” instead of right “quantity of dimension one” is not recommended, even for historical reasons.3. the affirmation “The units and values of quantities with unit one are numbers.” seems a bit strange: although “one” is a number, the unit of the “quantities of unit one” is “one”! 4. The expression “quantities with unit one” would have to be uniformized with the suggested new term of the entry	Replace: “1.8 quantity with unit one dimensionless quantity---NOTE 2 The term “dimensionless quantity” is still commonly used and is kept here for historical reasons. However, all quantities, including number of entities, have a dimension. The term “quantity of dimension one” used in the previous edition of the VIM reflects the convention in which the symbolic representation of the dimension for such quantities was the symbol “1”. NOTE 3 The units and values of quantities with unit one are numbers. NOTE 4 Some quantities with unit one are defined as… “By: “1.8 quantity of dimension one quantity with unit one”---- NOTE 2 In spite of still being commonly used, the term “dimensionless quantity” should be avoided. Indeed, all quantities, including *number of entities*, have a dimension. NOTE 3 Some quantities of dimension one are defined as… “.	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0164 IEC-DE 18	1.8 (now 1.10)	Item	ge	It is the wrong concept to be defined.	Replace “quantity with unit one” by “quantity of dimension number” and replace “dimensionless quantity” by “quantity with unit 1” and the definition “numbers are quantities of dimension number, their unit is the number 1”.	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0166 IEC-DE 19	1.8 (now 1.10)	Note 1	te	The actual note 1 makes no sense.	Replace the text of note 1 by “Number is a derived quantity for any system of quantities.”	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0167 IUPAC	1.8 (now 1.10)	Note 1	te	The reference to a unit in the note is redundant – and indeed unhelpful - for a dimensionless quantity.	Delete ‘having a unit’.	Agreed: done.

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0168 IUPAC	1.8 (now 1.10)	Note 2	te	‘number of entities’ is never a dimensionless quantity (see comment on 1.8 note 6) so I do not see why it is singled out here.	Delete ‘including number of entities’.	Agreed: done. See new 1.6 Note 4.
0169 NPL, UK	1.8 (now 1.10)	Note 2	te	Consider adding a final sentence, stating that more logically we might say dimension number.	“However “1” is the symbol for the unit and not the dimension. More logically we might use dimension number: in the same way that metre is to length, so ‘1’ is to number.	Partially agreed: the Note has been expanded with a reference to “dimension number”, though without stating that it is “more logical”, something that is still open to discussion.
0165 RNMF_FR	1.8 (now 1.10)	Note 3	ge	Note 3: it the notion of unit 1 remains in the VIM, then there is no sense to say that the unit of a dimension with unit one could be another number than 1.	If unit one is kept, suppress Note 3.	Partially agreed: the Note has been changed to better explain, as in the 9th SI Brochure.
0170 IUPAC	1.8 (now 1.10)	Note 3	te	Numbers can not be units unless you are counting numbers	delete Note 3, or at least delete ‘units and’ in the Note	Partially agreed: the Note has been changed to better explain.
0158 ISO 117 0171 ISO 120 0178 ISO 122 0179 PTB 0180 PTB-OIML	1.8 (now 1.10)	Note 4 and Note 5	te	This definition is the one where it would make sense to distinguish between “general quantities” and “individual quantities” because some of such quantities are defined as ratios of two individual quantities of different belonging to two general quantities of the same kind. E.g. the solid angle is the ratio of the individual quantity “area of a surface of a curved surface” in space divided by the squared individual quantity “distance from the vertex of the solid angle to the curved surface”.	Change NOTE 4 to: Some quantities with unit one are defined as the ratios of two individual quantities of different kind belonging to two general quantities of the same kind. In addition, change NOTE 5 to: In reporting the values of quantities defined as the ratios of two individual quantities different kind but belonging to general quantities of the same kind, the relevant units should be specified when there is possibility of ambiguity.	Partially agreed: the Note has not been changed, but Note 1 has been rephrased to make it clear that quantities with unit one are, in some sense both general and individual quantities. The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0172 IUPAC	1.8 (now 1.10)	Note 6	te	‘number of entities’ is not a quantity of dimension 1 by the definition given. The dimension is always ‘number of (specified) entities’ (a base quantity in any system of units, according to 1.4 note 4) and the unit is always the entity counted. In “ten metres” the unit is the metre; in “10^5 neutrons” the unit is one neutron, in “number of turns in a coil” the unit is one turn in a coil etc etc.	Delete note 6 – it is inconsistent with 1.4 note 4	Partially agreed: the Note has been changed to better explain. Please see also the justification in the “Significant changes” annex.
0173 NPL, UK	1.8 (now 1.10)	Note 6 Examples	ge	Number of entities is a quantity for which the SI only allows the unit one, ‘1’. This is quite different from other quantities with the unit one where we may use explicit units to aid understanding, e.g. mmol/mol, kg/kg, rad. This distinction should be clarified and it would also be useful to add notes on current best practice for expressing these quantities.	Add text to the effect that: Number of entities is a quantity for which the SI only allows the unit one, ‘1’. For this reason it is essential that a full description of the quantity being expressed accompanies the presentation of a measurement result. Nonetheless, it is common for many technical fields to employ their own ’units’ for number of entities, in place of one, to aid understanding of the quantity being expressed, e.g.	Partially agreed: the Note has been changed to better explain. Please see also the justification in the “Significant changes” annex.

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
					cells, particles, bytes.	
0174 IEC-DE 20	1.8 (now 1.10)	Other notes	te		Delete whatever doesn't make sense.	Unclear comment.
0182 ISO 124 0190 ISO 129	1.9 (now 1.12)	definition	te	Please note that the concepts “real” and “scalar” are missing a definition. “Scalar” may suggest that the quantity is a number/ is of dimension number (cf. Def. 1.8; also applies to Note 4). Does “real” denote real numbers? If so, then explanation would be needed.	Please check/improve the wording.	Agreed: the definition has been rephrased.
0188 IEC-DE 21	1.9 (now 1.12)	definition	te	The definition looks very strange. The concepts “real” and “scalar” are not yet defined but used. “Scalar” may suggest that the quantity is a number/ is of dimension number (cf. Def. 1.8). Stands “real” for real numbers? If yes, there is nowhere explained why.	Explain what is meant.	Agreed: the definition has been rephrased.
0183 ISO 125 0186 MB IMEKO-024	1.9 (now 1.12)	definition	te	Text: measurement unit unit of measurement unit real scalar individual quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared by ratio, resulting in a number	Proposed “specific value of a quantity, defined and adopted by convention, with which is compared by ratio with any other value of the same quantity, resulting in the latter number”.	Disagreed: units are used to define values of quantities, and are not values.
0205 UK-OIML	1.9 (now 1.12)	definition	te	measurement unit unit of measurement unit real scalar individual quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared by ratio, resulting in a number. Reference should be to quantities, not only to individual quantity.	Proposal: Delete “individual”. Add note: “A value attributed to a particular quantity”.	Disagreed: units are individual, not general, quantities.
0184 ISO 126 0187 EC-025	1.9 (now 1.12)	definition	te	The word “number” is confusing in the given definition. The number is seen as an intrinsic part of the “value of a quantity”, i.e. the latter equals the product of a number and a unit. The number is the numerical value of the quantity expressed in the given unit.	Please consider the following revision: “real scalar individual quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared by ratio, resulting in a value of that quantity”.	Disagreed: the ratio of two (ratio) quantities, and therefore in particular a quantity and a unit, is a number, not a value of a quantity.
0181 ISO 123 0185 ISO 127 0206 ISO 132 0207 PTB 0208 PTB-OIML	1.9 (now 1.12)	definition	te	The definition applies to quantities, not only to individual quantities. Chapter 2.1 of the SI Brochure No. 9. contains an explanation that is easier to understand.	Delete “individual”. Add a note: For more information about measurement units see SI Brochure 9, chapter 2.1.	Disagreed: units are individual, not general, quantities. However, the definition has been rephrased to make it clearer. The VIM already contains references to the SI Brochure, where the context is more specifically related: here the definition encompasses also non-SI units.
0189 ISO 128	1.9 (now 1.12)	definition	te	The definition is too restrictive in that not all measurement units are on ratio scales (e.g., Celsius; for Celsius, only differences can be compared by ratio).	Rewrite to include interval scales.	Partially agreed. While the definition has been kept, a new Note 2 has been introduced to deal with the case of interval quantities.

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0191 IUPAC	1.9 (now 1.12)	definition	te	The definition can be read as unduly restrictive in that not all measurement units are on ratio scales. Celsius is the most common. In the case of Celsius, only differences can be compared by ratio.	Consider.	Partially agreed. While the definition has been kept, a new Note 2 has been introduced to deal with the case of interval quantities.
0192 IUPAC	1.9 (now 1.12)	definition	te	The definition implies comparison of quantities by ratio, rather than comparison of values by ratio. See also the substantive objection to the new definition of 'value' below	amend to something more general, such as "real scalar individual quantity, defined and adopted by convention to serve as a standard of reference for [intervals on] a measurement scale".	Disagreed: values are meaningfully comparable by ratio only if the corresponding quantities are comparable by ratio.
0193 RNMF_FR	1.9 (now 1.12)	definition	ge	See comment on "general" and "individual" §1.1The term "individual" should be removed in the VIM 4 definition of "measurement unit" and in all the VIM 4 document. We should consider the unit as a particular quantity and not a quantity value. Notes 1 and 2 of VIM3 remain essential to keep. It is suggested that the definition of unit written in the SI brochure could be put as a note to help the reader.	See proposal on "general" and "individual" §1.1Real scalar quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared by ratio, resulting in a number. To reintroduce Notes 1 and 2 of VIM3To add the definition of unit written in the SI brochure, in a note to help the reader.	Disagreed: units are individual, not general, quantities. Anyway, the definition has been slightly changed, and the superordinate is now 'reference quantity'. Notes 1 and 2 were not removed, but only renumbered.
0195 MIRS-OIML	1.9 (now 1.12)	definition	te	Proposed definition is concise, useful, practical and non-restrictive, enough explanatory and focused on the term's essence, while being compatible with other related definitions.	quantity adopted by convention as a reference.	Disagreed: the definition proposed by the commenter applies also to ordinal quantities, that do not have units.
0197 ISO 130 0198 MB IMEKO-026	1.9 (now 1.12)	Note 1	te	Text: NOTE 1 Ordinal quantities have no units because they cannot be compared by ratio.	"ordinal properties".	Disagreed: for the reasons explicitly explained in the Introduction, the VIM maintains ordinal properties to be quantitative.
0194 RNMF_FR	1.9 (now 1.12)	Note 3 (now 5)	ed	NOTE 3: Line 5: put inside quotation marks: "unit second to the power minus one"	To modify the Note 3 as follows "NOTE 3 Units of quantities of the same dimension may be designated by the same name and symbol even when the quantities are not of the same kind. For example, "joule per kelvin" and J/K are respectively the name and symbol of both a unit of heat capacity and a unit of entropy, which are generally not considered to be quantities of the same kind. However, in some cases special unit names are restricted to be used with quantities of a specific kind only. For example, the "unit second to the power minus one" (s-1) is called "hertz" (Hz) when used for frequencies and "becquerel" (Bq) when used for activities of radionuclides".	Disagreed: that expression refers to the unit, not to its name.
0199 IEC-DE 22	1.9 (now 1.12)	Note 4 (now 6)	te		Adapt the note with respect of terminology (definition 1.8, see above).	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the

