**This document tracks and records changes implemented in 1CD**

**Key**

- Agreed and implemented in 1CD

- - Further discussion/decision required.

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| **Highlighted text** | **Text amended/added following discussions at the virtual meeting held over multiple days in May 2021.** |

**TC 12/ p 1 subgroups**

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| **Subgroup (SG)** | **Topic** | **Subgroup lead** |
| **SG 1 (SG 4 merged)** | **Quantities and Harmonics** | **Canada** |
| **SG 2** | **Electric Vehicle Charging Stations** | **Netherlands** |
| **SG 3** | **Smart street lighting** | **Australia** |
| **SG 5** | **Remote displays and meters with modular components** | **Brazil** |

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| CA 001 |  |  |  | Gen | The terms measuring instrument, measurement system, and meter seem to be used interchangeably and there are notes under various sections to suggest this. | The terms measuring system measuring instrument, and meter should be defined explicitly in the terms section to mean the same and that they will be used interchangeably. | Accepted.  To be discussed at the meeting. Please note that the SG on modular components may provide additional definition for components.  Included measuring instrument to the definition at 3.1.1. |
| AT 002 |  |  |  | Gen. | Considering the growing importance of DC Electric Vehicle Charging Stations, R46 should be extended to include direct current measurement. | Direct current measurements should be added to R46- Part 2 | Accepted.  To be discussed at the meeting.  To be revisited at the end of the meeting  SG4 to decide and recommend on inclusion of DC. |
| BR 003 |  | 1 |  | gen | Introduction should include a description on the difference between R46 and IEC standards. In our opinion the main difference is that R46 should be devoted warrant minimal metrological requirements to warrant a level of confidence in the metrological results of the meters. Besides metrological requirements, IEC standards also include quality requirements in order to warrant a minimum level of standardization among many manufacturers. Because of this, R46 should follows IEC standards as close as possible including legal metrology concepts that are not applied by IEC standards, for example, fraud prevention. | Include in the introduction differences between R46 and IEC standards. | Accepted.  Convener suggestion is to add text about international harmonisation with other standards including IEC.  **Added Introduction text. It refers to a list of differences in a new Annex (to be completed later)** |
| BR 004 |  | 2 |  | gen | Requirements apply to both electromechanical and electronic (static) electricity meters measuring both active and reactive energy. Brazil tried to merge in one single document many IEC standards until release the first version of our metrological regulation in 2007. That version covered only electronic (static) meters and leaving electromechanical meters in another regulation. By our experience, we recommend excluding electromechanical meters from R46 because such technology is old and is not been manufactured anymore. In addition some definitions and requirements are not used anymore becoming its discussion inefficient and unnecessary (as happens with definition 3.1.24) | Do not include electromechanical meters in R46. | Not accepted.  Convener recommends keeping electromechanical meter to provide for meters still in use. Also, IEC 62052-11 2020 version includes electromechanical meters.  **At meeting agreed to remove electro-mechanical for approval, but keep for verification.**  **Added paragraph to scope. Removed references to electromechanical meters from Parts 1 and 2.** |
| BR 005 |  | 2 |  | gen | Because the scope states that R46 also apply to modifications that may be made to existing approved devices, we strongly recommend to include a table with additional tests to be carried out in previously approved models when they require a modification. Example of common model modifications are: change of nominal rs or currents; changes in mechanical disposition of the circuit board; addition of communication interfaces; and firmware modifications, among other to be discussed. Brazil can provide a table for consideration of TC12. | Include a table with additional tests when changes in a previous approved model are required. | Agree with the idea.  But Convener recommends that this should be left to individual economies.  Also, this was discussed at the last meeting.  **No action required** |
| BR 006 |  | 3 |  | techn | We miss some definitions in this section | Include the following definitions:  - Calibration constant (Def. 3.9.8 of IEC 61052-11);  - Memory and non-volatile memory (Def. 3.2.9 & 3.2.10)  - others as per IEC 61052-11. | Partially accepted.  OIML R 46 terminology provides for meter constant and not calibration constant. There is no definition for calibration constant/factor but referenced in 6.2.5.2.  Definition for meter constant already provided at 3.1.22.  Definitions for memory and non-volatile memory added at 3.1.29 and 3.1.30.  **Done** |
| BR 007 |  | 3 |  | techn | Should demand meters be included in R46? | Discuss if demand meters should be included in R46. | Accepted.  To be discussed at the meeting. To be included in 5 WD.  **DONE (1CD) – see Proposal from Canada saved under Demand Metering subfolder – and edited in red with notes and comments.** |
| BR 008 |  | 3 |  | techn | In our opinion pre-payment, multi-rate and demand measurements meters are functions of a 4th generation of smart meters. Even than all of these functions can be implemented by electronic meters there are specific legal metrology concepts that can apply for each case (i.e. credits and the load switch in pre-payment meters can be consider relevant for legal metrology; time in multi-rate meters can also be consider relevant and also subject to metrological control). Because of this, we believe that these functions should be treated in other OIML Recommendation to complement R46. | Delete smart metering definitions and focus on generic electronic meters. | To be discussed at the meeting.  Prepayment meters not to be included.  Multi-rate and demand meters to be included in R 46.  **Prepayment meters removed.**  **Demand meters added (see above)**  **Multi-rate meters included – more to add?** |
| CA 009 |  | 3.1.16 |  | Edit | The term auxiliary device is not used in the document. Unless there is a need it should be removed. |  | Please see Convener’s response to comment US012. |
| US 010 |  | 3.1.22 |  | Tech | Should the definition also contain information about typical usage? e.g. kWh/impulse. | Add typical units of use. | Accepted.  Notes 1 & 2 from IEC 62052-11:2020 (3.9.7 & 3.9.8), added to definition at 3.1.22, to provide typical usage for electromechanical meters and static watt-hour meters.  Convener seeks clarification on IEC text at the meeting.  **Edited note for meter constant to improve grammar, align with terms in R 46 and make it less like a requirement. If requirement, cannot be in note or definition.** |
| AT 011 |  | 3.1.24 |  | Techn. | An adjustment device shall only be accessible after breaking the verification seal and shall be handled as internal device functionality. Therefore it is not necessary to provide a definition in R46. | Remove definition 3.1.24 | To be discussed at the meeting.  The definition to be removed from R 46, as it is not mentioned anywhere else in the document.  DONE |
| US 012 |  | 3.1.25 |  | Edit | How does an ancillary device differ from an auxiliary device? | Choose one or other but do not have both. Could also add the unused term, in brackets, as an alternate usage. (Note that ancillary is an OIML term; auxiliary and IEC term. Still, better to use only one.) | Accepted.  Retained auxiliary device, as it aligns with IEC. Changed all ancillary to auxiliary. |
| BR 013 |  | 3.1.27 |  | techn | As meters operating with LPIT are a novel technology, we are not aware about its use in Brazil, therefore, we consider it a new application that need to be studied before be included in R46 scope. As we don’t know what implications on legal metrology this technology has, we suggest not include LPIT in R46 scope. | Delete LIPT definitions and references. | Not accepted.  LPITs are being used more commonly across the globe.  **No action required** |
| CA 014 |  | 3.1.27 |  | Tech | This is a complex definition describing an arrangement of transformers rather than an LPIT itself. The latest IEC 61869 is now providing two terms: LPIT and electronic LPIT (EIT). | low-power instrument transformer  LPIT  instrument transformer with no rated output power  electronic LPIT  EIT  LPIT in which signal processing is performed by active electronic components | Accepted.  However, the definition in R 46 is the same as that in IEC 62052-11:2020.  To be discussed at the meeting.  To be changed in 5 WD as proposed.  **DONE 1CD – Check references** |
