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| **TC9 p1 comments** **on:** **OIML R60 1CD: Metrological Regulation for Load Cells (R60 1CD, Parts 1&2)** | |
| **TC9 Secretariat: United States of America** [john.barton@nist.gov](mailto:john.barton@nist.gov) | |
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| **Member State** | **Page** | **Paragraph** | **Comment** | **Secretariat Response** |
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| Australia | 2 | 2.1 | Suggest rewording added sentence to:  ‘Although strain gauge technology is the conventional or most common form of load cell design, there is no intent to exclude alternate technologies when applying this Recommendation. ‘  Suggest deleting last sentence:  ‘The further revision R60 is conducted in such a way so to be non-specific with regard to load cell design and their operating principles. | Paragraph amended, see also U.S. comment |
| Australia | 3 | 3.3.1 | Suggest rewording sentence with:  ‘Resistive element which produces an output proportional to the deformation of a solid body.’ | Amended according to CECIP comment |
| Australia | 4 | 3.4.2 | Delete ‘approval’ in first sentence. | Amended as proposed |
| Australia | 4 | 3.4.2.1 | These examples are intended to be limiting.  Suggest listing additional characteristics which are applicable and removing note. Replace clause with:  ‘All load cells within a family possessing identical metrological characteristics (as listed in 6.1.5 - including class, nmax, temperature rating, etc.). ‘ | Amended as proposed |
| Australia | 5 | 3.5.8 | Delete ‘which’ | Amended |
| Australia | 8 | 3.7.6 | Suggest delete ‘in agreement’ and ‘value’:  ‘Difference between a measured quantity derived from the output of a the load cell measurement result and the true quantity of the measurand (the applied force expressed in mass). [Adapted from VIM: 2012, 2.13 measurement accuracy] [2]’ | Removed definition. Inserted definition from VIM (2.16) for "measurement error" in Annex E |
| Australia | 8 | 3.7.7 | Suggest replacing clause with:  ‘Load cell error, determined under reference conditions (see 3.8.3). [Adapted from VIM: (1993) 5.24] [1] ‘ | Removed definition. "Maximum permissible measurement error" definition located in Annex E (E.1.7.) |
| Australia | 12 | 4 | Suggest changing ‘proportionately related’ to ‘proportional’ :  ‘A load cell provides an output proportional to an applied force or load. ‘  Suggest deleting 'relative to an input stimulus' :  ‘While many technologies are used in the design of load cells, those used in legal metrology applications are commonly designed to provide an output based on electrical current. Both analog and digital outputs are recognized in load cells within that category. Variations of transducers that operate using alternative basis of input/output may include, but are not limited to: pressure (e.g., hydraulic, pneumatic); vibratory frequency; and magnetic forces. ‘ | Paragraph amended |
| Australia | 15 | 6.2 | Incorrect reference. 6.2.2 doesn’t exist. | Amended reference. |
| Australia | 15 | 6.2 | Suggest replacing 'measurand' with 'load'  ‘These MPEs are applicable after increasing as well as decreasing the load (i.e., they include hysteresis)’ | Amended wording |
| Australia | 16 | 6.2.1.1 | Suggest replacing 'pattern' with 'type' | Amended |
| Australia | 16 | Table 4 | Suggest replacing 'pattern' with 'type' | Amended |
| Australia | 17 | 6.4.1 | Suggest replacing clause with:  ‘The load cell output shall not vary by more than the specified mpes for continuous application of an applied load.  The difference between the initial load cell output and the load cell output taken after 30 mins shall not exceed 0.7 times the absolute value of the mpe.  The difference between load cell output after 20mins and 30mins shall not exceed 0.15 times the absolute value of the mpe.’ | Clause amended per Germany's comment |
| Australia | 16 | 6.4.2 | Suggest replacing clause with:  ‘The load cell output shall not vary by more than half the value of the load cell verification interval (0.5 v) following application and removal of an applied load. ‘ | Language amended per France’s and Japan's comment |
| Australia | 19 | 6.5 | Incorrect reference. 6.8.1 and 6.8.2 don’t exist. | References amended |
| Australia | 19 | 6.5 | Need to provide more information on what is meant by ‘typically performed by weighing instruments’:  Suggest replacing ‘typically performed by weighing instruments’ with ‘typically performed by weighing instruments (e.g. A/D conversion)’ | Language amended |
| Australia | 19 | 6.5.1.1 | Incorrect reference. 6.2.2 doesn’t exist.  Suggest replacing 'with a range of' with 'spanning':  *‘Note*: National legislation may prescribe alternate temperature limits spanning 50 °C as appropriate for local climatic conditions and the environmental conditions that can be anticipated. ‘ | Language amended per CECIP comment |