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						justification in the "Significant changes" annex.
0200 ISO 131 0204 MB IMEKO-027	1.9 (now 1.12)	Note 4 (now 6)	te	Text: NOTE 4 Units of quantities with unit one are numbers. In some cases these units are given special names, for example "radian" and "steradian", or are expressed by quotients such as millimole per mole equal to 10^{-3} and microgram per kilogram equal to 10^{-9}.	Suggestion: *OMIT* (see also 1.12 Note 4). The name unit is assigned to a quantity value equal to 1. This can happen by assigning the value 1 to a specific *indication* of an instrument: it also happens for example in case of the use of different scales. But that should not be confusing, as in the VIM4 draft. In that sense *"unit 1" is an identity*.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0201 IUPAC	1.9 (now 1.12)	Note 4 (now 6)	te	Units cannot be numbers or vice versa.	Amend the note by deleting the first statement and beginning "In some cases the units for dimensionless quantities are given special names,…".	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0202 IUPAC	1.9 (now 1.12)	Note 4 (now 6)	te	The mole and mass fraction examples are potentially misleading. A mole ratio is always a ratio of amounts of different substances; a mass ratio – at least in compositional statements - the same. It is not useful or, more importantly, safe, to regard these as simply numbers or quotients. Nor is it necessary to include them as these do not have special names.	Delete the mass and mole ratio examples.	Partially agreed: the examples have been maintained but the Note has been expanded to provide a better explanation.
0203 NPL, UK	1.9 (now 1.12)	Note 4 (now 6)	te	It is important to state why special names or those expressed with quotients are useful – i.e. to aid understanding and avoid confusion when measurement results are expressed.	Add a final sentence, "Using special names or quotients is useful to aid understanding and avoid confusion when measurement results are expressed."	Partially Agreed: see revised wording.
0196 RNMF_FR	1.9 (now 1.12)	Note 4 (now 6)	ge	See comment above for 1.6	To delete Note 4.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0209 ISO 133	1.10 (now 1.13)		ed	In the Notes, the space between the header and the text is generally too small.	Increase the space.	Agreed: done.

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0217 IEC-DE 23						
0211 ILAC	1.10 (now 1.13)	Note 1 Example	te	CGS system is long retired—do not use as example.	Eliminate from VIM4.	Disagreed: in some fields of physics the CGS system is still in use.
0212 ISO 134 0213 EC-028	1.10(now 1.13)	Note 1, example	ed	The abbreviation “CGS” may not be commonly understood by the reader of the vocabulary as it only appears in entries 1.10 and 1.12. Therefore, it may be advantageous to spell it out at first mention.	Please consider replacing “CGS systems” by:“centimetre-gram-second (CGS) system of units”.	Agreed: done.
0214 NPL, UK	1.10 (now 1.13)	Note 2 and Example	te	In 1.9 Note 4 it is stated that units of quantities with unit one are numbers. Why is 1.10 Note 2 and its example any different? i.e. derived quantities with the dimension of base quantities are just base quantities – they are not ‘serving as derived quantities’. We may choose, as in the example and analogously to mol/mol etc, to use the units m3/m2, to aid understanding.	Change Note 2 to “A derived quantity may have the same dimension as a base quantity”.	Disagreed: this Note is not about quantities of unit one, and is about units, not dimensions.
0215 IUPAC	1.10 (now 1.13)	Note 3	te	Numbers cannot be units, and ‘1’ is not the unit for entities. The unit for counting entities is the single entity of interest. It is not generally useful to consider it as a base unit, though it arguably fulfils all of the criteria for one.	Delete the note.	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0216 NPL, UK	1.10 (now 1.13)	Note 3	te	This statement is perhaps true, but number of entities is a rather different base quantity, not having a ‘dimension’ in the same way the other base quantities do. The text should reflect this.	“The quantity number of entities is a neutral element of any system of units, necessary and present automatically, and as such may be regarded as a base quantity.”	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes” annex.
0210 RNMF_FR	1.10 (now 1.13)	Note 3	ge	Note 3 may remain useful at this place even if changes are made above about unit one.	Note 3 may remain useful at this place even if changes are made above about unit one.	The subject of quantities with unit one (a.k.a. “dimensionless quantities”, “quantities of dimension one”, “quantities of dimension number”, etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the “Significant changes”

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						annex.
0218 ISO 135 0219 MB IMEKO-029	1.12 (now 1.15)	definition	te	Text: coherent derived unit coherent unit derived unit that, for a given system of quantities and for a chosen set of base units, is a product of powers of base units with no other proportionality factor than one.	It is *not* a generic "proportionality factor", but, for a non-coherent system, a factor needed to match the dimensions. (see also Comment to 1.25 NOTE 2).	Unclear comment. However, the phrase has been changed to "product of base units each raised to a power".
0220 IUPAC	1.12 (now 1.15)	definition	ed	"product of powers" is usually interpreted as product of exponents. That is apparently not the intent here. Note also that a product of multiple instances of the same base unit is still a product.	Delete "of powers".	Agreed. The phrase has been changed to "product of base units each raised to a power".
0221 IUPAC	1.12 (now 1.15)	definition	te	derived units do not have to be simple products (for example, bels, pH) but can still be regarded as coherent if no conversion factor is needed. The present definition accordingly excludes any derived unit that is not a simple product.	Generalise to "derived unit that, for a given system of quantities and for a chosen set of base units, is derived from base units with no other proportionality factor than one".	Disagreed. The meaning of "coherent derived unit" is at least partly conventional: this definition has been taken from a characterization given in the current edition of the SI Brochure, sect 2.3.4.
0223 IUPAC	1.12 (now 1.15)	Note 2	ed	The example does not illustrate the statement; all the units in the example use the SI but the statement is about whether coherence can be stated across different systems. Note 3 covers that point adequately.	Delete Note 2. Alternatively, move the example in Note 2 to an Example for the definition itself – for which it serves reasonably well - and delete the statement (Note 2) preceding it.	Partially agreed: the example has been rewritten to make its content clearer.
0222 RNMF_FR	1.12 (now 1.15)	Note 4	ge	Note 4 tautology…	Either suppress or change to … derived dimensionless quantity …	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0224 IUPAC	1.12 (now 1.15)	Note 4	te	Numbers cannot be units, and the note is in any case unnecessary here	Delete Note 4.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0225 NPL, UK	1.12 (now 1.15)	Note 4	te	"The name and symbol of the unit one are generally not indicated" does not seem like relevant information here. This relates more closely to 1.9 Note 4.	Remove the final sentence in this note.	Agreed: removed.
0226 CMI	1.14 (now 1.17)	definition	ge	„System of units in which the measurement unit for each derived quantity is a coherent derived unit". The term „measurement unit" has been replaced by the term „unit"	„System of units in which the unit for each derived quantity is a coherent derived unit".	Disagreed: the full term "measurement unit" is used in the preceding definitions.

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				in all the preceding definitions.		
0231 UO	1.15 (now 1.18)	Term	ge	This entry does not seem necessary! Firstly, it is not used anywhere else in VIM 4. Secondly, it is more intuitive to state that “...day is not an SI unit” rather than “...day is an off-system unit [with respect to SI].	Consider deleting entry 1.15.	Disagreed: the definition is about a more generic concept than ‘non-SI unit’.
0227 ISO 136 0232 ISO 138	1.15 (now 1.18)		te	The concept “off-system (measurement) unit” is defined in VIM 3 and has been copied into ISO 80000-1, but in both documents it is not used elsewhere. The SI-brochure ed. 8 and 9 do not mention it. Hence it should be replaced by a concept which covers better Example 1 and 2: electronvolt and non-SI units of time.	Replace the term “off-system measurement unit off-system unit” by “accepted non-SI unit” Replace “a given system of units” by “SI, but is accepted for use with the SI” In example 1, replace “unit of energy with respect to the SI.” by “accepted non-SI unit of energy.”	Disagreed: the definition is about a more generic concept than ‘non-SI unit’.
0228 CMI	1.15 (now 1.18)	definition	ge	See the previous comment. In the definition the term “measurement unit” has remained whereas in the examples it has been deleted – non-consistency.	Only “unit”.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0229 ISO 137	1.15 (now 1.18)	Example 2	te	The time format should follow ISO 8601-1:2019 “Date and time - Representations for information interchange - Part 1: Basic rules” (subsection 5.5.2 “Duration”).	Replace ”off-system units of time with respect to the SI. ”by “accepted non-SI units of time, 3:12:15 d; 12:15:30 h, 12:15 h, 15:30 min may be used as values of duration in the expanded alternative format instead of 3 d 12 h 15 min, 15 h 30 min, 12 h 15 min, 15 min 30 s.	Disagreed: the Note lists examples of units by their names, not their symbols.
0230 IUPAC	1.15 (now 1.18)	Example 2	ed	List missing ‘and”	“Day, hour *and* minute …”.	Agreed: inserted.
0233 ISO 139	1.16 (now 1.19)	definition	ed	In the “VIM4_CD_Significant_changes” document (N2866), there is a "," between “constants” and “together”.	--> based on a set of defining constants, together with rules.	Agreed: inserted.
0235 BelGIM	1.16 (now 1.19)	definition	ed	It is not clear whether the words "together with rules for their use" refer to "units" or to "defining constants". By contrast, there is a comma placed before "together with rules for their use" in JCGM-WG2-CD-03 (page 7, table in clause 3)	A comma should be used before the word "together".	Agreed: inserted.
0234 BelGIM	1.16 (now 1.19)	definition	ge	It should be definitely stated whether the SI is still based on the ISQ as previously defined in VIM3 or not. As the concept of base and derived units has to be maintained in the current SI for continuity, it would be appropriate for the definition to clearly indicate the presence or absence of a linking between the SI and the ISQ. It also should be noted that an important aspect of any system of units is not only rules for using the units but also principles of forming them (derived units, multiples and submultiples) within that specific system (see definition 1.13). Should the SI be no longer based on the ISQ, both the SI set-up principles and the rules for deriving SI units become undefined.	Our proposal is to keep the definition from VIM3 essentially but add the information that, within the current SI, any SI unit can be written either through a defining constant itself or through products or quotients of the defining constant. The definition might read as follows: "a system of units which is based on the ISQ and in which the definition of any unit is established in terms of a set of seven defining constants, adopted by the 26th Conference of Weights and Measures."	Partially agreed: that the SI is based on the ISQ is not considered an actual specification anymore, but rather a choice allowing to present the units of the ISQ base quantities as the SI base units, as explained in Note 1.
0237	1.16 (now	definition	ed	To keep SI definition as it in VIM3, as it defines what SI	Replace first two lines of VIM4 cl.1.16 with first 3 lines	Partially agreed: the reference to the 26th