| BR 015 |  | 3.1.28 |  | techn | Multi-branch meters are a specific application of LPIT, therefore, we suggest not include it in R46 scope. | Delete this definition. | Not accepted.  Please see Convener’s response for BR013. |
| US 016 |  | 3.1.5 |  | Tech | Apparent energy is undefined | Add definition apparent energy | Accepted.  Added 3.3.20 for definition of apparent energy. Similar to apparent power, this definition to be updated following feedback from SG on Harmonics. |
| US 017 |  | 3.1.7 |  | Edit | Prepayment is an application of a meter, not a performance criteria of metering. It doesn’t belong in this standard | Delete definition. | To be discussed at the meeting.  See Convener’s response for BR008.  Prepayment is to be removed from R 46.  DONE |
| US 018 |  | 3.1.9 et al |  | Edit | If the standard is to include DC meters in future then the word ‘transformer’ will need modifying to be inclusive of DC capable transducers. | Change ‘transformer’ to ‘transducer’, or identify specifically that ‘transformer’ pertains to AC metering only and ‘transducer’ pertains to DC metering only. | Accepted.  To be amended following discussions at the meeting.  To be revisited following DC discussion at the newly formed SG for DC metering, SG 4. |
| CA 019 |  | 3.2.1 |  | Tech | The term measuring system is seemingly defined in Note 4 of definition for MPE. Suggest to add a formal definition for measuring system. | **Measuring system**  See 3.1.1 | Accepted.  See Convener’s response to CA001. |
| CA 020 |  | 3.2.16 |  | edit | Text is not clear. | fault  An undesired error of indication, condition, or change in value of a measured quantity in a measuring instrument. | Not accepted.  The definition is from D11 and the notes with the definition provides the necessary clarification. Do not see the need to redefine the term. |
| BR 021 |  | 3.2.18 |  | techn | Significant fault should be defined like section 9.2 of IEC 62052-11, with the criteria A and B defined by table 15. | Define clearly what a significant fault is, in special during disturbance tests. Include a table similar to the following: | Significant fault is an OIML term and has been defined as per D 11. Also, the note provides clarification for significant fault as applicable to R 46.  Acceptance criteria are defined for each test based on the test being either for influence factor (Table 5) or disturbance (Table 6).  To be discussed at the meeting.  Agreed to include the table in WD 5.Not under definitions.  DONE in 1CD. Noting, criteria B has been modified to explicitly include an accuracy test afterwards. And, not all tests have the same acceptance criteria as IEC. E.g. Dry Heat. |
| BR 022 |  | 3.2.19 |  | techn | Checking facilities should not apply for integrating instruments like electricity meters in special under disturbance conditions. On the other hand, the action of stop measuring and record time, duration and the amount of energy measured during the fault is impractical for all the meters and also could offer vulnerability to fraud the instrument. In fact, if under some disturbances the limits of maximum permissible error are extended, then why allow the meter stops measuring? | Do not allow checking facilities for electricity meters or at last, define clearly which actions are expected/allowed and which no. | Not accepted.  Accuracy requirements provide for faults that are detected and acted upon by means of a checking facility. It provides towards protection of metrological properties of the meter.  To be discussed at the meeting.  Definition to be amended for an integrating instrument and provide reference to event record.  DONE. Added Note 3, and amended note 2. |
| US 023 |  | 3.2.20 |  | Edit | The term ‘primary register’ is often used in the context of a register that is scaled to provide information relating to the primary side of an instrument transformer. As defined it is confusing. | It is assumed that the term ‘primary’ is used in the context of ‘primacy’ or ‘the main thing’, so choose a word that means that exclusively and cannot be confused with other metering terms. Suggest using ‘principal’ meaning ‘first in order of importance’ or ‘main’. (Is this a term of art? The definition given is very vague and not terribly useful.) | Accepted.  To be discussed at the meeting.  Definition amended to Cumulative register. Clause 9.2.1 amended such that primary register is replaced by cumulative register. To be harmonised with EV Annex.  Changed “primary register to “energy accumulation register” and change definition. Cumulative register has now been changed to “energy accumulation register” in the document at 7.8 and B.3.3.4 (Part 1).  Note, it does not align with Final draft EV guide terms because they are specific to EVs. |
| BR 024 | 1 | 3.2.21 |  | techn | To support the concepts of positive and negative flows in bi-directional meters for active and reactive energy include the geometric representation of active and reactive power as per IEC 62053-24. | Include the following figure to support definitions of positive and negative flows of energy:    Review if definitions are according with the graphic representation avoiding the use of the word “consumer” because in photovoltaic residential installations the consumer could become producer some hours. Instead that use export or import energy to define the flows. | Accepted.  To be discussed at the meeting.  To use the diagram from the document shared by Canada – perspective of the utilities to be included to clarify directions.  DONE.  Created my own figure based on Canada’s doc.  Also, reviewed and re-organised:  5 Quantities and Units  5.1 Units of measurement  5.2 Electrical quantities – for the figure and equations  7.5 Categories of meter  7.6 Direction of energy flow  And updated definitions. |
| CA 025 |  | 3.2.21 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| CA 026 |  | 3.2.22 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| CA 027 |  | 3.2.23 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| CA 028 |  | 3.2.24 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| CA 029 |  | 3.2.25 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| CA 030 |  | 3.2.26 |  | edit | Suggest to move this under section 3.3 |  | Accepted.  Please see Convener’s response to BR024.  Done |
| US 031 |  | 3.2.4 et al |  | Edit | “Intervals” has been previously used in the context of an interval meter. Usage in two different ways will lead to confusion. | Use the term ‘limits’ instead of ‘intervals’. | Partially accepted.  3.2.4 text amended to remove intervals.  Intervals changed to ranges in 3.2.12.  The word ‘interval’ has been retained for 3.2.13, 9.3.2 and 9.3.3 where it is more appropriate than limits.  3.2.12 changed back to interval as per OIML V 2 |
| CA 032 |  | 3.2.7 |  | Tech | The definition references the “error” of a measuring instrument. Error needs to be qualified and error of indication | intrinsic error  error of indication of a measuring instrument, determined under reference conditions | Accepted.  Definition amended.  And further changed to  *error of indication, determined under reference conditions*.  This now fully aligns with OIML V 2.  Note, the term indication captures ‘of a measuring instrument and measuring system’ |
| US 033 |  | 3.3.14 |  | Tech | Both inductive and capacitive PF include 180 degrees, and zero degrees. These angles can only belong to one grouping not both. | Inductive PF 0=<angle<180. Capacitive PF 180=<angle<360. | Accepted.  Definitions 3.3.14.1 and 3.3.14.2 amended to provide more clarity.  Partially accepted  This is inconsistent with the doc provided by Canada on directional quantities. Have changed to:  (0° < θ ≤ 180°) and 180° < θ ≤ 360°). |
| NL 034 |  | 3.3.14.1  3.3.14.2 |  | techn | The power factor inductive and the power factor capacitive are introduced, for a range from 0-180 degrees or 180-360 degrees.  The definition needs to be improved, becoming more precise. | Change the definition, like:  power factor value when the phase angle of the voltage waveform minus the phase angle of the current waveform is in the range from 0 to 180 degrees. | Partially accepted.  See Convener’s response to US033. |
| US 035 |  | 3.3.15 |  | Tech | Should refer to active energy | Rate at which active energy is transported | Not accepted.  The definition of active power and active energy would become circular. |
| US 036 |  | 3.3.18 |  | Tech | This is only one of many definitions of reactive power. This single definition alone cannot be the only one allowed by this standard, since it relates to a fundamental only method. Methods that include harmonics to measure vars should also be included. | Recommend that many definitions be allowed, and that documents like ANSI C12.24TR or IEEE1459 be referenced for a list of methods. | To be amended following feedback from SG 1. |