| Australia | 19 | 6.5.1.2 | Suggest replacing 'These ranges shall be at least' with ‘These ranges shall span’ | Wording amended |
| Australia | 20 | 6.5.1.3 | Incorrect reference. 6.8.1.1 & 6.8.1.2 doesn’t exist. | References amended |
| Australia | 21 | 6.6.1 | These tests are not applicable to strain gauges:  Suggest deleting ‘(including load cells using strain gauge technology)’  More information is needed on what additional functions a load cell may have which will require it to undergo additional testing.  Suggest adding as an example:  A/D Converter  Signal Amplification  Display  Frequency Counter | Language amended |
| Australia | 23 | 6.6.2.1 | Agree Vmin is more appropriate. | Vmin replaces V |
| Australia | 23 | 6.6.2.2 | These tests are not applicable to strain gauges.  Suggest deleting ‘(including load cells using strain gauge technology)’  Span stability requirements are not only applicable to load cells with electronics, suggest moving this test to general requirements. It would then be more efficient to incorporate this into the temperature and humidity test profile. | Strain gauge technology statement removed from 6.6.1.  Span stability requirement was located under chapter for load cells equipped with electronics in previous editions of R60. This suggestion will be an item of discussion for TC9 p1 members at future meeting |
| Australia | 25 | 6.6.2.3 | References are not correct | References corrected |
| Australia | 25 | 6.6.2.4 | References are not correct | References corrected |
| Australia | 27 | 7.1 | The risk of someone changing the load cell configuration is low compared with the effort required for the suggested software checking; therefore this test seems disproportionately onerous.  Suggest that severity level I, validation procedure A is sufficient for all load cells including those on an open network. | This must be addressed by TC9 p1 at future meeting. See France's, SCAIME's comment |
| Australia | 28 | 7.2 | The title ‘Inscriptions’ implies this section covers markings only. Suggest deleting ‘Inscriptions’:  7.2 Presentation of information | Amended as proposed |
| Australia | 28 | 7.2.2 | Suggest that load cell classification, Vmin or Y and Z if applicable should also be marked on the load cell.  The requirement for the OIML certificate number would be confusing in Australia as we require a national certificate number.  Suggest either removing e. or replacing with 'OIML or National Certificate number as required by national Legislation' or something similar. | Added Vmin to list under 7.2.2.  OIML Certificate number has been added "if applicable". A certificate number marking would be affixed by the manufacturer and as such does not seem to be appropriately left up to National Legislation. |
| Australia | 35 | 8.2 | Suggest deleting this requirement. Requirements documents shouldn't seek to override National Legislation. 'Responsibility for compliance' and definition of 'in use' are for each member state to determine and are outside the remit of a recommendation. | To be considered by TC9 p1 at future meeting |
| Australia | 37 | 9.3 | Load cell selected is not definitive, merely representative. Suggest deleting ‘definitive’. | Amended as proposed |
| Australia | 37 | Table 6 | Suggest all temperature and humidity effect tests are carried out on 1 cell.  Everything else can be split, but any changes made to cells should be highlighted. | Amendments made per CECIP and Germany's comments |
| Australia | 38 | 9.4.1 | Suggest replacing text with:  ‘Where selection of a load cell for test requires a choice between characteristics, the load cell requiring the most onerous tests shall be selected. This will result in the load cell with the best metrological characteristics being tested.’ | Paragraph modified. See also comments from CECIP and NL |
| Australia | 39 | 9.4.6 | This assumes that the electronics are identical between different load cells. Suggest adding:  ‘Providing the electronics do not differ between load cells, only one cell shall be subjected to the additional tests for load cells…’ | Paragraph modified - see also comments from CECIP and Germany |
| Australia | 40 | 9.7.2 | Suggest deleting ‘linear’ | Text amended |
| Australia | 41 | 9.7.3.1 Table 7 | Disagree with setting these conditions.  Restricting temperature and humidity to specific values adds nothing to the stability of the test.  Suggest limiting the range of temperature and humidity to 2C and 5% but leave the absolute values undefined.  Other values are not measureable/controllable and therefore nothing is gained by adding them. Suggest deleting them. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations.  The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| Australia | 42 | 9.7.4.3 | Suggest that terms are not redefined, suggest deleting '(hereafter referred to as "minimum test load")' and '(hereafter referred to as "maximum test load")'  Suggest replacing ‘increased by’ with ‘plus’  Suggest replacing ‘The minimum value Dmin’ with the ‘minimum load Dmin’  ‘The minimum load, Dmin, shall be as near as possible to but not less than the minimum dead load, Emin, as permitted by the force-generating system. The minimum load Dmin shall not be higher than the value of Emin plus 10% of Emax. The maximum load, Dmax, shall be not less than 90 % of Emax, nor shall it be greater than Emax (refer to Fig. 1). ‘ | Language deleted as proposed.  Other changes made according to comments from CECIP and UK |