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ILAC	1.19)			means. "Adoption is made the 26th CGPM" is explained in NOTE 1.	of VIM3 cl. 1.16 so that the clause reads: "system of units, based on the International System of Quantities, their names and symbols, including a series of prefixes and their names and symbols,…."	CGPM has been removed, but that the SI is based on the ISQ is not considered an actual specification anymore, but rather a choice allowing to present the units of the ISQ base quantities as the SI base units, as explained in Note 1.
0238 IUPAC	1.16 (now 1.19)	definition	ed	Unnecessary, and possibly incorrect, to specify the particular meeting – the SI is the system adopted and maintained by the CGPM adopted at that time.	Delete the date and begin Note 1 with "The International System of Units at the time of issue of this vocabulary was adopted by the 26th General Conference on Weights and Measures (CGPM)".	Agreed: removed from the definition.
0239 AU	1.16 (now 1.19)	definition	ed	Remove reference to the "26th" CGPM, noting that the second is also likely to be re-defined at some point.	Remove reference to the "26th" CGPM.	Agreed: removed.
0240 RNMF_FR	1.16 (now 1.19)	definition	ed	Keep the French name for CGPM "Conférence générale des poids et mesures, in particular in VIM….	To modify as follows: System of units, based on a set of defining constants together with rules for their use, adopted by the 26th Conférence générale des poids et mesures.	Disagreed: the phrase "General Conference on Weights and Measures (CGPM)" is also used in the SI Brochure.
0236 CMI	1.16 (now 1.19)	Note 1	te	The term „seven physical constants" is not precise. The 9th SI Brochure itself admits that some constants are only of technical nature.	„seven physical and technical constants".	Disagreed: technical constants are not fundamental constants, but are physical nevertheless.
0241 RNMF_FR	1.16 (now 1.19)	Note 1	ed	NOTE 1: remove "and the English names" in the last sentence. VIM should not refer to particularities.	The names of the seven base quantities of the ISQ and the symbols of the corresponding base units of the SI are listed in the following table.	Partially agreed: removed "English" (the table included also the names of the units).
0242 IUPAC	1.16 (now 1.19)	Note 1	ed	Much of this information is redundant – there is a much more complete statement in the SI Brochure, already referenced at note 3.	Reduce the text to the list of the base units.	Disagreed: the Note provides some helpful, introductory information, and then explicitly refers to the SI Brochure.
0243 IEC-DE 24 0245 ISO 140	1.16 (now 1.19)	Note 4	ge	It is not clear if NOTE 4 really expresses what is intended. "Number of entities" may only be natural numbers.	Please check.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0247 IUPAC	1.16 (now 1.19)	Note 4	te	Numbers can not be units, and if that assertion is included, 'often' is a gross overstatement.	Delete ", with the base unit one, symbol "1".".	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.

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2 Type of comment: ge **= general** te **= technical** ed **= editorial**

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
0248 NPL, UK	1.16 (now 1.19)	Note 4	te	The text in this note “is often considered” is currently not consistent with 1.4 Note 4 and 1.10 Note 3 “can be regarded”.	Unify the text in these notes.	Agreed: changed.
0246 ISO 141	1.16 (now 1.19)	Note 5	ge	Please check if the terms in NOTE 4 are proper English names.	Otherwise, delete the word “English”.	Agreed: removed.
0244 IEC-DE 25	1.16 (now 1.19)	Note 5	te	Are these real English names?	Delete the word “English” if they aren't.	Agreed: removed.
0249 ISO 142 0252 PT/ IPQ	1.16 (now 1.19)	Note 5	te	As the rules for the use of the SI units include the prefixes of only decimal multiples and submultiples of units, this may be suggested in the entry 1.16 International System of Units.	Replace: “NOTE 5 The rules for the use of the SI units include the prefixes for multiples of units and submultiples of units listed in the following table, “By: “NOTE 5 The rules for the use of the SI units include the prefixes for only decimal multiples of units and submultiples of units listed in the following table, “	Disagreed: the current phrase “prefixes for multiples and submultiples” is correct, and intentionally generic (thus avoiding a more specific description, like “for multiples of 10^3 etc.”).
0250 IUPAC	1.16 (now 1.19)	Note 5	ed	This table is unnecessary – the VIM is a vocabulary, not a replacement for the Brochure or a reference to SI rules. Further, for ISO, notes to entry should give information on the use and meaning of the term, not additional provisions.	Amend to, for example, “The SI Brochure gives rules for multiples and submultiples of units, including prefixes for particular multiples. Examples: The prefix “yotta”, symbol Y, is used for the multiple 10^{24}. Similarly, the prefixes “kilo” (k), “milli” (m) and “micro” (μ) correspond to the multiples and submultiples 10^3, 10^{-3} and 10^{-6} respectively”.	Disagreed: the table was included also in the VIM3, and here it has been updated with the new prefixes.
0251 IUPAC	1.16 (now 1.19)	Note 5	ed	Reference to “the current version” of a separate document is potentially unsafe when documents may be updated at different time.	Refer specifically to the 9th edition of the SI brochure issued in 2019.	Agreed: changed everywhere.
0253 ILAC	1.17 (now 1.20)	entry	te	The definition of multiple and submultiple of a unit in 1.17 and 1.18 is only used in NOTE 5 in 1.16. As that NOTE is rather clear and the terms are really straightforward there is no need to maintain these definitions.	Delete 1.17.	Disagreed. This entry was already in the VIM3, as it is considered helpful here.
0254 CMI	1.17 (now 1.20)	definition	ge	See the preceding comments 1.14 and 1.15.	See 1.14 and 1.15.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0256 ISO 144 0257 EC-030	1.17 (now 1.20)	Note 1	te	In its current version, Note 1 may be interpreted that SI prefixes are exclusively reserved for use with SI base units and SI derived units. Of course, SI prefixes may also be used with off-system units, for instance, kiloelectronvolt (keV).	Please consider either revising Note 1 or inserting an additional Note to expand the use of SI prefixes for off-system units.	Agreed: The Note has been expanded.
0255 ISO 143 0258 EC-031	1.17 (now 1.20)	Note 1	ed	“[…] are given in Note 5 of entry 1.16.”	Replace by: “[…] are given in Note 5 to entry 1.16.”	Disagreed. The phrase “note to entry” seems to assume that the note is not part of the entry, which is not the case here.
0259 ISO 145 0262 EC-032	1.17 (now 1.20)	Note 2	te	Indeed, the fact that one kilobyte = 1024 bytes is confusing, but it is unlikely that the whole IT industry is changing its definitions because of a new issue of the VIM. The note is therefore meaningless.	Delete this note or changing it to an explanatory one.	Disagreed. There are examples in which binary prefixes are used, and this is what technical standards define.

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
0260 IUPAC	1.17 (now 1.20)	Note 2	ed	There seems no good reason to include a table of binary prefixes.	Delete the table and state that “ISO/IEC 80000-13 gives prefixes for binary multiples”	Disagreed. The table was already in the VIM3, as it is considered helpful here.
0261 IUPAC	1.17 (now 1.20)	Note 2	ed	IEC 80000 is a joint ISO/IEC document.	Describe as “ISO/IEC 80000-13”.	Disagreed. While the 80000 series is a joint ISO and IEC product, each part is either ISO or IEC.
0263 ILAC	1.18 (now 1.21)	entry	te	The definition of multiple and submultiple of a unit in 1.17 and 1.18 is only used in NOTE 5 in 1.16. As that NOTE is rather clear and the terms are really straightforward there is no need to maintain these definitions.	Delete 1.18	Disagreed. This entry was already in the VIM3, as it is considered helpful here.
0264 CMI	1.18 (now 1.21)	definition	ge	See the preceding comments 1.14, 1.15 and 1.17.	See 1.14 and 1.15.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0265 NPL, UK	1.18 (now 1.21)	Example 2	te	This is a confusing example as it uses second and minute without a clear relationship back to angle.	Change to either “…the minute is a non-decimal sub-multiple of the degree” or “…the inch is a non-decimal submultiple of the foot.”	Agreed: changed.
0266 ISO 146 0267 ISO 147 0270 EC-034	1.18 (now 1.21)	Note	ed	“[…] are given in Note 5 <u>of</u> entry 1.16.”	Replace by:“[…] are given in Note 5 <u>to</u> entry 1.16.”	Disagreed. The phrase “note to entry” seems to assume that the note is not part of the entry, which is not the case here.
0268 ISO 148 0269 EC-033	1.18 (now 1.21)	Note	te	In its current version, the Note to entry may be interpreted that SI prefixes are exclusively reserved for use with SI base units and SI derived units. Of course, SI prefixes may also be used with off-system units, for instance, millirem (mrem).	Please consider either revising the Note or inserting an additional Note to expand the use of SI prefixes for off-system units.	Agreed: the Note has been expanded.
0280 ISO 152 0281 EC-036	1.19 (now 1.23)	term	te	The term “measurement scale” is very unfortunate, as many people will regard what is glued to the instrument (e.g., scale of a refractometer) as the measurement scale. The term also breaks the link with what is measured, namely a quantity value.	Keep the value “quantity value scale”	Partially agreed. The concept defined here is about entities like the Celsius scale of temperature and the Mohs scale of hardness, that are not directly related to measuring instruments. A note has been added to explain the relation and the difference with ‘scale of a displaying measuring instrument’.
0271 ISO 149 273 MB IMEKO-035	1.19 (now 1.23)	definition	te	Text: measurement scale ordered set of individual quantities of the same kind, where each quantity is associated with an element of a set of ordered identifiers.	NOT “individual quantities” but “instances of the same quantity”, so “of the same kind” is not necessary. However, also the Ordinal and Nominal Properties have scales (not found in VIM4 draft): can them be also considered as “measured? To be noted.	The definition has been rephrased, in terms of reference quantities, which are individual quantities, so that the issue has been addressed. Both ‘ordinal scale’ and ‘nominal scale’ are defined in this draft.

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0272 ISO 150 0282 ISO 153 0283 PTB 0284 PTB-OIML	1.19 (now 1.23)	definition	te	Is the "set of ordered identifiers" always related to quantity values? If so, the new definition seems to be equivalent to the one given in VIM 3, albeit less accessible. If it should allow for a measurement scale that is not related to the corresponding quantity values, on the other hand, then that is seen critically.	Keep VIM 3 definition.	Disagreed. The concept defined here is about entities like the Celsius scale of temperature and the Mohs scale of hardness: it is a different and more fundamental concept than the one defined in the VIM3.
0274 ISO 151	1.19 (now 1.23)	definition	te	Previous versions say a measurement scale is a set of values; the change is unhelpful.	Include the earlier definition of 'quantity-value' scale.	Disagreed. The concept defined here is about entities like the Celsius scale of temperature and the Mohs scale of hardness: it is a different and more fundamental concept than the one defined in the VIM3.
0275 IUPAC	1.19 (now 1.23)	definition	te	Previous editions identify a measurement scale as a set of values; the change of perspective is not helpful without explanation.	Include the 2006 or earlier definition of 'quantity-value' scale if it is in use.	Disagreed. The concept defined here is about entities like the Celsius scale of temperature and the Mohs scale of hardness: it is a different and more fundamental concept than the one defined in the VIM3.
0276 IUPAC	1.19 (now 1.23)	definition	te	measurement scales can probably be best thought of as 1:1 relations between an ordered set of values and a set of (hypothetical) quantities, ordered by magnitude, carrying those values; neither one, nor the other, but a relation between both. The previous definition of 'quantity-value' scale reflected this; the proposed definition does not. As importantly, the definition is quite hard to comprehend and would make a document unreadable very quickly if substituted.	Consider something 'common-sense', like "ordered set of values with rules for its construction, used as a basis for measurements" and then add notes for any more technical description (such as the homomorphism in the comment) that are considered essential to understanding the definition.	Partially agreed. The definition has been further improved, by making it clear that a scale is a function. This seems to be substantially coherent with this comment.
0285 INRIM	1.19 (now 1.23)	Note 1	ed	See the suggested changes (underlined in the column to the right).	"For a quantity having a unit, a measurement scale is an ordered set including the unit and all or some of its products by a real number k, where k is the numerical value with which each quantity is identified."	Partially agreed: the definition has been further improved, by making it clear that a scale is a function. Moreover, the content of Note 1 has been expanded to Notes 1-3 and the related Examples.
0277 VNIIM	1.19 (now 1.23)	Note	Technical	In Note 3 to entry 1.1 three types of quantities are indicated, namely those which instances can be compared by ratio or ratio of intervals and by order only. There are corresponding scales for all these quantities. It would be useful to mention these scales in Note 3 to entry 1.19.	NOTE 3 For a quantity having a unit a measurement scale is a ratio (absolute) scale or a scale of intervals. A measurement scale for ordinal quantities is an ordinal scale. A similar scale for nominal properties is a reference set of nominal properties (nominal scale).	Partially agreed: for the sake of clarity, a Note has been introduced for each type.