| US 037 |  | 3.3.19 |  | Tech | This definition is only true if the system is only metering the fundamental | Remove ‘at the fundamental frequency’. If a definition of fundamental only reactive energy is required then add it, but DO NOT assume all reactive energy is fundamental only. | To be amended following feedback from SG 1. |
| NL 038 |  | 3.3.20  3.3.21  3.3.22  3.3.23 |  | techn | Definition of varhour misses the essential definition of varhour  Isn’t it better to define reactive energy, import and export? | Define reactive energy (delivered), while explaining the applied unit, rather than defining varh delivered. | To be amended following feedback from SG 1. |
| US 039 |  | 3.3.20, 3.3.22,  3.3.23 |  | Tech | Quadrant definitions apply to Wh and VAh as well. Why only definitions for varh? | Add quadrant definitions for Wh and VAh as well. | To be amended following feedback from SG 1.  DONE |
| NL 040 |  | 3.3.24 |  | techn | The definition for active energy is related to the fundamental frequency. This has been discussed previously, however, it is questioned whether all participating countries do agree with this statement and its impact. | Leave this interpretation to national authorities and make it more clear in the document. It is proposed to discuss this topic somewhere at another place in the document. | To be amended following feedback from SG 1. |
| US 041 |  | 3.3.24 |  | Tech | This definition is only true if the system is only metering the fundamental | Remove ‘at the fundamental frequency’. If a definition of fundamental only active energy is required then add it, but DO NOT assume all active energy is fundamental only. | To be amended following feedback from SG 1. |
| BR 042 | 1 | 3.20 to 3.24 |  | techn | Definitions 3.20 to 3.24 can be simplified by using the geometric representation of active and reactive power as per IEC 62053-24. | Add figure B.1 of IEC 63053-24 | To be amended following feedback from SG 1.  Done |
| BR 043 | 1 | 4  7.2 |  | techn | By our experience approving electricity meters we do not allow family approvals. In fact, we had cases in which two instrument models declared as being from the same family of products, produced different results during the type approval tests (i.e. the single-phase pass and the 3-phases fail). Because of this we suggest to clearly define what is consider as a model of an electricity meter and do not allow family approvals. | Define clearly what is a model of a electricity meter.  Model definition in Brazil:  The model of the electronic electricity meter is defined by the following metrological properties:  a) measured quantities: active and/or reactive energy;  b) technology of voltage sensor element;  c) technology of current sensor element;  d) maximum current value;  e) measurement principle; and  f) Display technology. | Not accepted.  Convener sees this as an administrative issue in Brazil, as to how the meters are approved.  But further discussion is required to draft section 4 “Description on the instrument”. Also relates to SG on remote and modular components. |
| BR 044 | 1 | 5.1 |  | techn | Brazil is unaware of the existence of commercially available meters for exclusive measurement of VAh in commercial transactions. This type of instrument is used only for energy quality measurement applications and should not be subject to legal metrological control. | Remove sentence regarding apparent electrical energy units. | The document covers meters measuring apparent energy (to be confirmed upon feedback from SG 1). The units of measurement needs to be stated in the document. |
| US 045 |  | 5.2.1 |  | Tech | Implies operating range shall be a series of discrete fnoms. Allow an operating range.  Also same issue with usage of ‘intervals’. Intervals is redundant in this case. | the rated operating conditions shall include all *f*nom ± 2 %, or a single frequency range encompassing the minimum fnom -2% to the maximum fnom +2%. | Accepted.  Document amended to make it clear that it is an operating range rather than discrete fnom. |
| US 046 |  | 5.2.2 |  | Edit | Intervals | As per previous suggestions | Accepted.  Document amended to make it clear that it is an operating range rather than discrete Unom. |
| US 047 |  | 5.2.3 |  | Edit | Vague sentence in the note. | Annex E provides additional information about accuracy classes and current values | Accepted.  Document amended as per the suggestion. |
| US 048 |  | 5.2.8 |  | Edit | Tilt is the name of the test. Mounting Position is the name of the requirement. | Change ‘Tilt’ to ‘Mounting Position’ and allow the manufacturer to specify the position limits. Delete +-3%. | Partially accepted.  Changed the name of the test. Have retained ±3%.  Based on meeting outcomes, mounting position/tilt removed because not applicable for static meters and electromechanical now out of scope for type approval. |
| US 049 |  | 5.2.9 |  | Edit | Some jurisdictions have many more harmonic test waveforms than those listed. | Add a note allowing national authorities to add to this list. | See Convener’s response to US065. |
| CA 050 |  | 5.3.1 |  | Edit | The following two sentences should be merged into one.  The meter shall be designed and manufactured such that, when exposed to disturbances, significant faults do not occur, unless mitigated by detection.  A fault is not considered a significant fault if it is detected and acted upon by means of a checking facility. The meter shall clearly indicate if such an event has occurred (see 3.2.16 and 3.2.17). | The meter shall be designed and manufactured such that, when exposed to disturbances, significant faults do not occur, unless the fault is detected and acted upon by means of a checking facility. The meter shall clearly indicate if such an event has occurred (see 3.2.16 and 3.2.17). | Accepted.  Document amended. |
| CA 051 |  | 5.3.1 |  | Tech | The accuracy requirements should apply to all units of measure. | Accuracy requirements are applicable to all legal units of measure that the meter is designed to measure. | Convener is unclear as to the meaning of the comment.  To be discussed at the meeting.  Add a statement –to clarify accuracy requirements for all units of measure.  Notes 1 & 2 removed.  Checking facility to be amended following amendment to checking facility definition.  No action. Unclear what change is proposed. |
| CA 052 |  | 5.3.1 |  | Tech | All requirements will need to be reviewed for suitability for reactive and apparent metering | To be discussed when reactive and apparent requirements are introduced in the document. | Accepted.  To be finalised following feedback from SG on Harmonics. |
| US 053 |  | 5.3.1 |  | Edit | Vague sentence. Also make this sentence a note since it is not normative. | Annex E provides additional information about accuracy classes and current values | Accepted.  The sentence made in to note and sentence amended to add ‘additional’. All notes consolidated and numbered for improved readability.  Notes moved back to under relevant paragraphs. |
| US 054 |  | 5.3.1 |  | Tech | Rated operating conditions also include many influence and disturbance factors, so the meter might not be operating at reference conditions EG temperature. BMPE only applies at reference conditions. | The meter shall be designed and manufactured such that its error does not exceed the ~~base~~ maximum permissible error (~~base~~ mpe) for the specified class under rated operating conditions. | Not accepted.  However, the text changed to provide more clarity.  Further clarified BMPEs, and added sentence about influences. |
| NL 055 |  | 5.3.2 |  | techn | Formulas are new and seem to differ from the ones used in IEC.  Formulas need to be placed in chapter 3. | Align the formula’s with IEC.  Move the formula’s to chapter 3. | The formulas were provided by Canada for 4WD.  To be discussed at the meeting.  To be discussed at SG 1. |
| US 056 |  | 5.3.2 |  | Tech | These equations only work for fundamental only (FO) metering, thus excluding meters that measure energy over a large range of frequencies. | Replace equations with a list that includes FO and well as wideband metering. | See Convener’s response to NL055.  To be discussed at the meeting.  To be discussed at SG 1 |
| JP1 057 |  | 5.3.2.3 | Performance requirements for … | edit. | Use the terms defined in Section “3 Terms and definitions”. In this section, “volt-ampere hour meter” and “reactive energy (var-hour)” are defined in 3.1.5 and 3.3.19, respectively. | In the title, change “apparent energy meter” to “volt-ampere hour meter”. In the second and seventh lines of the main text, change “var energy” to “reactive energy”. | See Convener’s response to NL055 and US056 above.  To be discussed at SG 1. |