| Australia | 45 | 9.8.3.2 | Suggest that actual loading/unloading times should always be recorded in the test report.  Suggest deleting ‘in other cases’ | Amended as proposed |
| Australia | 46 | 9.9.1 | Suggest rewording  ‘A load Dmax (between 90% and 100% of Emax) shall be applied. An initial reading shall be taken, followed by subsequent readings after 20mins and 30mins of exposure. Differences in readings shall comply with the limits specified in 6.4.1’ | Paragraph amended as proposed |
| Australia | 46 | 9.9.2 | Suggest rewording:  ‘A Load Dmin shall be applied and an initial reading shall be taken. A load Dmax (between 90% and 100% of Emax) shall be applied for 30mins and the load returned to Dmin. A subsequent reading shall be taken.  The difference between this reading and the initial reading shall not exceed the value in 6.4.2.’ | Paragraph amended |
| Australia | 52 | 9.10.4.6 | Agree to this change. | This change will be reviewed further by TC9 p1 |
| Australia | 58 | 9.10.7.1 | The tests are not applicable to strain gauges.  Suggest deleting ‘(including load cells using strain gauge technology)’. | Amended as proposed |
| Australia | 64 | 9.10.7.8 | Suggest that the statement on Test Load which relates to zero setting and zero tracking might not be applicable for a load cell. | Wording amended to acknowledge testing done while load cell is installed as a component in a weighing instrument |
| Australia | 64 | 9.10.7.8 | Insert  **Immunity to conducted radio-frequency fields**  The test consists in exposing the EUT to disturbances induced by conducted radio-frequency fields.  Test equipment: See IEC 61000-4-6 (2003-05) with amendment 1 (2004-10)  Test set-up: See IEC 61000-4-6 (2003-05) with amendment 1 (2004-10)  Test procedure: See IEC 61000-4-6 (2003-05) with amendment 1 (2004-10)  Before any test:  Stabilize the EUT under constant environmental conditions.  The EUT shall be exposed to conducted disturbances of the strength and character as specified by the severity level.  Test Load:  As per RI text  Test severity: Frequency range: 0.15 MHz-80 MHz  RF amplitude (50 Ω): 10 V (emf)  Modulation: 80 % AM, 1 kHz, sine wave | Requirement added as proposed |
| Australia | 65 | 9.10.7.9 | Suggest replacing  ‘The installation of the load cell in the force-generating system shall be carried out correctly according to the technical specification of the manufacturer. Positions of frictions should be avoided. After installation the whole system should rest a minimal time period, which depends on the temperature’s difference, before testing to attain temperature stability. ‘  With  ‘The installation of the load cell in the force-generating system shall be carried out correctly according to the technical specification of the manufacturer. After installation the load cell shall be allowed to attain temperature stability prior to commencing testing.’ | This paragraph deleted. See comments from NL and CECIP |
| Austria | 3 | 3.3. | Is it meant to mention only Strain gauge as Construction of load cells?  Many comments suggest to keep in mind other principles like Electromagnetic force compensation, Vibrating string, …  Although alternative technologies are mentioned to be considered in 2.1, it may be useful to consider those in terminology, too. | Additional terms may also be added if deemed necessary by TC9 p1. Based on the perceived need, Secretariat will add terms and definitions provided by TC9 p1. See also Japan's comment |
| Austria | 7 | 3.7.2 | To harmonise with OIML R76 we suggest changing the writing of the proportional factor from  “PLC” to “pLC” | Amended as proposed |
| Austria | 14 | 6.1.5 | Reference 7.3.4.5 does not exist (should be 7.2.4.5). Review all references in this list. | Amended |
| Austria | 22 | 6.6.1 | Support NL comment [JB45] | "including load cells using strain gauge technology" deleted.  Language amended |
| Austria | 23 | 6.6.2.1 | Support vmin | Vmin replaces V |
| Austria | 30 | 7.2.4.5 | In 6.5.3 the humidity class “standard” is introduced.  Maybe it is useful to mention the class “standard” in this paragraph, too, even if there is no special symbol.  It is unclear which condition the standard class represents. A clearer definition of the standard class should be amended in the appropriate clause (9.7.4.8). | Standard class introduced in error. Future references to standard class will be replaced by CH |
| Austria | 40 | 9.6 | Reference for Software should be 7.1. Review all references. | References corrected |