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0278 IUPAC	1.19 (now 1.23)	Note 2	te	The note is not helpful. All individual quantities are “empirically distinguishable”, whether of the same magnitude or not, and the definition already states that quantities and identifiers are ordered. The sole purpose of the note seems to be to say that the identifiers are usually chosen to follow their natural order. This is not new information.	Delete Note 2.	Agreed: the Note has been deleted.
0279 PT/ IPQ	1.19 (now 1.23)	Note 3	te	This NOTE refers both ordinal quantity and nominal property: it is confusing as they are totally different concepts. It may be useful to create a NOTE 4 to only refer nominal properties and develop the part of for ordinal quantities in NOTE 3, inserting the JCGM – WG 2 proposed NOTE 2 of entry 1.32.	Replace: “NOTE 3 A measurement scale for ordinal quantities is an ordinal scale. A similar scale for nominal properties is a reference set of nominal properties.” By: “NOTE 3 A measurement scale for ordinal quantities is an ordinal scale, and it may be established by measurements according to a measurement procedure. NOTE 4 A similar scale for nominal properties is a reference set of nominal properties.”	Partially agreed: for the sake of clarity, a Note has been introduced for each type and each of them with an Example.
0325 AU	1.20 (now 1.24), 1.33, 6.4	term	te/ed	VIM4 1.20 is a definite improvement on VIM3 1.19. Agree with 1.33. 6.4: Suggest change “reference set” to “a given set” as it will not always relate to a reference set.	6.4 Change “reference set” to “a given set”.	Partially agreed. (definition 6.5 has been aligned with this one).
0317 ISO 162 0320 EC-040	1.20 (now 1.24)	term	te	The term “quantity value” is well established and it is not clear why this should be changed to “value of a quantity”.	Keep the original term “quantity value”.	Disagreed: the term “quantity value” was introduced in the VIM3 (the VIM1 and VIM2 have “value (of a quantity)”), and the choice to take it as the preferred term was variously criticized as an unrequired neologism.
0321 UO	1.20 (now 1.24)	term	ge	For some concepts in the CD, the preferred (main) term is the short form, and the alternative (synonym) term is a longer form. In this and some other cases, it’s the opposite. As a non-native English speaker, I don’t immediately see why, here, the short form could not be the main term.	Let ‘quantity value’ be the preferred (main) term and ‘value of a quantity’ an alternative (synonym) term.	Disagreed: the term “quantity value” was introduced in the VIM3 (the VIM1 and VIM2 have “value (of a quantity)”), and the choice to take it as the preferred term was variously criticized as an unrequired neologism.
0287 ISO 155 0291 MB IMEKO-037	1.20 (now 1.24)	definition	te	value of a quantity quantity value value <quantity>individual quantity identified as the product of a number and a measurement unit or on an ordinal scale.	NO. Still valid VIM3, clause 1.19: Quantity value number and reference together expressing *magnitude* of a quantity Disagree with VIM4 draft: a value is not *a* quantity, is *a* number and *a* reference *of a* quantity. Much clearer (and, for a quantity obviously numerical).	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0294 ILAC	1.20 (now 1.24)	definition	te	We disapprove strongly of the characterisation of ‘value of a quantity’ as a quantity. Not only is this a substantial and fundamental departure from existing usage; we are unable to see it as a sensible characterisation in any rational framework for metrology. While there are many reasons for the objection, we note in particular that, if the intent is to declare the two concepts (value and quantity)	Consider to revert to the previous definition and adjust all dependent definitions accordingly.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.

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				to be aspects of the same entity, a simple objection is that the value of a quantity can generally change while the quantity remains the same. The two must accordingly be distinct.		
0295 ISO 158	1.20 (now 1.24)	definition	te	The proposed definition is completely inconsistent with existing usage and very hard to justify. Worse, the effect on dependent definitions (starting with 1.21) is to make many self-contradictory or meaningless.	Delete. Revert to “number and reference describing the magnitude of a quantity” Correct all dependent definitions accordingly.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0297 RNMF_FR	1.20 (now 1.24)	definition	ge	See comment on “general” and “individual” §1.1Moreover, the “ordinal” scale will not be easily understood by the reader, even metrologist. Is there a real need to introduce ordinal quantity and ordinal scale in the vocabulary of metrology? Is there any metrology behind ordinal quantity ? LNE is in favour to come back to the VIM3 definition but removing the term « magnitude » and using the French version. The translation in English gives: “Number and reference together expressing quantitatively a quantity” or alternatively, “Quantity value is the quantitative expression of a quantity”.	See proposal on “general” and “individual” §1.1 To modify definition as follows: “Number and reference together expressing quantitatively a quantity”.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0296 IUPAC	1.20 (now 1.24)	definition	te	The proposed definition is nonsensical. I also do not believe it is in use anywhere in metrology or in any other branch of science.	Delete and replace with “number and reference describing the magnitude of a quantity”.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0292 CMI	1.20 (now 1.24)	definition	ge	See the preceding comments 1.14, 1.15 and 1.17.	See 1.14 and 1.15.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0298 PT/ IPQ	1.20 (now 1.24)	definition	te	In the rationale of our suggestion for the entry 1.1, concerning the two kinds of defining comparisons for the quantity, using the expression “either or” may make the definition clearer yet.	Replace: “individual quantity identified as the product of a number and a measurement unit or on an ordinal scale “By: “individual quantity identified either as the product of a number and a measurement unit or on an ordinal scale“.	Agreed: changed.
0286 ISO 154 0288 ISO 156 0322 ISO 164 0323 PTB	1.20 (now 1.24)	definition	te	There is no need to distinguish between quantity and individual quantity.	Delete “individual”.	Disagreed. While in this new draft one definition of ‘quantity’ has been reintroduced, the distinction is substantially maintained and in some definitions, like this one, the adjectives “general” or “individual” are considered helpful to make the intended meaning clearer.
0318 ISO 163 0319 EC-039	1.20 (now 1.24)	definition	ed	“Number value” sounds unnecessarily arcane; the usual term is “numerical value”.	Change to… identified as the product of the numerical value of a quantity and…	Disagreed: the definition does not contain the expression “number value”, nor implies it. And, in any case, numerical values are numbers.

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0299 ILAC	1.20 (now 1.24)	Examples	ed	The examples in VIM3:1.19 are given more clearly. It is recommended to not change the examples.	EXAMPLE 1 Length of a given rod: 5.34 m or 534 cm EXAMPLE 2 Mass of a given body: 0.152 kg or 152 g EXAMPLE 3 Curvature of a given arc: 112 m-1 EXAMPLE 4 Celsius temperature of a given sample: -5 °C However do not use "x" for multiplication sign. Are all examples really needed (e.g. Ex 1 and 4).	Disagreed: the new phrasing has been introduced to avoid a possible wrong interpretation of these examples, where an expression like "Length of a given rod: 5.34 m" could be misinterpreted to mean that the length of a given rod is a value.
0293 CMI	1.20 (now 1.24)	Examples	ed	The numbering of the examples should be better separated from individual values of the quantities.	Only typographical improvement.	Agreed: fixed.
0289 ISO 157	1.20 (now 1.24)	Examples	ed	EXAMPLE 1 5.34 m ……EXAMPLE 2 0.152 kg …...Comment: Spacing and colons are to be inserted	EXAMPLE 1: 5.34 m ……EXAMPLE 2: 0.152 kg …...	Agreed as to spacing: fixed (colons are not used in this way in the VIM).
0290 ISO 165	1.20 (now 1.23)	Examples	ed	Spacing and colons are to be inserted	The remaining examples 3 – 10 should have a colon " : " then spaces are to be placed after which the statements are to begin	Agreed as to spacing: fixed (colons are not used in this way in the VIM).
0300 VNIIM	1.20 (now 1.24)	Example 1	te	The example illustrates "two different ways" rather than "two different values of quantity"	5.34 m or 534 cm as the same length expressed by two different values of quantity	Agreed: changed, but moved under new Note 1.
0301 IUPAC	1.20 (now 1.24)	Example 1, Example 2, Example 8	ed	These examples are not examples of 'value'; they illustrate an important but separate point.	Move example 1, example 2 and example 8 to follow Note 6. Consider also moving Note 6 further up, preceding the present note 1.	Agreed: changed and included as part of Note 1.
0304 VNIIM	1.20 (now 1.24)	Example 2	te	The same.	0.152 kg or 152 g as the same mass expressed by two different values of quantity	Partially agreed: changed.
0305 NPL, UK	1.20 (now 1.24)	Example 3	te	Using "m-1" for curvature is not best practice.	Change to rad m-1 or rad/m.	Disagreed: this is the unit of curvature according to ISO 80000-3: 2019, entry 3.2.
0306 IUPAC	1.20 (now 1.24)	Example 5	te	In this context where 'unit' has special meaning, it is probably better to describe *j* (*i* in English) as the "unit imaginary number" as it is not a measurement unit. For even less ambiguity, write "where $j = \sqrt{-1}$"	Amend to "where".	Agreed: changed.
0307 VNIIM	1.20 (now 1.24)	Example 8	te	The same	3 µg/kg or 3・10−9 as the same mass fraction expressed by two different values of quantity	Partially agreed: changed.
0302 ISO 159	1.20 (now 1.24)	Example 10	ed	The United States prefers the use of the uppercase letter L as the unit symbol for the liter in order to avoid the risk of misinterpretation between the lowercase letter l (el) and the numeral 1 (one). Recommend replacing "IU/l" with "IU/L". New emphasis has been placed on *Risk Assessment* within ISO/IEC documentary standards, resulting in increased awareness by metrologists of identifying potential risks and taking action to prevent errors and eliminate risk. When fonts with serifs are used,	"IU/L " instead of "IU/l "	Agreed: changed