| NL 058 |  | 5.3.3 |  | techn | The R 46 contains requirements for currents below Imin. There is not much added value in this and the approach deviates from IEC. | It is proposed to delete accuracy requirements for currents below Imin. | To be discussed at the meeting.  Keep the requirements and redefine Imin.  DONE and changed should to shall in def of Istart. |
| US 059 |  | 5.3.3 |  | Edit | Mistaken reference. Needs correction | Table 3 (Base maximum permissible errors), | Accepted.  Amended the document to remove the bracket with text.  Assume that the comment was that the reference should be to rated operating conditions (not Table 3). Have edited the sentence. |
| AT 060 |  | 5.3.3. |  | Techn. | Care should be taken to avoid inconsistent definitions and requirements wrt. to IEC or EN standards | It should be considered to avoid inconsistencies to IEC or EN standards. | Convener seeks more information.  To be discussed at the meeting. |
| US 061 |  | 5.3.4 |  | Edit | Incorrect reference | The test procedure is specified in section 9.2.3 | Accepted.  Reference corrected. |
| US 062 |  | 5.3.4 |  | Edit | ‘significant energy’ is undefined | Refer to critical change value instead. | Not accepted.  5.3.4 provides the principle behind the test. Note 1 provides link to the relevant test procedure with information on significant value. |
| US 063 |  | 5.3.5 |  | Tech | No voltage is specified for static meters | Add ‘With Voltage circuit(s) energized at reference voltage, static meters shall….’ | Accepted.  Document amended as suggested. |
| CA 064 |  | 5.4.1.4 |  | Tech | Harmonic test waveforms need to be adjust by a 90 degree phase shift when used to assess reactive meters. | To be discussed and reviewed. | To be discussed at the meeting.  To be discussed at SG1. |
| US 065 |  | 5.4.1.4 |  | Tech | Not all of these signals are relevant to all jurisdictions | Add allowance for national authorities to choose the harmonic tests most appropriate to their conditions. | Accepted in principle.  To be discussed at the meeting as to appropriate wording.  To be discussed at SG1. |
| US 066 |  | 5.4.1.4.c) |  | Tech | There is little to zero value in specifying multiple phase fired angle tests. 135 degrees is highly unrealistic as a whole meter load. | Only specify 1 phase fired signal at 90 degrees. | To be discussed at the meeting.  To be discussed at SG1. |
| US 067 |  | 5.4.1.5 |  | Edit | Mounting position | Change title to Mounting Position | Accepted.  Document amended to change Tilt to Mounting position.  Now removed as agreed |
| US 068 |  | 5.4.1.6 |  | Tech | Reversed phase sequence should apply to any single phase 3 wire and poly-phase meter, not just 3-phase meters. USA has many poly-phase meter variants. | It is only applicable to ~~three~~ Poly-phase meters and single phase 3 wire meters. | To be discussed at the meeting.  Unsure of ramifications on other economies.  Accepted. Document to be amended. |
| US 069 |  | 5.4.1.7 |  | Tech | The title ‘Magnetic field (AC, power frequency) of external origin.’ is used twice. Once for a continuous test and the other for a pulsed test. | Add ‘Continuous’ to the title to distinguish the test from the pulsed magnetic field test | Not accepted.  Magnetic field of external origin with the value range 400 A/m is an influence and with value range 1000 A/m is a disturbance. |
| BR 070 | 1 | 5.4.1.8 |  | techn | Dwell time is missing | Specify a minimum dwell time of 3 s | Not accepted.  5.4.1.8 provides the principle behind the test for influence factors. The test 9.3.11 provides information on dwell time. |
| FR 071 |  | 5.4.2 |  | techn. | Allowed effects of the influence factors  Table 5 - There is no value for some tests for class E.  Why “Limit of error shift (%) for meters of class” is not applicable for tilt test in classes D and E? | Indicate values for class E  Proposal to divide per 2 the values for class E for all tests regarding some known values are divided per 2 between column D and E (except for the reversed phase sequence considering the value in column D is already weak).  See annex 1 of this document for the proposals: added values are highlighted in yellow. | Accepted.  To be discussed at the meeting.  Table 5 to be amended as proposed.  Values for class E/0.1 now included. DONE |
| FR 072 |  | 5.4.2 |  | techn. | Allowed effects of the influence factors (table 5)  Better alignment with IEC standards on meters would be desirable. For example :  - harmonics in voltage and current circuits : 0.6% (class B) for R46 while 0.8% (class B) for EN 50470  - self-heating : 0.5% (class B) and 0.25% (class C) for R46 while  1% (class B) and 0.2% (class C)  There are also differences about “Magnetic fields” and “Harmonics in the AC current circuit”.  It is noticed that project R46 and EN 50470 propose same maximal error for the tests "DC in the AC current circuit" and "Odd harmonics in the AC current circuit" for classes A, B ,C. | It may be considered aligning with IEC TC13 / TC85 for discussion and harmonize the limit error for all tests in table 5 of R46 and EN 50470. | To be discussed at the meeting.  Accepted. Requirements to be aligned with IEC.  Updated Table 5:  Table cell colours:  Green – aligned with IEC  Red – Different to IEC  Gold – doesn’t exist  Note IEC may have different values for classes 0.5S and 0.5. I have used class 0.5 values. |
| US 073 |  | 5.4.2 |  | Tech | American meters are generally higher current rating than IEC (200A per phase is typical) thus have significantly higher dissipated heat. | Double the temperature coefficient above 50C rather than 70C, or allow national dispensation. | Accepted.  Footnotes (1) and (2) amended to allow national authorities specify 50 °C to compensate for higher current ratings. |
| BR 074 | 1 | 5.5.1 |  | techn | EMC tests do not apply for electromechanical meters | Include a note or change the scope. | Not accepted.  To be discussed at the meeting.  Electromechanical meters removed from scope. Tilt (Mounting position) requirement to be removed.  Verification requirements to be applicable for electromechanical meters.  DONE |
| FR 075 |  | 5.5.1.11 |  | edit. | Short-time overcurrent  It is proposed 50 Imax for this test, while for the same one, § 9.4.12 proposes 30 Imax for direct connected meter and 20 Imax for meters connected through current transformer.  50 Imax is not realistic considering the life of the meter. The needed protection would be disproportionate while even in case of overcurrent, this is an unlikely situation.  Example: for a smart meter with 90 A, it supposes that the meter is able to support 4500 A.  Moreover, it is not sure that test facilities are dimensioned for such an important intensity. | Modify § 5.5.1.11 and replace 50 Imax by 30 Imax for direct connected meters and 20 Imax for meters connected through current transformers as mentioned in § 9.4.12 | Accepted.  Document amended.  DONE |
| JP3 076 |  | 5.5.1.11 and 9.4.12 | Short-time overcurrent | edit./techn. | The value range (50·*I*max) of 5.5.1.11 is incorrect because it does not correspond to the test currents specified in 9.4.12 (30·*I*max and/or 20·*I*max). | If the specification in 9.4.12 is correct, replace “50 *I*max” with “30·*I*max” (connected directly) and/or “20·*I*max” (connected through a transformer) in 5.5.1.11. | Accepted.  See the Convener’s response to FR075. |
| FR 077 |  | 5.5.1.12 |  | techn. | Impulse voltage test procedure  The recommendation proposes that the national authority may change the applicable rated impulse voltage levels.  But considering R46 is an internationally agreed normative document, at least it should be defined a minimum rated impulse voltage to avoid too large a difference in test conditions, especially because this test was discussed extensively in the previous revision of OIML R 46.  These minimum values can be based on values in EN 50470-1. | These minimum impulse voltages can be required :  1,5 kV (≤ 100 V)  2,5 kV (≤ 150 V)  4 kV (≤ 300 V)  6 kV (≤ 600 V) | As mentioned in Convener’s response to 3 WD on the same issue, this is to be discussed at the meeting.  Accepted. Minimum requirements as proposed to be accepted. National authorities can specify higher impulse voltages as per the current requirements.  Provide wording re: higher requirements and providing options for minimum and seek feedback on the preferred wording.  DONE and updated Part 2 test |
| NL 078 |  | 5.5.1.14 |  | techn | For the test ‘operation of ancillary devices’, the prescribed load points deviate from IEC, due to the fact a load point at Imax is mandatory. There is not so much added value in this load point. | Remove the load point at Imax and as a result, align it with IEC 62053-21, 9.4.9. | To be discussed at the meeting.  Not accepted. No changes to the test. |
| NL 079 |  | 5.5.1.17 |  | techn | The test ‘protection against solar radiation’ deviates from the one in IEC. It is proposed to align these tests. | Align 5.5.1.17 with IEC 62052-11, clause 8.3.6. | To be discussed at the meeting.  Not accepted.  Suggest keeping the current test requirements. |