| Austria | 41 | 9.7.3.1 | Space missing between “Table7” and “shall” | Corrected |
| Austria | 48 | 9.10.1.13 | Delete “20 °C, then“, this could lead to misunderstanding. The procedure for 20°C is already described before in the context and therefore in this paragraph the amendment could be confusing. | Deleted as proposed. It should be noted that this language was amended per Austria's comment regarding 1WD as shown:  According to the test report, the measurement at reference temperature is missing in this sentence.  replace  “Repeat the operation described in …, first at the higher temperature, then at the lower temperature, including the approximate temperature range limits for the accuracy class; then perform the operations at 20°C.”  by  “Repeat the operation described in .., first at 20°C, then at the higher temperature, the lower temperature, including the approximate temperature range limits for the accuracy class; then perform the operations at 20°C.” |
| Austria | 65 | 9.10.7.9 | Support comment [132]. The amendment (Comment [133]) fulfils the same intent as mentioned in comment [132] and therefore we suggest deleting the amendment “for temperature and humidity tests” in the paragraph test duration. | Paragraph amended. See response to CECIP's comment |
| Austria | D-4 |  | Is there a special use and need for the information of the wiring and Pictures of the load cell dimensions in the test certificate? However, we would prefer the Annex D. | The addition of the OIML Certificate as an annex was supported by the conclusions of TC9 during the September 2012 meeting. |
| Canada | 2 | 2.1 | Grammatical error only - **Of load cell** repeated in sentence  Grammatical error in the following sentence : Although strain gauge technology is commonly recognized as the conventional form or benchmark of load cell ~~of load cell~~ design, | Paragraph amended, see also Australia and U.S. comments |
| Canada | 5 | 3.5.8 | Grammatical error which should be deleted.  Minimum dead load (Emin)  Smallest load that **~~which~~** may be applied to a load cell without exceeding the MPE (see 3.7.8). | Amended |
| Canada | 14 | 6.1.6 | If I understand the marking requirements correctly the classification example below is missing the symbol for compression:   |  |  |  | | --- | --- | --- | | C3 5/35 | Class C, 3 000 intervals, compression, + 5 °C to + 35 °C |  | | Amended |
| Canada | 20 | 6.5.3 | Sentence seems incomplete. Sentence expanded to say that only cells that pass the requirements shall be marked.  Humidity  With respect to humidity conditions, there are 4 humidity classes: Standard, CH, NH, and SH. In case of class CH, NH, or SH, **where the load cell meets the requirements set out in 9.11.5 and 9.116,** the class designation shall be marked on the load cell. | At the time of evaluation, classification markings will determine requirements to be met. |
| Canada | 21 | 6.5.3.1 | Having the text in the title that specifies what is applicable is confusing. Should be moved below:  *6.5.3.1. Humidity error ~~(applicable to load cells marked CH or with no humidity symbol marking and not applicable to load cells marked NH or SH~~).*  **This requirement is only applicable to load cells marked CH or with no humidity symbol marking and not applicable to load cells marked NH or SH.**  The difference between the average of the readings of the minimum load output attributed to cyclic changes in humidity as determined using test procedures in 9.10.5 shall not exceed the limits specified in 9.10.5.15 | Amended as proposed. See also NL comment and response |
| Canada | 21 | *6.5.3.2.* | Same as 6.5.3.1  *Humidity error ~~(applicable to load cells marked SH and not applicable to load cells marked CH or NH or with no humidity symbol marking).~~*  **This requirement is only applicable to load cells marked CH or with no humidity symbol marking and not applicable to load cells marked NH or SH.**  A load cell shall meet the applicable MPE when exposed to conditions of relative humidity up to 85% as specified in 9.10.6. | Amended |
| Canada | 23 | 6.6.2.1 | As per comment on this item I would say the error is based on vmin not v.  *6.6.2.1. Disturbances*  When a load cell equipped with electronics is subjected to the disturbances specified in 9.10.7.1, the difference between the load cell output due to a disturbance and the load cell output without disturbance (**fault** load cell intrinsic error) shall not exceed the load cell verification interval, ~~v~~ **vmin**, or the load cell shall detect and react to a significant fault. | "vmin" retained |
| Canada | 28 | **7.2.** | Sentence structure is incomplete. Not sure what requirement is. I have attempted to fix but still unsure.  **Presentation of information (Inscriptions)**  Technical information markings, including load cell classifications, as indicated in 6.1.5 must be marked. Complete Load Cell Classification must be specified for the load cell(s) under evaluation. | No changes made. The additional language being proposed is being inserted between the clause number and clause title. Please reconsider proposal. |