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				lowercase l (el) and 1 (numeral one) are almost visually indistinguishable and further deteriorates when sans serif fonts are used. An uppercase letter L cannot be visually confused with the numeral one (1). Using uppercase letter L as the liter unit symbol improves the information legibility and mitigates misinterpretation risk (EXAMPLE 10).		
0303 NPL, UK	1.20 (now 1.24)	Example 10	te	IU are international units and cannot be referred to as representing directly an amount-of-substance concentration, which implies the units mol/L or mol/m3.	Change to “..as the biological equivalent of a given amount-of-substance concentration for a specified compound.”	Not agreed. The Example has been modified however.
0310 ISO 160 0314 EC-038	1.20 (now 1.24)	Note 3	ed	Note 3 erroneously refers to an equation in Note 1.	Please correct by referring to Note 2.	Agreed: fixed.
0311 ISO 161	1.20 (now 1.24)	Note 3	ed	The number of reference note in NOTE 3 is incorrect.	NOTE 3 ... According to this understanding, in the equation in NOTE 2 the value 5.34 m is ...	Agreed: fixed.
0313 NMIJ1	1.20 (now 1.24)	Note 3	ed	In NOTE 3 of 1.20 Value of a quantity, “NOTE1 the value 5.34 m” should be changed to “NOTE 2 the value 5.34 m”.NOTE 3 In some mathematical theories of measurement, values of quantities are more generically understood as symbols associated with quantities of objects for representation purposes. According to this understanding, in the equation in Note 1 the value 5.34 m is interpreted as a symbol representing the length l of rod a.	Change “NOTE1 the value 5.34 m” to “NOTE 2 the value 5.34 m”.	Agreed: fixed.
0324 National Institute of Standards (NIS), Egypt	1.20 (now 1.24)	Note 3	ed	There is an editorial error in the following sentence: “According to this understanding, in the equation in Note 1 the value 5.34 m is interpreted as a symbol representing the length l of rod a.” Because the equation was mentioned in Note 2 not in Note 1 in the context.	“According to this understanding, in the equation in Note 2 the value 5.34 m is interpreted as a symbol representing the length l of rod a.”	Agreed: fixed.
0312 IUPAC	1.20 (now 1.24)	Note 3	ed	Note 3 describes the understanding of ‘value’ almost universally adopted for metrology, and is unnecessary if a rational definition of ‘value’ is adopted (see comment on definition 1.20)	Correct the definition and then remove Note 3	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0315 BelGIM	1.20 (now 1.24)	Note 4	ge	Note 4 has become inconsistent with the updated definition. Although the term "reference" is no more mentioned there, it has been retained in that note. Furthermore, the instructions on how to represent a value given in items 2 (a number and a reference to a measurement procedure) and 3 (a number and a reference material) seem to be inconsistent as well. In our opinion, items 2 and 3 should refer to the cases when an individual quantity shall be identified on an ordinal scale.	Note 4 should either be amended to be in line with the definition or fully deleted.	Agreed: the Note has been deleted.

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				An indication that an ordinal scale may be established by measurements according to a measurement procedure is contained in note 2 in 1.32.		
0308 RNMF_FR	1.20 (now 1.24)	Note 8	ed	NOTE 8 is not necessary and difficult to understand because it's just a problem of language. Concerns the English version only. Should not refer to particularities	To withdraw the Note 8.	Partially agreed. The first sentence of the Note has been removed, whereas the second sentence, about the unqualified term "value", has been maintained and clarified.
0316 IUPAC	1.20 (now 1.24)	Note 8	te	i) This is not a valid reason for using a defined term; a defined term could be any lexical construct. The reason for using the alternate term is brevity. ii) 'adjectival noun' is now the wrong description; the applicable terms for English seem to be 'noun adjunct' or 'attributive noun' iii) English is not the only language with the construct.	Amend to "The second term, "quantity value", may be used for brevity. When there is no possibility of ambiguity or confusion, the unqualified term "value" may be used.	Agreed: the sentence has been expanded for clarity.
0326 ISO 166 0328 MB IMEKO-041	1.21 (now 1.25)	definition	te	numerical value of a quantity numerical quantity value numerical value ratio of a quantity and a unit of the same kind	"Ordinal quantities" are actually "Ordinal properties" and can use numerical values but not as "measurement results" but as indexes in an ordinal scale.	Disagreed: please refer to the more extended explanation / justification in the "Significant changes" annex.
0327 ISO 167 0329 EC-042	1.21 (now 1.25)	definition	te	"Number in a value of a quantity. […]" Strictly speaking, the numerical value of a quantity is the product of a "number" and a "unit".	Please consider revision	Disagreed: a numerical value is a number, and a number cannot be the product of a number and a unit.
0331 IUPAC	1.21 (now 1.25)	definition	te	The definition seems to make sense only in the light of 1.20, which catastrophically confuses value and quantity (see comment on 1.20) See also general comments on this issue.	This should be defined as a ratio of magnitudes or values, not a ratio of quantities. Alternatively consider defining it operationally as "the numerical part of a value of a quantity"	Disagreed: please refer to the more extended explanation / justification in the "Significant changes" annex.
0330 ILAC	1.21 (now 1.25)	definition / Note 1	te	The NOTE 1 is not understood. What is written here. It was clearer in VIM 3 clause 1.20 NOTE 2	Consider if this definition is needed at all or redefine it as "ratio of a quantity and its unit" (to simplify the text and not force users to consult more definitions), or; revert to VIM 3 clause 1.20.	The Note contained a typo that possibly made it hard to understand: fixed.
0333 ISO 168 0341 ISO 170 0342 PTB 0343 PTB-OIML	1.21 (now 1.25)	Note 1	ed	Printing error in note 1: The numerical value {Q} of a quantity Q is frequently denoted {Q} = Q/denotes the unit.	Change text to: The numerical value {Q} of a quantity Q is frequently denoted {Q} = Q/[Q], where [Q] denotes the unit.	Agreed: fixed.
0334 NPL, UK	1.21 (now 1.25)	Note 1	te	"{Q} = q/denotes the unit": a) is unclear as to what meaning is intended here and b) this seems to violate the general principle of not mixing words and symbols in equations.	Please clarify what is meant by this expression.	Agreed: fixed.
0335 PT/ IPQ	1.21 (now 1.25)	Note 1	ed	In the present version of the NOTE 1, it can be read: "NOTE 1 The numerical value {Q} of a quantity Q is	Replace: "NOTE 1 The numerical value {Q} of a quantity Q is frequently denoted {Q} = Q/denotes the	Agreed: fixed.

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				frequently denoted {Q} = Q/denotes the unit." This is not complete, as it can be read in the VIM3 version: "the numerical value {Q} of a quantity Q is frequently denoted {Q} = Q/[Q], where [Q] denotes the measurement unit".	unit." By: "NOTE 1 The numerical value {Q} of a quantity Q is frequently denoted {Q} = Q/[Q], where [Q] denotes the unit".	
0332 PT/ IPQ	1.21 (now 1.25)	Note 2 / Example	ed	According to the SI Brochure 9th edition: 2019, 5.4.7 - Stating quantity values being pure numbers: "The internationally recognized symbol % (percent) may be used with the SI. When it is used, a space separates the number and the symbol %.", in line with ISO 80000-1:2009 "Quantities and Units", 7.1.4 Expressions for quantities: "The symbol of the unit shall be placed after the numerical value in the expression for a quantity, leaving a space between the numerical value and the unit symbol. It should be noted that this rule also applies to the units per cent, % and per mil, ‰.", the expression: "the value is expressed as 70%" needs to be corrected.	Replace: "the value is expressed as 70%" by: "the value is expressed as 70 %".	Agreed: fixed.
0336 UO	1.21 (now 1.25)	Note 2 / Example	ed	Missing space.	...70 %.	Agreed: fixed.
0337 IUPAC	1.21 (now 1.25)	Note 2	te	First sentence fundamentally incorrect. If there is a unit "1" for counting (see comments elsewhere), a number multiplied by a unit (or a 'quantity' in the proposed definition at 1.20) cannot be identical to the number alone.	Delete the first sentence.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0338 NPL, UK	1.21 (now 1.25)	Note 2	te	The statement "there is no difference between the value and the numerical value of the quantity, when the coherent unit one is used" needs to be re-considered in the light of usage outside the SI that gives special names to counting units. i.e. for the relationship 1 byte = 8 bits, the preceding statement is not necessarily true.	Reconsider the wording of this statement to state that there are exceptions outside coherent unit sets.	The subject of quantities with unit one (a.k.a. "dimensionless quantities", "quantities of dimension one", "quantities of dimension number", etc.) is unfortunately still controversial. Note 2 of entry 1.10 (was 1.8) has been expanded, to acknowledge this and to justify the position of this Vocabulary in reference to the SI Brochure. See also the justification in the "Significant changes" annex.
0339 ISO 169 0340 MB IMEKO-043	1.21 (now 1.25)	Note 3	te	NOTE 3 Ordinal quantities have no numerical values. The numeral in an expression of the value of an ordinal quantity is not a numerical value of a quantity, but an identifier for the ordinal position of the quantity on the ordinal scale.	Why ordinal properties have no numerical values? Means that they are not numbers but indexes?	Correct: among ordinal quantities ratio is not defined, so that numerals in values of ordinal quantities canot be ratios, as instead the definition requires.
0363	1.22 (now	term	ge	For some concepts in the CD, the preferred (main) term is	Let 'true quantity value' be the preferred (main) term	Disagreed. The choice of adopting "quantity

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UO	1.26)			the short form, and the alternative (synonym) term is a longer form. In this and some other cases, it's the opposite. As a non-native English speaker, I don't immediately see why, here, the short form could not be the main term.	and 'true value of a quantity' an alternative (synonym) term.	value" in the VIM3 was criticized, with the justification that it is a term less common than "value of a quantity". This position has been consistently adopted here.
0345 ISO 172 0351 EC-044	1.22 (now 1.26)	definition	te/ed	This is not understandable: what does "consistent with a quantity" mean?	Correct.	Agreed. The definition has been changed, by more explicitly making the condition required for a value to be a true value.
0346 IUPAC	1.22 (now 1.26)	definition	ed	Object of the closing subclause unclear; is it the value that is defined, or the quantity? It is appreciated that the previous VIM definition of true value implied that the value is consistent with a definition but the proposed definition does nothing to address that issue and adds scope for different misreading.	Revert (approximately) to 2008 text: "value consistent with the definition of a quantity" and add an explanatory note to the effect that "In the definition, a value is regarded as consistent with the definition of a quantity when it is a value of the quantity in an ideal realisation of the defined quantity."	Partially agreed. The definition has been changed, by more explicitly making the condition required for a value to be a true value.
0347 IUPAC	1.22 (now 1.26)	definition	te	Confuses quantity and value thereof (see general comments on this and comment on 1.20).	Revise for consistency with value as an attribute of a quantity and not the quantity itself.	Partially agreed. The definition has been changed, by more explicitly making the condition required for a value to be a true value.
0348 NMIA submission to OIML 0350 AU-OIML	1.22 (now 1.26)	definition	ge	This draft adopts the use of the more general 'value' instead of 'value of a quantity' (or quantity value) in this definition (1.22) and elsewhere. Given the range of terms that separately define different "values" it would be helpful if the use of the more general 'value' was explained and in some cases, such as 1.22, the specific intent of the use of "value" was clarified.	We suggest providing clarification of the use and meaning of the more general "value" in a Note, and/or possibly as part of the Introduction.	Agreed: such a clarification has been added in the last Note of the entry about 'value of a quantity'.
0349 UK-OIML	1.22 (now 1.26)	definition	ge	"Value" is used in several definitions, but it is in itself not defined anywhere. Bearing in mind the fact that this vocabulary will be translated into many languages it does help to define widely used words to simply translation.	Proposal: "A number or symbol used to represent quantity".	It is not clear whether the proposal is about a different definition of 'true value of a quantity' or a possible definition of 'value'. Disagreed in the first case, given that not all representations are true. Disagreed in the second case, given that 'value' as such is a broad, non-specifically-metrological concept (as applied to variables and functions), and therefore it should not be defined in the VIM in this broader sense.
0352 ILAC	1.22 (now 1.26)	Note	te	Elsewhere it is noted that definitional uncertainty is generally kept sufficiently small to treat the set of true values as essentially unique. This point should be made in reference to 'true value'.	Add a note to the effect that "In practice, the measurand is defined in such a way that the range of true values is so small that the true value can be considered as essentially unique (see 'definitional uncertainty')"	Disagreed. The VIM is aimed at being a guidance document also for situations in which definitional uncertainty cannot be neglected.
0353 ISO 174	1.22 (now 1.26)	Note 1	te	true value of a quantity true quantity value true value value consistent with a quantity, as it is defined NOTE 1	At best, it can be estimated.	What is actually suggested here is unclear.