| BR 080 | 1 | 5.5.1.2  5.5.1.3  5.5.1.9 |  | ed | Add both polarities before the voltage level. | Add “±” symbol before the voltage level | Not accepted.  5.5.1.2, 5.5.1.3 and 5.5.1.9, provide principle. The tests as described in 9.4.3, 9.4.4 provides for both polarities. |
| BR 081 | 1 | 5.5.1.23 |  | techn | A discussion in Brazil has risen recently about if the Ring wave disturbance is common in Residential, commercial and light industrial environments. Some participants claim that the current varistor protections are quite enough to protect the meters against the ring wave. As there is no conclusion yet, a study will be conducted in our country in order to determine if this statement is true. | Consider to apply this test only for substation meters.  The value range can be express as follows:  All disturbances should be applied in differential mode:  a) Mains port:  - Each line (including neutral) to PE terminal: ±4 kV;  - Between lines (line to line & line to neutral): ±2 kV.  b) Auxiliary power supply:  - Between line (including neutral) to PE terminal: ±2 kV;  - Between lines (line to line & line to neutral): ±1 kV.  Note: Instruments without PE terminal shall consider neutral as PE terminal. | Thank you for providing test details.  To be discussed at the meeting.  To be revisited after feedback from Brazil. |
| NL 082 |  | 5.5.1.23 |  | techn | For the ring wave test a description is missing. | Align with IEC 62052-11, clause 9.3.10. | See Convener’s response to BR081.  Agree to align with IEC.  Added value range for Ring Wave description. Need to confirm if sufficient. Note, the IEC ring wave test has different values for HLV and ELV auxiliary ports. (These terms are not defined in OIML R 46). |
| KR 083 |  | 5.5.1.23 |  | Edit | The values range of ring wave. |  | See Convener’s response to BR081.  To seek further information.  Also see NL 082 |
| US 084 |  | 5.5.1.23 |  | Tech | How to express? | Express as the frequency of the ring wave, the peak voltage, and the peak current, e.g. 100kHz, 6kVpeak, 500Apeak. | See Convener’s response to BR081.  Awaiting further information from US.  To be revisited after meeting.  Also see NL 082 |
| BR 085 | 1 | 5.5.1.6 |  | techn | The value of 400 mT at 30 mm from core surface could not be enough to prevent the possibility of frauds in the electricity meter using typical neodymium magnets (800 mT to 1200 mT). | Open a discussion about if 400 mT is enough to prevent frauds. | To be discussed at the meeting.  Test requirements to be aligned to IEC.  I have updated Parts 1 and 2 to specify 400 mT at the surface (0 mm).  But, this does not fully align to IEC.  IEC mentions 1000 At (ampere-turns) electromagnet. Then says static meters normally accessible locations(?) also to be tested with permanent magnet (400 mT). |
| NL 086 |  | 5.5.1.6 |  | techn | Although a try has been made to align the magnet with the one as described in IEC 62052-11 Annex K, there is still a difference. The one in the R 46 shall produce 400 mT at 30 mm from the core surface, where the one in IEC produces a flux density at the center of the pole surface of 400 mT +/- 10 mT. | Replace “400 mT at 30 mm from core surface” by the characteristics as defined in IEC 62052-11, Annex K, item 1.  Same for Table 13. | To be discussed at the meeting.  Test requirements to be aligned to IEC. |
| US 087 |  | 5.5.1.6 |  | Edit | Value range data has not included full wording of IEC test from IEC 62052-11 Appendix K. The field is measured at the pole surface not 30mm away from it. | ~~400 mT at 30 mm from core surface~~~~(2)~~  The flux density measured at the center of the pole surface is 400 mT ± 10 mT.(2) | To be discussed at the meeting.  Test requirements to be aligned to IEC. |
| JP2 088 |  | 5.5.1.6 and 9.4.7 | Continuous (DC) magnetic induction of external origin | Techn. | In 5.5.1.6, the value range “400 mT at 30 mm from core surface” might be incorrect because it does not correspond to the description on flux density “measured at the center of the pole surface is 400 mT” in IEC 62051-11. We request to use the test condition of the IEC standard in 4WD for consistency. Where, “pole” in the IEC standard has the same meaning with “core” in 4WD. | In “value range” of 5.5.1.6, we propose replacing “400 mT at 30 mm from core surface” with “400 mT at the center of the core surface”.  In Table 13 of 9.4.7, “distance from magnet surface” should be corrected from 30 mm to 0 mm. | To be discussed at the meeting.  Test requirements to be aligned to IEC. |
| BR 089 | 1 | 5.5.1.7 |  | techn | The disturbance levels are not aligned with IEC 61052-11 table. 16.  For 60 Hz:  Dips in IEC 62052-11:2020 – table 16:  a) 0% (red. 100%), 6 cycles (0,1 s).  b) 0% (red. 100%), 60 cycles (1 s).  c) 0% (red. 100%), 1 cycle (16,7 ms).  d) 5% (red. 95%), 300 cycles (5 s)  e) 40% (red. 60%), 6 cycles (0,1 s)  f) 40% (red.60%), 60 cycles (1 s)  g) 70% (red. 30%), 0,5 cycles (8,3 ms)  h) 70% (red. 30%), 1 cycle (16,7 ms)  Dips levels on IEC 61000-4-11:2020  Class 3:  a) 0% (red. 100%), 0.5 cycles (8,3 ms).  b) 0%, 1 cycle (16,7 ms).  c) 40% (red. 60%), 12 cycles (0,2 s)  d) 70% (red. 30%), 30 cycles (0,5 s  e) 80% (red. 20%), 300 cycles (5 s) | Clarify from what reference the disturbance levels were taken. | Partially accepted.  5.5.1.7 amended to align with IEC 62052-11:2020 Table 16. |
| NL 090 |  | 5.5.1.7 |  | techn | The test ‘voltage dips and interruptions’ differs from the one in IEC. It is proposed to align these requirements. | Align 5.5.1.7 with IEC 62052-11, table 17. | Accepted.  IEC 62052-11:2020, Table 16 is for AC and Table 17 is for DC.  Clause 5.5.1.7 amended as per Table 16.  Table 17 to be added following discussions on inclusion of DC in R 46. |
| KR 091 |  | 5.5.1.7 |  | Tech | When I compared with IEC 62052-11, some test conditions are omitted. | Adding the test conditions into value range.   1. 100% voltage reduction, 5/6 cycles 2. 100% voltage reduction, 1/1 3. 100% voltage reduction, 5/6 4. 30% voltage reduction, 0.5/0.5 | Accepted.  See Convener’s response to BR089. |
| US 092 |  | 5.5.1.7 and others |  | Edit | ‘cycles’ is used in 2 senses. a) line cycles, and b) test cycles. | Recommend using ‘line cycles’ when referencing mains cycles and use ‘test cycles’ where a test has a repetition rate. Adds clarity. | Accepted.  Note as per IEC 62052-11:2020, added to 5.5.1.7 to provide clarity. |
| BR 093 | 1 | 5.5.1.8 |  | techn | Polarization, minimum dwell time and faces to be radiated are missing | Add the following sentence:  Both polarizations (vertical and horizontal), shall be applied in all the instrument surfaces.  Dwell time: Enough to obtain the meter error at each frequency point. Cannot be less than 3 s. | Not accepted.  5.5.1 describes the disturbances and not the test conditions. As such, test conditions and limits are specified in 9.4.9. |
| FR 094 |  | 5.5.1.8 |  | techn. | Radiated, RF, electromagnetic fieldsProcedure is different between NF EN 50470 end R46 (value of the magnetic field and without current).R46 : f = 80 MHz to 2.0 GHz, 30 V/m, amplitude modulated, without current.EN 50470 : 80 MHz to 2.0 GHz, 10 V/m, amplitude modulated, with current. | Apply current during the test would be better because it would be more representative of field conditions. | R 46 amended to align with current IEC requirements. The proposed requirements do not align with IEC.  To be discussed at the meeting.  No changes |
| BR 095 | 1 | 5.5.1.9 |  | techn | Electricity meters is an special case for surge because it is at the beginning of the electrical installation where, depending on the grounding scheme, neutral line could be connected with the installation grounding to start PE conductor. | In meters without PE terminal, consider to apply 4 kV line to neutral. | To be discussed at the meeting.  To be discussed on Day 5 of the meeting.  Accepted.  To be included in 5 WD.  Done Parts 1&2 |
| US 096 |  | 5.5.2 |  | Edit | Give more prominence to the critical change formula as per other formulae in the standard and make a heading specifically for critical change value. | **5.5.2.1 Critical Change Value**  For disturbances where no current is applied, a change in the registers or pulses of the test output shall not be considered as a significant fault if the change in the registers or equivalent energy of the test output, expressed in kWh, is less than the Critical Change Value (CCV), such that…  CCV < *m* × *U*nom × *I*max × 10-6,  where …  *m* is the number of measuring elements,  *U*nom is expressed in volts, and  *I*max is expressed in amperes. | Accepted.  Definition for Critical change value added to 3.3.20.  Text under 5.5.2 amended accordingly.  Moved formula for calculating critical change value to 5.5.2 (now 6.4.2) |
| US 097 |  | 5.6 |  | Edit | “Interval meters shall be able to measure and store data relevant for billing”. How is this relevant? ALL meters measure and store data. | Delete sentence. | Accepted.  Document amended. |
| US 098 |  | 5.7 |  | Tech | Are the requirements of IEC 62054-21 strictly necessary for electricity metering? Specifically is a +-15 seconds per month time base accuracy a necessity? This requirement is a cost adder with no known practical value. Many metering time bases are only ~2000ppm = 1.8 seconds in a 15 minute interval. | Use a +/-50ppm limit rather than +/-5ppm, which equates to ~150 seconds per month, ~45ms per 15 minute interval.  Alternatively make the timebase accuracy a function of the meter class accuracy e.g. Class Accuracy / 10. so a 2% meter must have a 0.2% timebase accuracy = 2000ppm, 0.1% meter must have a 0.01% timebase accuracy = 100ppm. | To be discussed at the meeting.  Convener to draft some wording for 5 WD – to seek feedback from PG.  No change made in 1CD. To discuss again.  Find out if changes are being made to IEC – check with Henri. |
| AT 099 |  | 5.11. |  | Techn. | When requirements for modular components are added to R46, these requirements should be in line with Welmec-Guide 8.8-2017 |  | Requirements of modular components to be added following feedback from SG for modular components. |
| KR 100 |  | 6.1 |  | Edit | Nowadays it is trends that the static meters are smaller than in the past. So writing the manufacture address in the name-plate is difficult because of small size. | How about delete the manufacturer address in the meter marking? | Not accepted.  6.1 is a recommendation and provides for national authorities to determine the marking on the meter.  Maybe discuss at the meeting re: minimum acceptable marking requirements.  Not sure of value of list if none are mandatory. |
| US 101 |  | 6.2 |  | Gen/ Edit | No tests are given for section 6 requirements | Where possible reference the tests in section 9 which will test the requirements given in section 6, e.g.  6.2.1.2 All means to protect the metrological properties of an electricity meter intended for outdoor locations shall withstand solar radiation, and meet the requirements of test 9.4.17 Protection Against Solar Radiation. | Not accepted.  Section 6 provides requirements and the tests are described under section 9. For instance, 9.4.17 references section 6.2.1.2.  In many cases there are notes and references (e.g. Tables 5 & 6). But, OIML drafting rules do not allow Part 1 to depend on Part 2. |
| US 102 |  | 6.2 |  | Gen/ Edit | No tests are given for section 6 requirements. A requirement that is untestable may be well intentioned but it isn’t possible to verify. | Where no tests exist within section 9 that are applicable to the requirement of section 6, then create a test or delete the requirement. E.G.  6.2.3.1 Prevention of Misuse. How can this be tested? If no test can be found then either delete, or make the clause informative by making it a note or changing ‘shall’ to ‘should’ | Not accepted.  7.3, table 7 provides for validation procedure. However, D31 also provides for ‘Prevention of misuse’ along with appropriate documentation submitted as a part of satisfying this requirement.  No change |
| CN 103 |  | 6.2.4.3 |  | tech | When modifying a device-specific parameter remotely via a network, stopping registering energy may be inoperable and unnecessary steps.  Delete the requirement of stopping registering energy | When modifying a device-specific parameter, it shall ensure and verify the modifying is correctly carried out. | To be discussed at the meeting.  D31 6.1.3.2.3 Note 1 provides for device-specific parameters to be modified only in special operational mode.  Accepted. R 46 to be amended accordingly.  Updated (now B.2.4?) with new wording (not exactly as proposed). |
| US 104 |  | 6.3.2 |  | edit | Wavelengths of radiated signals refer specifically to light emitting test pulses. Add the word ‘light’ | The wavelength of the radiated signals for light emitting systems shall be between 550 nm and 1 000 nm | Accepted.  Document amended for clarity. |
| US 105 |  | 7.1 |  | Gen/ edit | Clock frequencies need to include not only oscillator frequencies but frequency multiples generated by PLL circuits | - specified clock output frequencies of oscillators and PLL multiplier circuits, | Accepted.  Document amended. |
| US 106 |  | 7.1 |  | Gen/ edit | Energy consumption is not a constant single value, so needs parameters to determine conditions of the test. | - average energy consumption of the meter per minute measured in VA; | Not accepted.  There are no requirements specified for energy consumption in this recommendation. So, this requirement for relevant documentation has been deleted. |
| BR 107 | 1 | 7.2.1 |  | techn | In Brazil we do not allow any modification in the samples during the type evaluation.  By allowing the manufacturer to change the submitted samples, Will the issuing authority violating the IEC 17065 requirements? | Replace the sentence:  In the case of modifications to the meter made after or during the type test and affecting only part of the meter, the issuing body may deem it sufficient to perform limited tests on the characteristics that may be affected by the modifications.  By the following:  The issuing authority cannot allow any hardware/software change in the samples submitted to the type evaluation | Not accepted.  It is up to the issuing bodies to decide if the modifications to the meter would necessitate full testing or partial testing. Requiring full testing at all instances places unnecessary regulatory burden on manufacturers.  For discussion at the meeting re: OIML-Cs and flow of information between Type testing facilities and Issuing authorities.  Convener to consider alternate wording for 5 WD.  Wording now amended to provide clarity and to align with OIML D 19 (Pattern approval and pattern evaluation) document. |
| NL 108 |  | 7.3 | Table 8 | edit | The third column of table 8 refers to D31:2008. A new version was published in 2019. | In principle, D31 is meant as a source document to copy from, not to reference indirectly. If, in this Table 8, it is truly desirable to refer to a particular clause in D31 instead of copying its text, we suggest to replace D31:2008 with D31:2019, and note that clauses 6.3.2.x have become 7.3.2.x in the 2019 edition. | Accepted.  Reference to D31:2008 replaced with reference to D31:2019 and relevant clauses included. |
| US 109 |  | 8 |  | Edit | The third paragraph is specific to the IIE test, so is out of place in section 8. It should be moved to the procedural part of 9.2.1 | Move paragraph to 9.2.1 | Accepted.  IIE specific wording moved to 9.2.1 |
| CA 110 |  | 9.2.1 |  | Tech | “Mandatory test points are specified in Table 11 for positive, negative and reverse flow tests. National authorities shall select two mandatory test points as specified in Table 11.”  It is not clear why test points are being limited to a selection of two by the National authorities. All applicable test points should be mandatory. | Mandatory test points are specified in Table 11 for positive, negative and reverse flow tests. Tests shall be conducted at a minimum at all applicable test points identified in Table 11. | Accepted.  Document amended as suggested.  Unclear if we are keeping 10 Itr? Have edited to keep, and remove “A testpoint… selected by national authority” |
| CN 111 |  | 9.2.3 |  | tech | Ensure this test is same as IEC requirements | The test be performed at 1.1Unom.  The minimum test period ∆t shall be calculated at 1.1Unom. | Accepted.  Test of no-load condition to be performed at 110% Unom and ∆t calculated at 110% Unom. Aligned with IEC 62052-11:2020. |
| CN 112 |  | 9.3.10 |  | tech | The AC magnetic field at power frequency can be divide into the value of load current independent and the value of load current relate.  The error shift cause by the value of load current independent varies inversely with test power value, and the error shift cause by the value of load current relate will independent with test power value.  The error shift of the meter due to AC magnetic field at power frequency will decrease as the test power increases.  If the test be performed at Itr ,PF = 1. It can ensure the meter is pass during Itr ≤I≤Imax | The test shall, at minimum, be performed at Itr, PF = 1. | To be discussed at the meeting.  Accepted.  Test point at Imax to be removed and the test to be aligned with IEC requirements.  Retain 10 Itr as mandatory test point.  Brazil to provide draft wording re: clarification.  Changes done – Part 2 2.3.8. No draft wording has been provided by Brazil. |
| NL 113 |  | 9.3.10 | Table 5 | techn | For the test ‘magnetic field (AC power frequency) of external origin’, the prescribed load points deviate from IEC, due to the fact a load point at Imax is mandatory. There is not so much added value in this load point. | Remove the load point at Imax and as a result, align it with IEC 62053-21, 9.3.13. | Accepted.  Please see Convener’s response above to CN112. |