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0357 MB IMEKO-045				True values are, in principle and in practice, unknowable. Some approaches consider that there is not a single true value but rather a set of true values, whereas some other approaches dispense altogether with true values and rely on metrological compatibility and metrological traceability of measurement results for assessing their validity.		
0344 ISO 171 0364 PTB-OIML 0366 ISO 173 0367 PTB	1.22 (now 1.26)	Note 1	te	"NOTE 1 True values are, in principle and in practice, unknowable." That not true in general, see e.g. Note 2. Also, this does not mean, that they do not exist.	Change Note 1 with Note 2. Change the wording of the Note, so that the possible existence of a true value is taken into account.	Partially agreed: expanded the Note accordingly.
0355 IUPAC	1.22 (now 1.26)	Note 1	te	First sentence: True values for the defining constants of the SI are known.	Insert "with the exception of certain values attributed by definition,"	Partially agreed: expanded the Note accordingly (now Note 2).
0356 IUPAC	1.22 (now 1.26)	Note 1	ed	The second sentence is unrelated to the information given by the first sentence, and is more closely related to note 3.	Move the sentence "Some approaches …assessing their validity." to a separate numbered Note, following 1.22 note 3.	Agreed: done, by both expanding the existing Note and adding a new Note, as suggested.
0354 ISO 175 0358 EC-046	1.22 (now 1.26)	Note 1 (actually Note 2)	te	Fundamental (physical) constants come with associated uncertainties that are agreed by convention (e.g., CODATA). As a result, the quantity of a constant should strictly speaking be considered as a unique set of true values.	Please consider replacing by: "In the special case of a fundamental constant, the quantity is considered to have a unique <u>set of</u> true value<u>s</u>."	Partially agreed: the Note has been removed, and Note 1 has been expanded to take into account the case of SI defining constants.
0359 CMI	1.22 (now 1.26)	Note 2	te	The definition constants of the new SI are probably meant by this note. Then the adjective „fundamental" is not correct, see the comment for 1.16. If any fundamental constant is meant by that (e.g. the mass of a proton) it is surely true that they have a unique true value but the same is also valid for physical constants not being considered fundamental.	See 1.16.	Agreed: the Note has been removed, and Note 1 has been expanded to take into account the case of SI defining constants.
0360 ISO 176 0362 MB IMEKO-047	1.22 (now 1.26)	Note 2	te	Text: NOTE 2 In the special case of a fundamental constant, the quantity is considered to have a unique true value.	Add to NOTE 2 "and its value is assigned by agreement and convention" or "see 1.23 NOTE 2".	Partially agreed: the Note has been removed, and Note 1 has been expanded to take into account the case of SI defining constants.
0361 IUPAC	1.22 (now 1.26)	Note 2	ed	Noteworthy that 'fundamental constant' is not defined in the VIM and this is the only place it is used. ISO 80000 appears to use the (undefined) phrase 'fundamental physical constant'	Amend to 'fundamental physical constant' and consider adding a reference to (for example) the CODATA repository.	Partially agreed: the Note has been removed, and Note 1 has been expanded to take into account the case of SI defining constants.
0365 UO	1.22 (now 1.26)	Note 2	ge	Is the wording "fundamental constant" correct here? The BIPM website refers to seven "defining constants" and states that "The numerical values of the seven defining	Check and revise if appropriate.	Partially agreed: the Note has been removed, and Note 1 has been expanded to take into account the case of SI defining constants.

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				constants have no uncertainty". In Entries 1.5 and 1.16 "defining constant" is used. Some fundamental constants (CODATA list) come with uncertainties.		
0377 UO	1.23 (now 1.27)	term	ge	For some concepts in the CD, the preferred (main) term is the short form, and the alternative (synonym) term is a longer form. In this and some other cases, it's the opposite. As a non-native English speaker, I don't immediately see why, here, the short form could not be the main term.	Let 'conventional quantity value' be the preferred (main) term and 'conventional value of a quantity' an alternative (synonym) term.	Disagreed. The choice of adopting "quantity value" in the VIM3 was criticized, with the justification that it is a term less common than "value of a quantity". This has been consistently changed here.
0368 ILAC	1.23 (now 1.27)	definition	te	The words "by agreement" is not clear and may not be needed. Further the Examples need to be revisited. Example 2 shall be deleted because this is actually a definition in the new SI and the defining constants in the new SI should not be seen as conventional values. Rather keep only Example 3 and then make m = 100 g as an example of the conventional mass of a mass standard. Conventional values will always have an uncertainty although maybe unknown.	Consider delete "by agreement" from definition as that might be unclear and is unnecessary and keep only Example 3. Also delete NOTE 2 to abstain from even using the term "true value". There is no need to note everything you shall not do.	Partially agreed as to the first comment: a Note has been added to explain "by agreement" and "for a given purpose". Disagreed as to the second comment: the term "conventional true value" has been quite extensively used in some contexts, and it is important to point out that its meaning is unrelated to the meaning of "true value".
0369 ISO 177 0372 EC-048	1.23 (now 1.27)	definition	te	"Agreement" between whom? Example 2: If it is a mass standard, then its quantity value must have an uncertainty (note the re-definition of the kg) and it definitely is NOT a conventional value, but a measured one.	Correct.	Disagreed. The fact that a value is conventional does not depend on who agrees upon it. Example 2, about a conventional value of the Josephson constant, has been removed.
0370 IUPAC	1.23 (now 1.27)	definition	te	Inconsistent with 1.20 – this provides for attribution of a value to a quantity, which now means attribution of a quantity to a quantity	Correct 1.20 – see comment on 1.20.	Agreed. The definition has been fixed by specifying that the value is attributed to a quantity of a given object.
0371 IUPAC	1.23 (now 1.27)	definition	ed	'for a given purpose' is unnecessary for the definition; the defining characteristic is attribution by agreement, not limitation to a purpose. Also, none of the examples indicate a given purpose and the notes do not elaborate.	delete ", for a given purpose" Consider, as well as deletion above, adding a Note to the effect that "A conventional value is often assigned for a particular, limited, purpose. Example: Fixed ratio of nitrogen content to protein content, by mass, used in conversion of measured nitrogen to protein content, adopted for the purpose of determining nutritional value of a specified foodstuff."	Partially agreed: a Note has been added to explain "by agreement" and "for a given purpose".
0374 NMIJ2	1.23 (now 1.27)	Example 1	ed	The description of 9.806 65 ms-2 seems to be not appropriate from the viewpoint of the SI brochure.	The description of the unit ms-2 should be changed to m s-2 or m/s2.	Agreed: fixed.
0375 PT/ IPQ	1.23 (now 1.27)	Example 1	ed	As the SI unit of the standard acceleration of free fall is m s-2, the unit symbol displayed in the present document needs to be corrected.	Replace: "gn = 9.806 65 ms−2" By: "gn = 9.806 65 m s−2".	Agreed: fixed.
0373 RNMF_FR	1.23 (now 1.27)	Example 2	ge	Regarding the new definition of SI unites adopted in 2018, Example 2 shall be absolutely removed in this context of the revised SI (KJ-90 not used anymore).	To remove Example 2.	Agreed: removed.

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0376 IUPAC	1.23 (now 1.27)	Note 1	ed	The term used is more likely to be “conventional true value”. More importantly, there seems to be no reason to discourage its use.	Amend to read The term “conventional true value” is sometimes used for referring to conventional values.	Disagreed. There is an important difference between truth and conventionality. The Note has been expanded to make this reason explicit.
0386 UO	1.24 (now 1.28)	term	ge	For some concepts in the CD, the preferred (main) term is the short form, and the alternative (synonym) term is a longer form. In this and some other cases, it’s the opposite. As a non-native English speaker, I don’t immediately see why, here, the short form could not be the main term.	Let ‘reference quantity value’ be the preferred (main) term and ‘reference value of a quantity’ an alternative (synonym) term.	Disagreed. The choice of adopting “quantity value” in the VIM3 was criticized, with the justification that it is a term less common than “value of a quantity”. This has been consistently changed here.
0379 ISO 180 0380 MB IMEKO-049	1.24 (now 1.28)	definition	te	reference value of a quantity value used as a basis for comparison with values of quantities of the same kind.	From 1.1 “quantity” means also “kind of quantity” thus the concept here is circular.	Entry 1.1 has been changed. According to the current definition, there is no circularity.
0385 ILAC	1.24 (now 1.28)	term/Note 1	te	The first time “reference value” is used is in 3.15, but it is as “reference value of a measurand”. It is not used anywhere as “reference value of a quantity”. Not even in the notes below. “reference quantity value” is also not used anywhere in VIM 4. Further the NOTE regarding “true values” should be deleted.	Delete “of a quantity” from the term and delete “reference quantity value” completely. Delete NOTE 1 to skip the inclusion of true values at all.	Disagreed as to the terms: their lexical structure is analogous to that of other terms (e.g., “true value”), and the VIM is a guidance document for standards and other documents, where such terms could be properly used. Disagree about deleting Note 1. A true value can be a reference value.
0378 ISO 179 0387 PTB-OIML 0388 ISO 181 0389 PTB	1.24 (now 1.28)	Note 1	ed	“NOTE 1 Examples of reference values are true values of a measurand, in which case they are unknown, and conventional values, in which case they are known.” Isn’t that the other way around?	Change to: Examples of reference values are true values of a measurand, in which case they are known, and conventional values, in which case they are unknown.	Disagreed. Please see in particular Note 1 of the entry about ‘true value’.
0381 IUPAC	1.24 (now 1.28)	Note 1	te	True values can never be “used as a reference” if they are unknown. The list in Note 2 also provides a reasonable list of examples, though it could be slightly better worded to provided example	Delete Note 1 and amend Note 2 to give examples of reference values.	Disagree.See 0378.
0382 IUPAC	1.24 (now 1.28)	Note 1	ed	This would be better worded as examples of reference values	Amend Note 2 to “Examples of reference values include: a) a certified value provided with a certified reference material, b) a conventional or known value provided by a device, such as for example a stabilized laser, c) a value provided by a reference measurement procedure, d) the value associated with a measurement standard.	Partially agreed: changed, with some adaptations.