| US 114 |  | 9.3.11.1 |  | Tech | The test is not completely described. No mention is made of how the meter shall be mounted. | Add requirement for ‘normal mounting per manufacturers documentation’ | Not accepted.  Mounting covered by reference conditions as specified in 9.4.1.  To discuss again because reference conditions changed to remove “Operating position for instruments sensitive to position”. This is removed because the tilt test is removed. |
| US 115 |  | 9.3.11.1 |  | Gen | The test requires 435 steps if stepped in 1% increments. This leads to very long test. Is this desirable? 435 steps, test 15 seconds per step, 4 sides = 4.8 hrs | Consider shortening the test by allowing larger frequency increments. 2% or 5%. | To be discussed at the meeting.  Not accepted.  US to provide more information.  No info provided yet. |
| US 116 |  | 9.3.11.1 |  | Edit | Confusing language implying a test repetition but not stating it. | The test shall be repeated ~~performed~~ with the generating antenna facing each side of the meter (front, back, left, and right). | Partially accepted.  Document amended to provide clarity. |
| US 117 |  | 9.3.11.2 |  | Gen | The test requires 633 steps if stepped in 1% increments. This leads to very long test. Is this desirable? 435 steps, test 15 seconds per step = 2.64 hrs | Consider shortening the test by allowing larger frequency increments. 2% or 5%. | To be discussed at the meeting.  Not accepted.  US to provide more information.  No info provided yet. |
| US 118 |  | 9.3.11.2 |  | Tech | The test is not completely described. No mention is made of how the meter shall be mounted. | Add requirement for ‘normal mounting per manufacturers documentation’ | Not accepted.  Mounting covered by reference conditions as specified in 9.4.1.  See US114 above. |
| US 119 |  | 9.3.11.2 |  | Tech | e.m.f is not explained or defined. | Add explanation in context of this test. | e.m.f added as per OIML D 11:2013. |
| CA 120 |  | 9.3.2 |  | Tech | Is the reference meter exposed to the influence condition? | The reference meter shall be at reference temperature for all test conditions | To be discussed at the meeting.  Reference meter shall be at reference conditions.  Convener to check if this is clear in the document.  Reference meter definition (Part 1) and section with information (Part 2) now added. |
| NL 121 |  | 9.3.4 |  | techn | For the test ‘load balance’, the prescribed load points deviate from IEC, due to the fact a load point at Imax is mandatory. There is not so much added value in this load point. | Remove the load point at Imax and as a result, align it with IEC 62053-21, 9.4.5. | To be discussed at the meeting.  Test point at Imax to be removed and at 10 Itr retained.  Unable to find this test in IEC. The reference given to IEC 62053-21, 9.4.5 does not exist. Not in the 2020 edition.  Maybe relates to new draft IEC document? |
| CA 122 |  | 9.3.4 |  | Tech | It is not clear that the reference meter shall be exposed to the same loading condition as the meter under test. | Add directive:  The reference meter shall be exposed to the same loading condition as the meter under test | To be discussed at the meeting.  Reference meter shall be at reference conditions.  Convener to check if this is clear in the document.  See CA120 |
| FR 123 |  | 9.3.8.1  9.3.8.4 |  | techn. | Harmonics in voltage and current / High-order harmonics  During next PG meeting, we would like to discuss the purpose of the test that is specific to OIML R46 (no other norm provide this test), and particularly to which perturbation it is related. |  | Thank you for the feedback.  To be discussed at the meeting.  To be discussed at SG 1. |
| CA 124 |  | 9.3.8.2 |  | Tech | It is not clear if the reference meter is required to measure harmonic energy or is supposed to measure only the sinusoidal content. | This may need to be addressed pursuant to the work of SG1 | Thank you.  To be discussed at the meeting.  To be discussed at SG 1. |
| FR 125 |  | 9.3.8.2 |  | techn. | Integral cycle load control test  The phase fired waveforms as described in Fig 4 et 6 are wrong.  These tests are required too in 62052-11 (FDIS 2020) with the good waveforms.  Maintaining these waveforms would simulate less strong perturbations than those provided by 62052-11 (FDIS 2020). | Replacing phase fired waveforms for 45° and 135° by those below (62052-11 (FDIS 2020)  cid:image001.png@01D7060C.439A2A30  cid:image002.png@01D7060C.439A2A30 | Accepted.  To be discussed at the meeting.  To be discussed at SG 1.  Figure 4 and 6 updated |
| FR 126 |  | 9.3.8.2 |  | techn. | Integral cycle load control testProcedure of harmonic test (9.3.8.2 R46) is different between EN 50470 and R46.EN 50470 : 40 % I et 10 % URI 46 : 30 % I max et 3 % U | Harmonize procedure between R46 and EN 50470 | To be discussed at the meeting.  To be discussed on Day 6 of the meeting.  To be discussed at SG 1. |
| US 127 |  | 9.3.8.2 |  | Tech | This test is not a sub-harmonics test. The test waveform does not generate sub-harmonics. The sub-harmonics assumed to be generated are an artefact of the FFT window used to measure the waveform. | Delete this test. It is not representative of common power system waveforms. | To be discussed at the meeting.  To be discussed at SG 1. |
| US 128 |  | 9.3.8.3 |  | Tech | Testing 3 different phase fired waveforms serves no purpose. Moreover the 135 degree waveform is exceptionally unlikely to occur in power systems. | Only use 90 degree phase fired test. Delete 45 degree and 135 degree tests. | To be discussed at the meeting.  To be discussed at SG 1. |
| JP4 129 |  | 9.3.8.3 | Odd harmonics in the AC current circuit | Techn. | The waveforms of Figure 4 and Figure 6 seems incorrect. The test current should be controlled (on/off) with the same interval as shown in Figure 5 (0.5 cycle). | We propose correcting the Figures 4 and 6 as shown below with the red lines. Figure 5 is also shown for your information.    Figure 4- 45° phase fired waveform (odd harmonics)    Figure 5 - 90° phase fired waveform (odd harmonics)    Figure 6- 135° phase fired waveform (odd harmonics) | To be discussed at the meeting.  To be discussed at SG 1.  Accepted. Graphs to be redrafted.  DONE – See FR125 also. |
| FR 130 |  | 9.3.8.5 |  | edit. | DC in the AC current circuit R46 proposes “The error shift, compared to the intrinsic error at sinusoidal conditions at  , shall be measured when the current amplitude is increased to twice its value () and is half-wave rectified.” | Replace by “The value of the current (before the distortion is applied) must be ), with a power factor equal to the unit.” | To be discussed at the meeting.  To be discussed at SG 1. |
| US 131 |  | 9.3.8.5 |  | Gen | This test is exceptionally difficult to execute in practice and is highly dependent on impedance and rectifier matching between paths. A consistent balanced impedance and matched rectifiers are not practicable. | Delete until a better test can be determined. | To be discussed at the meeting.  To be discussed at SG 1. |
| CN 132 |  | 9.4.10 |  | tech | The phase angle of pulses to be applied keep the same with IEC 61000-4-5: 2017. | Phase angle: pulses to be applied at 0°, 90°, 180°and 270°relative to zero crossing of AC supply. | Accepted.  Phase angles updated as per IEC 61000-4-5:2017.  Done |
| FR 133 |  | 9.4.13.2 |  | techn. | Impulse voltage test procedure  Test conditions should precise the value of the internal resistance of the source.  EN 50470 proposes 500 Ω ± 50 Ω | Specify the value of the internal resistance of the source | To be discussed at the meeting.  To be discussed on Day 6 of the meeting.  Convener to draft with proposed resistances for feedback in 5 WD.  Done in 1CD |
| FR 134 |  | 9.4.13.2 |  | edit. | Impulse voltage test procedure  In case of modification of the impulse voltages and the note indicated at clause 5.5.1.12, this clause needs to be modified. |  | Please see Convener’s response to FR077. |
| US 135 |  | 9.4.13.2 |  | Tech | Rather than specify output energy (10J), specify an output impedance of the equipment (say 42ohms or 50ohms). Equipment manufacturers are much more able to work with this specification. | ~~Source energy: 10.0 J ± 1.0 J;~~  Output impedance 42 ohms +- 10%; | To be discussed at the meeting.  To be discussed on Day 6 of the meeting.  See convener’s response to FR133. |
| US 136 |  | 9.4.13.2 |  | Tech | This test is essentially being proposed as an insulation withstand test. A steady state Hipot type test would be just as useful and easier to implement. | Propose replacing with a steady state AC Hipot style test, or if not replacing then adding one in addition to the present test. | To be discussed at the meeting.  To be discussed on Day 6 of the meeting.  US to provide more information on this test later.  May be discussed further subject to info from US. |