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0383 ISO 182 0384 EC-050	1.24 (now 1.28)	Note 2	te	The examples associated to Note 2 do not seem to be fully applicable or suitable with the intended definition of the term “reference value of a quantity”. In line with the generic example given in a) (i.e. certified reference material), it is not necessary to give a detailed practical example for b) (i.e. stabilized laser). The practical example should ideally be replaced by “material measure” (entry 4.6). According to entry 1.2, a “quantity <individual>” does not encompasses measurement procedures. Hence, a reference procedure does strictly speaking not provide or does not embody a reference value. Of course, measurement procedures can provide a common basis/reference for metrological traceability. According to entry 5.1, a measurement standard encompasses: a certified reference material, a measuring system and a material measure. Similar to measurement procedures, a measuring system does not embody a reference value. Also note that the two other instances are already given in a) and b).	Please replace “stabilized laser” by “material measure” Please consider to delete example “c) a reference procedure” Please delete example “d) measurement standard”.	Partially agreed: changed, with some adaptations.
0390 ILAC	1.25 (now 1.29)	entry	te	As this term is only used in 1.16 NOTE 4 and nowhere else, this definition is as straight forward as it is – not needed. One may even ask if calculus and algebra then are two different issues.	Delete this term completely. It is not needed and a combination of two straight forward well known terms. In the VIM 3 this was called “primitives” and although calculus is not a “primitive” to ordinary people, it is to anyone with a degree in science.	Disagreed. The term “quantity calculus” has a meaning that is not derived from the simple juxtaposition of the meanings of “quantity” and “calculus”. Furthermore, the VIM is aimed at being a foundational vocabulary for all metrology-related documents, in which the term “quantity calculus” may occur (and please note that this entry was present also in the VIM3).
0391 ISO 185 0392 MB IMEKO-182	1.25 (now 1.29)		te	system of mathematical rules and operations applied to quantities	The quantity calculus is NOT based on mathematics, but on logical operations, whose symbols, rules and operations are generally the same, but not always having the same meaning. As a consequence, e.g., only the fraction symbol (/) is used between quantity symbols.	Disagreed. Logical operations are NOT, AND, OR, etc., which do not have a specific role in quantity calculus. Vice versa, quantity calculus is based on multiplication and exponentiation, which are mathematical operations.
0393 ISO 183 0395 MB IMEKO-051	1.25 (now 1.29)	Note 1	te	NOTE 1 The quantities mentioned in the definition are general quantities having a unit.	“mentioned in the definition” ???	This is a phrase used quite extensively in Notes, to make the reference to entities mentioned in definitions explicit.
0394 IUPAC	1.25 (now 1.29)	Note 1	te	There is nothing to stop quantity equations being applied to individual quantities, such as the speed of light, the charge on an electron etc. etc.	Either delete note 1 or amend to read “can be” general quantities.	Partially agreed: the specification “general” has been removed.

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0396 ISO 184 0398 MB IMEKO-052	1.25 (now 1.29)	Note 2	te	Text: NOTE 2 In quantity calculus, quantity equations are preferred to numerical value equations because quantity equations are independent of the choice of units, whereas numerical value equations are not.	Except for numerical values to be included in the quantity equations, e.g., for matching the “dimensions”.	Note has been simplified.
0397 IUPAC	1.25 (now 1.29)	Note 2	te	numerical value equations are not often thought of as operations applied to quantities so appear to be are outside the scope of the definition. Why is it necessary to deprecate their use? The deprecation is also unrelated to use of the term or the definition.	Amend Note 2 to read “Quantity equations in quantity calculus are independent of the choice of units, whereas numerical value equations are not.”	Accepted
0399 ILAC	1.26 (now 1.30)	entry	te	This definition is only used in 1.25 and 1.29. As it is suggested to delete 1.25 the obvious choice is also to delete 1.26 and 1.29. Basically, this is so obvious and for both 1.26 and 1.29 it uses a “mathematical relation” as its basis for definition and then one might ask if that is an algebraic relation, a relation in calculus or some other area of mathematics.	Delete 1.26.	Disagreed. the VIM is aimed at being a foundational vocabulary for all metrology-related documents, in which the term “quantity equation” may occur.
0401 CMI	1.26 (now 1.30)	definition	ge	See the preceding comments 1.14, 1.15 and 1.17.	See 1.14 and 1.15.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0402 IUPAC	1.26 (now 1.30)	definition	te	The characterisation of ‘values’ as quantities (1.20) means that values fully satisfy definition 1.26 and that value equations are quantity equations according to 1.26 and 1.20	Correct 1.20 – see comment on 1.20.	Disagreed. While it is correct that values are quantities, they depend on units, contrary to what the definition of ‘quantity equation’ states: hence a quantity equation is not about values.
0403 IUPAC	1.26 (now 1.30)	Example 2	ed	T is the conventional symbol for thermodynamic temperature	Choose another symbol.	Disagreed. “*T*” is also the first symbol used for kinetic energy in ISO 80000-4.
0404 IEC-DE 26 0400 ISO 186	1.26 (now 1.30)	Example 3	ed	In Example 3, the concept “amount of substance” is written correctly without “-”.	Correct “amount-of-substance” wherever it appears elsewhere. At least unify the wording.	Agreed. The form “amount-of-substance” is used now only when the term is in adjectival position.
0405 IUPAC	1.26 (now 1.30)	Examples	ed	Are these examples of the definition, or examples related to note 1?	Clarify.	In the VIM examples about a Note have an indented left margin.
0406 IUPAC	1.26 (now 1.30)	Note 1	te	Note 1 of 1.26 contradicts note 1 of 1.25.	Correct note 1 of 1.25 (see comment there).	Agreed: the specification “general” has been removed.
0407 ILAC	1.27 (now 1.31)		te	This definition is obvious and a combination of a VIM 4 definition and a primitive. This term is not used anywhere at all in the VIM4.	Delete 1.27.	Disagreed. The VIM is aimed at being a foundational vocabulary for all metrology-related documents, in which the term “unit equation” may occur.
0408 CMI	1.27 (now 1.31)	definition	ge	See the preceding comments 1.14, 1.15 and 1.17.	See 1.14 and 1.15.	Disagreed: the full term “measurement unit” is used in the preceding definitions.
0409 CMI	1.27 (now 1.31)	example	ed	The numbering of examples should be better separated from the adjacent units.	Only typographical improvement.	Agreed: fixed.

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
0410 IUPAC	1.27 (now 1.31)	Example 1	ed	the example does not make sense as written. Should it say "denote Q1, Q2 and Q3 as measurement units" or perhaps ?	Amend accordingly.	Agreed: changed.
0411 IUPAC	1.27 (now 1.31)	Example 1	ed	For such a short example it would be simpler to write it explicitly rather than cross-reference another clause.	Include the relevant quantity equation in 1.27.	Agreed: changed.
0412 ILAC	1.28 (now 1.22)		te	This definition is obvious and a combination of a VIM 4 definition and a primitive and is just a tiny technical issue. This term is further not used anywhere at all in the VIM4.	Delete 1.28.	Disagreed. the VIM is aimed at being a foundational vocabulary for all metrology-related documents, in which the term "conversion factor between units" may occur.
0413 CMI	1.28 (now 1.22)	example	ed	The numbering of examples should be better separated from the adjacent units.	Only typographical improvement.	Agreed: fixed.
0414 ISO 187 0415 EC-053	1.28 (now 1.22)	Example	te	The example is useless, as the term "kilo" has been defined as multiplier before (1.17) and is therefore no real conversion factor.	Use one between miles and metre.	Partially agreed: a clarification has been added to the Example.
0416 ILAC	1.29 (now 1.32)		te	This definition is only used in 1.25 and 1.29. As it is suggested to delete 1.25 the obvious choice is also to delete 1.26 and 1.29. Basically, this is so obvious and for both 1.26 and 1.29 it uses a "mathematical relation" as its basis for definition and then one might ask if that is an algebraic relation, a relation in calculus or some other area of mathematics.	Delete 1.29	Disagreed. the VIM is aimed at being a foundational vocabulary for all metrology-related documents, in which the term "numerical value equation" may occur.
0417 IUPAC	1.29 (now 1.32)	Example 1	ed	The inclusion of ζ makes the value equation applicable irrespective of whether the units are base units or coherent derived units, because ζ in 1.26 example 1 is not restricted to 1. That is a particular case for a coherent system mentioned in the example but the example does not require it. Further, in general, base units are not sufficient for $\zeta=1$; that is only true for base units in a coherent system of units.	Either remove ζ entirely and say the equation is valid for a coherent system of units, or delete "provided that they are expressed in either base units or coherent derived units or both."	Agreed: fixed.
0418 IUPAC	1.29 (now 1.32)	Example 1	ed	As for 1.27, it would be simpler for the reader to include a quantity equation explicitly rather than cross-reference another clause.	Include the relevant quantity equation in 1.27	Agreed. Changed.
0419 IUPAC	1.29 (now 1.32)	Example 2	ed	As in 1.26, T is the conventional symbol for thermodynamic temperature	Choose another symbol	Disagreed. "*T*" is also the first symbol used for kinetic energy in ISO 80000-4.
0436 PT/ IPQ	1.30 to 1.33 (now 1.33 to 1.35)	entry	te	As the contents of the referring entries are all already present in previous parts of the documents, namely in NOTE 3 of entry 1.1, entry 1.2, entry 1.19 and NOTE 3 of entry 1.19, with the respective proposed changes by the present document.	Delete entries 1.30, 1.31, 1.32 and 1.33. for considered redundant.	Disagreed. In this edition of the VIM there is a more explicit emphasis on types of properties, in particular nominal properties but not only. Hence, rather than deleting these entries, new entries have been added about 'ratio quantity' and 'interval quantity'.
0001	1.30 (now	entry		"Ordinal quantities" do not have units and their instances	"Ordinal quantity" should be "Ordinal property", with the	Disagreed: please refer to the more extended

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Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
RISE	1.33)			cannot be compared. That means that there is no such thing as an ”ordinal quantity”, and both the entry and the term seems inappropriate	following definition: property of an entity whose instances can be compared only by order. The following NOTES should be added: NOTE 1: a common case of ordinal property are counted fractions (bounded by zero and one; percentages for example X_j%=X_j/(∑_i▒X_i)which, if not recognised, can lead to significant scale distortions and incorrect decisions NOTE 2: although ordinal (and nominal) properties generally lack a known order and thus do not have units, nor can be compared, it is possible to derive quantities (with units and comparability) by making a logistic regression in a process of restitution . The resulting “ordinal” quantities, so called categorically based quantities, then lie on a linear, quantitative scale where differences and uncertainties can be reliably and separately expressed. Typically, these “ordinal” quantities are properties of the object/entity and the instrument or device used to as a probe. The proposed changes will also require some consequential changes, of course in the entries directly addressing ordinal properties (e.g. 1.31-1.33) but also beyond.	explanation / justification in the “Significant changes” annex.
0428 IUPAC	1.30 (now 1.33)	entry	te	Definition does not seem consistent with statements (eg on quantities having units) elsewhere in this vocabulary. It is also generally not clear that a property that can only be expressed on an ordinal scale is a ‘quantity’ and in other branches of measurement theory they are not so called.	Change to “property”.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0421 ISO 200 0424 MB IMEKO-054	1.30 (now 1.33)	entry	te	Text: ordinal quantity <general>general ordinal quantity ordinal quantity in the general sense quantity whose instances can be compared by order but not by ratio	a) Order here implies “in a scale”: this cannot remain implicit in the definition of this term (contrarily to 1.1) b) It should be called “property” because it concerns non-quantitative scales.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.

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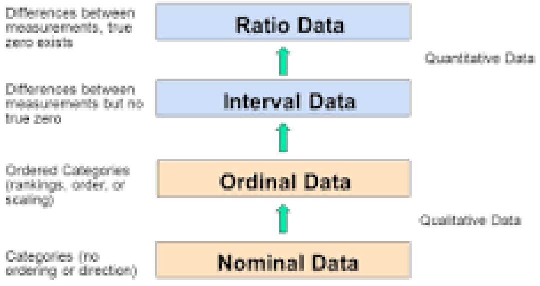
Country Code[1]	Clause	Paragraph/ Figure/Table	Type of comment[2]	Comments	Proposed change	Convener's responses
0420 ISO 189 0425 MB IMEKO-055	1.30 (now 1.33)	entry	ge		"Ordinal property" should be used instead of "Ordinal quantity". It requires a non-quantitative scale, as is correctly indicated in 6.1 "Nominal property". This is a major bug in VIM4 draft.	Disagreed: please refer to the more extended explanation / justification in the "Significant changes" annex.
0437 ILAC	1.30 (now 1.33), 1.31	term & definition	te	We do not feel that it is appropriate to describe a property expressed on an ordinal scale as a "quantity". In part, this is because the scale is not necessarily a characteristic of the property; in part because ordinal scales do not generally express a numerical magnitude.	Replace terms 'ordinal quantity' with 'ordinal property'.	Disagreed: please refer to the more extended explanation / justification in the "Significant changes" annex.
0423 ISO 204	1.30 (now 1.33)	term	te	In consonance with proposed changes at entry 1.1 it is suggested to change this term to 'ordinal measure'. In place of the term 'ordinal quantity <general>', a term 'ordinal measure' is proposed to denote the ordinal kind of quantity.	Ordinal measure.	Disagreed. A single definition, encompassing both 'general quantity' and 'individual quantity', has been introduced (we agree that one term for two meanings / entities may be confusing, but this is what we have inherited over centuries, and we doubt that adopting an existing term with a new meaning would be an effective move).
0422 ISO 201	1.30 (now 1.33)	definition	te	Why is the term quantity used in the definition of ordinal quantity and not property as is the case for the definition of quantity?	1.30 ordinal quantity property whose instances can be compared by order but not by ratio.	Disagreed. An intensional definition should refer to the most specific superordinate: since 'quantity' has been defined, and is more specific than 'property', the definition is more correct as is.
0426 ISO 202 0429 IUPAC	1.30 (now 1.33)	definition	te	Definition incorrect; the definition given applies to interval scale.	Change to "property whose instances can be compared only by order and identity" or, better, "property" (see remark on quantity/property elsewhere).	Partially agreed. The definition has been changed, also to make it consistent with the one for 'quantity'.
0427 ISO 203	1.30 (now 1.33)	definition	te	We suggest modifying the definition of "ordinal quantity" as given in clause 1.30 because can be difficult to translate clearly in other language different to English language, we suggest implement a definition based to that given by Dybkaer [1] [1] R. Dybkaer. An Ontology on Property for physical, chemical, and biological systems APMIS, 112, suppl. 117, pp. 1–210, Blackwell Munksgaard (2004); updated as <ontology.iupac.org>	Quantity, defined by a measurement procedure, that can be stated only to be lesser than, equal to, or greater than another quantity of the same kind-of-quantity.	Partially agreed. The definition has been changed, also to make it consistent with the one for 'quantity'.

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				(2009).		
0430 RNMF_FR 0431 RNMF_FR	1.30 (now 1.33)	definition	ge	See comment on “general” and “individual” §1.1	See proposal on “general” and “individual” §1.1.	The two definitions have been merged.
0432 IUPAC	1.30 (now 1.33)	Example 1	te	Rockwell hardness is an indentation size and comparison by difference is meaningful, as are measures such as standard deviation. These are not characteristics of an ordinal scale.	Delete Rockwell hardness example NB: Moh’s scale is a strictly ordinal hardness scale that could be substituted.	Agreed: changed.
0433 IUPAC	1.30 (now 1.33)	Example 2	te	Octane number is inadequately defined; it depends on specific method	Amend to ‘Research octane Number (RON)’ and, ideally, give a reference to allow the reader to detfind out.	See revised Examples.
0434 IUPAC	1.30 (now 1.33)	Example 2	te	Octane number is typically calibrated against quantitative octane/hexane mixtures and is expressed as a volume fraction of iso-octane. This is a ratio scale.	Delete octane number or give a specific octane number scale which is strictly ordinal.	See revised Examples.
0435 IUPAC	1.30 (now 1.33)	Example 3	te	The scale is not ordinal. Richter earthquake strength is a logarithm of measured movement amplitude. Amplitude is a ratio scale; the log of the amplitude is at least an interval scale.	Delete the Richter scale example.	Agreed, see revised Examples.
0438 EC-056 0439 ISO 188	1.30 (now 1.33),1.31	entry	te	The benefit for differentiating between ordinal quantities in the general sense (1.30) and individual ordinal quantities (1.31) is not clear.	Please keep original VIM3 definition for ordinal quantity Please consider deleting new entry 1.31.	Partially agreed: the two definitions have been merged, though with a definition that is consistent with the one given for ‘quantity’.
0441 IUPAC	1.31 (removed)	definition	te	See comments on 1.1 – ‘instance’ unclear. For example, is “Moh hardness” an instance of a general ordinal quantity or is it a general ordinal quantity?	Give examples of instances.	The two definitions have been merged.
0442 IUPAC	1.31 (removed)	Note 1	te	‘empirical relation’ insufficiently clear. Addition can be regarded as an empirical relation. Order might not be.	Specify the relations considered as empirical and do not use ‘empirical’.	The two definitions have been merged, and the new definition, that is consistent with the one given for ‘quantity’, does not refer to empirical relations.
0443 IUPAC	1.31 (removed)	Note 1	te	All quantities have dimension(s) unless dimensionless (and this guide says that those do, too). Either the note is incorrect or ordinal properties are not quantities.	Change 1.30 and 1.31 to ‘ordinal property’ and define ‘property’.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0444 IUPAC	1.31 (removed)	Notes 1 and 2	ed	These Notes should be attached to the general ordinal Quantity definition, not to a subordinate definition.	Move the notes to 1.30.	Agreed: the two definitions have been merged.
0445 ISO 206	1.31 (removed) , 1.32		ed	Be consistent with line spacing.	Inconsistency in the spacing and indentations on notes and examples.	Agreed: fixed.
0446 INRIM	1.31 (removed)	Note 1	ed	To improve readability. The wording used in VIM3 to express the impossibility of algebraic operations is preferred as more general, clear and with a longer tradition. No need to change without very good reasons,	Consider changing the second sentence to “No algebraic operations among those quantities exist (or can be performed).”	The two definitions have been merged, and the new definition is consistent with the one given for ‘quantity’.

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				which are not evident here.		
0447 ISO 207 0448 MB IMEKO-057	1.32 (now 1.34)		te	Text: ordinal scale measurement scale, accepted by agreement, whose elements are related by order only NOTE 1 A ordinal scale is an ordered set of explicitly chosen individual quantities, where each quantity is associated with an ordinal identifier. NOTE 2 An ordinal scale may be established by measurements according to a measurement procedure.	NO. Ordered scale without quantification of the indexes.	The comment is unclear. Anyway, a new definition has been given, that is consistent with the one for 'measurement scale'.
0449 IUPAC	1.32 (now 1.34)	definition	te	agreement is not a necessary or defining feature of an ordinal scale; that is a common feature only of standardised ordinal scales	Delete 'accepted by agreement' and add a note to the effect that ordinal scales intended for wide use are set by agreement.	Partially agreed: "accepted by agreement" is deleted.
0450 IUPAC	1.32 (now 1.34)	Example 2	te	See comment on 1.30 example 2 – octane number is calibrated against a ratio scale	Delete example 2.	Accepted. New Example is provided.
0451 IUPAC	1.32 (now 1.34)	Note 1	te	The Note reads as an alternative definition	Delete the note and retain only the examples.	Partially agreed: the Note has been rewritten, to make it an explanation of what is a measurement scale in the case of an ordinal quantity.
0452 IUPAC	1.32 (now 1.34)	Note 1	ed	What is an 'ordinal identifier'?	Amend to 'a unique identifier'.	Partially agreed: the expression has been changed to "ordered set of identifiers".
0453 ILAC	1.32 (now 1.34)	Note 2	te	Note 2 is obvious. Everything should be measured according to a procedure.	Consider delete NOTE 2 or just "according to a procedure".	Considered but disagree.
0454 IUPAC	1.32 (now 1.34)	Note 2	te	A scale that can be established by measurement in the usual sense is not generally an ordinal scale because values on it can typically be compared at least by difference.	Delete the note.	Disagree, since sometimes measurements are used in the process of establishing an ordinal scale.

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0455 ISO 208	1.32 (now 1.34) + 6.3	definition	te	The definitions are confusing.	Replace current text with the following: scales of quantities, units and other properties A quantity lies in its dimension on a scale having at least some degree of known mathematical order, such as on ratio or interval scales on which magnitudes or amounts of the quantity can be compared. (Units in distinct forms can be used to express both ‘quantity’ units: how generic quantities, Q, scale as well as ‘measurement’ units: how quantities, as measured, scale in different dimensions). A hierarchy of scales – from ratio through nominal – can be based on the invariance of the meaning of each scale under a transformation, f. Two instances, i and j, of a quantity Q on a ratio scale are related for any constant, c, and transformation, f, by the expression: Two instances, i and j, of a quantity Q on an interval scale are related for any constant, c, and transformation, f, by the expression: Properties without magnitude or known mathematical order are referred to ordinal and nominal scales. Ordinal scales have a monotonic order, but distances or intervals between two instances, i and j, of a property P on such scales may not be completely known nor quantifiable but the order is maintained under a transformation, f: EXAMPLE A property such as the “greatness” of e.g. a king as a leader can be classified on an ordinal scale with a number of categories – as regarding leadership rather than physical corpulency There are properties which are not quantities since they are not directly measurable. EXAMPLES Currency, quality indicator, colour [clause 5.4.2 of ISO 704], material hardness are all ordinal properties but not quantities. A nominal scale, that is without any sense of order but classified instead by assignment to a number of categories (labels or names) without distance or meaningful interval between two instances, i and j, of a property P, may be adequate in some cases: EXAMPLE Kings are categorised on a nominal scale as belonging to different lineages (Tudor, Stuart, etc) without ranking. Observations of properties on nominal and ordinal scales (such as decision risks caused by uncertainty) can however be related to so-called “latent variables” which can be identified as quantities on interval or ratio scales.	Partially agreed. The definition of ‘measurement scale’, and the one for ‘ordinal scale’ in consequence, has been rewritten to make it clearer, in line with the conditions of invariance mentioned in the comment, a reference to which has been introduced in the expanded Note 4 of the entry 1.1.

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0456 IUPAC	1.33 (now 1.35)	definition	te	Identifying values (typically identifiers, on an ordinal scale) with quantities is hopelessly inconsistent with present usage.	Define as ‘point on an ordinal scale’.	Disagreed: please refer to the more extended explanation / justification in the “Significant changes” annex.
0457 IUPAC	1.33 (now 1.35)	note	ed	Not all ordinal scales use numeric identifiers.	Amend to ‘The numeral in the expression of a value on some ordinal scales is not a numerical value …’	Agreed: changed.
0458 IUPAC	1.33 (now 1.35)	note	ed	An ‘identifier for position’ on an ordinal scale can be a rank, which is a number.	amend to “…, only a unique identifier for the individual quantity on the scale.”	Disagreed: the expression is “identifier for the ordinal position”, and an ordinal position – which can be a rank indeed, is only an ordinal (and not a cardinal) number.

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