| NL 137 |  | 9.4.13.2 | Table 15 | techn | In table 15 the values for the impulse voltage test are given. A note says: “The national authority may change the applicable rated impulse voltage levels.”  Already for a long time this aspect causes confusion, because it seems manufacturers need to meet the toughest requirement of 12 kV for getting a Certificate of Conformity under the OIML Certification System.  In many areas for meters with a voltage system of 230V, an impulse voltage of 6 kV is prescribed. The table seems not to give that possibility. This needs to be discussed and clarified. | Change the table, in line with the IEC 62052-31 safety standard, table 7. | To be discussed at the meeting.  Covered by previous discussions. Please see Convener’s response to FR077. |
| US 138 |  | 9.4.15 |  | Tech | No operating requirements are given for the aux devices. It would therefore be sufficient to operate aux devices once in a potentially long test. As written the test is almost useless. | Require aux devices to be operated X number of times in Y minutes of testing. Committee can determine X and Y. | The test is based on IEC 62052-11:2020 9.4.9.  To be discussed at the meeting.  To be discussed on Day 6 of the meeting.US to provide test procedure to convener.  May be discussed further subject to info from US. |
| FR 139 |  | 9.4.18.4 |  | techn. | Damp heat, cyclic (condensing) for humidity class H2 and H3  Acceptance criteria of Damp heat test in OIML R46 and ISO62052-11 §8.3.5 are different.  OIML R46 criteria are less restrictive. | Dielectric test should at least be carried out at the end of Damp heat test to ensure meter effective functioning. | To be discussed at the meeting.  IEC 62052-11 references to safety standard IEC 62052-31 for this test.  Accepted.  R 46 to be amended to align with IEC.  Error limits amended. In IEC it refers to 62052.31 for insulation test with 0.8 times the impulse voltage. But OIML has a different impulse voltage test. For feedback and discussion. |
| US 140 |  | 9.4.2 |  | Tech | The test severity only provides units in A/m. | Add units of mT as well. | Not accepted.  The test as provided aligns with OIML D11.  To be discussed at the meeting.  To be discussed on Day 6 of the meeting.  Convener to look in to the possibility of adding other units.  Note added based on IEC 61000-4-8. 1000 A/m = 1.26 mT in free space. |
| CN 141 |  | 9.4.4 |  | tech | According to IEC 61000-4-4, product committees should determine which repetition frequencies are relevant for specific products or product types.  In test severity of clause 9.4.4, repetition frequency shall be specified. | Repetition frequency: 100kHz | Accepted.  Repetition rate added.  Done |
| FR 142 |  | 9.4.4 |  | techn. | Fast transients  Repetition rate is missing for fast transients test | Mention repetition rate at 100 kHz as proposed in new version of IEC 62052-11 | Accepted.  Please see Convener’s response to CN141. |
| CN 143 |  | 9.4.7 |  | edit | There may be a confused understand. The test is performed keeping the magnetic core on the surface of the meter or having a 30mm distance between the magnetic core and the surface of the meter. | In test procedure of clause 9.4.7, adding:  The test is performed keeping the magnetic core on the surface of the meter. | To be discussed at the meeting.  Accepted.  Wording to be amended as proposed.  Done |
| US 144 |  | 9.4.7 |  | Tech | 62052-11 Appendix K DC induction test magnet is not specified at 30mm from pole face. The field strength is specified at the magnet surface. | Delete ‘Distance from magnet surface’ column of table13. | To be discussed at the meeting.  Test to be aligned with IEC and wording to be amended to provide clarity (see CN143). |
| BR 145 | 1 | 9.9.4 |  | techn | Repetition frequency is missing. In previous discussions someone suggest to use a repetition frequency of 100 kHz instead 5 kHz (that is the most broadly value used by EMC Labs in Brazil for EFT/B tests). The reason to use 100 kHz is because that frequency is more realistic than 5 kHz; however 5 kHz is better for reproducibility purposes. In fact, results from one laboratory to other could be different by using 100 kHz; such repetition frequency can be used during product development to warrant that the product will withstand real EFT/B. IEC 61000-4-4 probably specify 100 kHz for product development leaving the decision about what value use open to the laboratory expertise. Moreover, most EFT/B generators can apply EFT/B with repetition frequencies up to 1 MHz enabling product developers to explore the immunity of their products. | Include repetition frequency and also consider using 5 kHz instead 100 kHz for type approval tests favouring test results reproducibility between laboratories. | There is no clause 9.9.4 in the document. We are assuming that this comment refers to 9.4.4.  Please see Convener’s response to CN141. |
| AT 146 |  | 11.2.4.4. |  | Techn. | On Check of the register in case of multiple meter constants: Tests shall be performed using the minimum and maximum meter constant to cover the range of possible meter constants – similar to the test of energy meters with a wide range supply voltage. | Adding the following statement should be considered: Tests shall be performed using the minimum and maximum meter constant to cover the range of possible meter constants – similar to the test of energy meters with a wide range supply voltage. | Thank you for the feedback.  To be discussed at the meeting.  Wording to be included in 5 WD.  Updated  - Part 1, 7.3.2.1  - Part 2, 2.2.4 meter constant test (type approval)  - Part 2, 3.2.4.4 (verification) |
| KR 147 |  | Annex E, E.2 |  | Edit | IEC 62053-21 and 23 are revised in 2020 so the year should be changed to 2020. | Changing to IEC 62053.21:2020, IEC 62053.22:2020 or delete the year. | Accepted.  Have amended IEC standards to the most recent ones.  Done |
| KR 148 |  | Annex E, E.3 |  | Edit | Same as above. | Same as above. | See Convener’s response to KR147 above.  Check footnotes re basic and nominal current |
| NL 149 |  | Table 3 |  | techn | The values for class C/D/E for currents between Itr and Imax for the power factor deviate from the ones stated in IEC 62053-22. Instead of the range 0.5 inductive to 1 to 0.5 capacitive, in IEC 62053-22 a range of 0,25 inductive to 0,25 capacitive is used. | Align with IEC. | To be discussed at the meeting.  Table 3 to be edited for clarity.  Not sure as to what should be edited. Can NL provide more information? |
| US 150 |  | Table 5 |  | Tech | Test limits | Recommend that test limits be aligned with IEC and ANSI, and where a differences exist, then national authorities may choose which limits they follow. | To be discussed at the meeting.  Agree with the principle of the comment. Need further discussions to implement this. |

Annex 1

Table 5 - Limit of error shift due to influence factors updated (proposed values in yellow fields)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Influence quantity | Test Clause, Part 2 | Value of current | Power factor cos φ(1) | Limit of error shift (%) for meters of class | | | | |
| A / 2 | B / 1 | C / 0.5 | D / 0.2 | E / 0.1 |
| Self-heating | 9.3.3 | *I*max | 1; 0.5 | ± 1 | ± 0.5 | ± 0.25 | ± 0.1 | ± 0.05 |
| Load balance | 9.3.4 | *I*tr ≤ *I* ≤ *I*max | 1 | ± 1.5(2) | ± 1.0 | ± 0.7 | ± 0.3 | ± 0.15 |
| 0.5 | ± 2.5(2) | ± 1.5 | ± 1 | ± 0.5 | ± 0.25 |
| Voltage variation(3) | 9.3.5 | *I*tr ≤ *I* ≤ *I*max | 1 | ± 1.0(4) | ± 0.7 | ± 0.2 | ± 0.1 | ± 0.05 |
| 0.5 | ± 1.5 | ± 1.0 | ± 0.4 | ± 0.2 | ± 0.1 |
| Frequency variation | 9.3.6 | *I*tr ≤ *I* ≤ *I*max | 1 | ± 0.8 | ± 0.5 | ± 0.2 | ± 0.1 | ± 0.05 |
| 0.5 | ± 1.0 | ± 0.7 | ± 0.2 | ± 0.1 | ± 0.05 |
| Tilt | 9.3.7 | *I*tr ≤ *I* ≤ *I*max | 1 | ± 1.5 | ± 0.5 | ± 0.4 | n/a | n/a |
| Harmonics in voltage and current circuits | 9.3.8.1 | *I*tr ≤ *I* ≤ *I*max | 1 | ± 1.0(5) | ± 0.6 | ± 0.3 | ± 0.2 | ± 0.1 |
| Integral cycle load control test | 9.3.8.2 | 10 *I*tr | 1 | ± 3 | ± 1.5 | ± 0.75 | ± 0.5 | ± 0.25 |
| Harmonics in the AC current circuit | 9.3.8.2 | 10 *I*tr | 1 | ± 1 | ± 0.8 | ± 0.5 | ± 0.4 | ± 0.2 |
| Odd harmonics in the current circuit | 9.3.8.3 | 10 *I*tr | 1 | ± 6 | ± 3 | ± 1.5 | ± 0.6 | ± 0.3 |
| High-order harmonics | 9.3.8.4 | *I*tr | 1 | ± 1 | ± 1 | ± 0.5 | ± 0.5 | ± 0.25 |
| DC in the AC current circuit | 9.3.8.5 | *I*max/√2 | 1 | ± 6 | ± 3 | ± 1.5 | ± 1 | ± 0.5 |
| Reversed phase sequence | 9.3.9 | 10 *I*tr | 1 | ± 1.5 | ± 1.5 | ± 0.1 | ± 0.05 | ± 0.05 |
| Magnetic field (AC, power frequency) of external origin. | 9.3.10 | 10 *I*tr, *I*max | 1 | ± 2.5 | ± 1.3 | ± 0.5 | ± 0.25 | ± 0.13 |
| Radiated, RF, electromagnetic fields | 9.3.11.1 | 10 *I*tr | 1 | ± 3 | ± 2 | ± 1 | ± 1 | ± 0.5 |
| Conducted disturbances, induced by radio frequency fields | 9.3.11.2 | 10 *I*tr | 1 | ± 3 | ± 2 | ± 1 | ± 1 | ± 0.5 |
| Fast load current variation | 9.3.12 | 10 *I*tr | 1 | ± 3.0 | ± 2.0 | ± 1.0 | ± 0.5 | ± 0.25 |

Annex 1 is part of the comments from France.

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