| CECIP |  | General | Significant improvements have been made compared to the 1 WD. |  |
| CECIP |  | General  (Application and reference to templates) | Present version of templates for OIML Recommendations concerns informal **draft**.  Suggest removing all references to these templates from the (draft) R 60. | References to template removed as proposed |
| CECIP | 2 | 2.1 | 1st line: suggest “*characteristics*” by “*requirements*”.  Weighing modules as per OIML R76 T2.2.7 are not covered by this recommendation. | Paragraph amended, see also Australia and U.S. comments |
| CECIP | 2 | 2.2 | Suggest inserting: “…hysteresis and other influence factors). | Language amended |
| CECIP | 1 | 1 | \* I suggest removing the 3rd bullet and the sentences *“Thus a number of requirements …in the template … evaluation of load cells. In addition … within the template … testing procedures.”* as well as the next paragraph: *“Rather than … existing context.* On the other hand, these sentences do have some meaning in the draft, but they shall be removed in the final text.  \* For about the same reason, I suggest removing the end of the last sentence *“and will be presented in a future draft.”*  \* Suggest replacing *“… apply to* ***complex*** *instruments …”* by *“… apply to* ***complete measuring*** *instruments …”* | Amended as proposed |
| CECIP | 2 | 3 | \* It is confusing to refer to 2 different versions of the “VIM” ([1] and [2]).  So remove all references to the withdrawn version.  \* Please also take into account the 24th resolution of CIML 2011 (Prague) and if not strictly necessary do not deviate from the vocabularies. Where deviations are needed no reference to the vocabularies should be made.  \* Please be aware that it is highly probable that a new VIML will be published before the publication of a new R 60 | Amended as proposed |
| CECIP | 3 | 3.1.1 | *“Force transducer”* is not defined. We suggest:  \* to add  3.x.x **measuring transducer VIM 3.7 (4.3)**  *device, used in measurement that provides an output quantity having a specified relation to the input quantity.*  \* and to amend the definition accordingly to  3.1.1. Load cell  *measuring transducer that, in response to an applied load, will provide a measurable output quantity proportional to the force induced by the load. This output may be converted into units such as mass.* | Amended as proposed |
| CECIP | 3 | 3.1.2 | 1st note: “*stain gauge bridge circuits*” simplify to: “*strain gauges”* (the strain gauges are usually connected as a bridge-circuit, but other technical solutions shall not be prevented in this Recommendation).  So we suggest amending the 1st note to:  *“Note: passive elements like strain gauges are not considered electronic components for the purpose of this recommendation”* | Amended as proposed |
| CECIP | 3 | 3.2.1.1  3.2.1.2 | Suggested new wording:  Compressive force applied to the load receptor of the load cell.  Tension force applied to the load receptor of the load cell. | Amended as proposed |
| CECIP | 3 | 3.3.1 | Suggested new wording:  Analog resistive element that is bonded to a load cell structure and changes resistance depending on the compression or tension deformation of the load cell structure. | Amended as proposed |
| CECIP | 5 | 3.5.8 | Suggested new wording:  Smallest load that which may be applied to a load cell providing a result not affected by an error exceeding MPE. | Amended per comments from NL and UK |
| CECIP | 5 | 3.5.9 | Suggested new wording:  The observed difference in load cell verification intervals at minimum dead load (Emin) measured before and after application of a load of Emax.. | Amended as proposed |
| CECIP | 8 | 3.7.7 | See our comment on 3: Definition is not to be amended/ adapted. (No need to do so) | Removed definition. "Maximum permissible measurement error" definition located in Annex E (E.1.7.) |
| CECIP | 8 | 3.7.9 | Suggested new wording:  Deviation of the average of the values of increasing and decreasing load cell signals from a straight line through zero load and maximum load. | Amended clause. Did not include "increasing and decreasing" for risk of confusion with hysteresis |
| CECIP | 11 | 4 | Suggestions for minor editorial changes of the 1st paragraph:  \* Delete the last 2 words “*or load*” at the end of the 1st sentence. Reason: the load causes on force.  \* Change the line “*Designs of load cells include those intended for use in a system with other load cells and those used as a single transducer within a weighing instrument/system*.” to:*“Load cells may be used as a single transducer within a weighing instrument/system or applied together with other load cells in one weighing system where the design allows such application.”* | Paragraph amended |
| CECIP | 11 | 6.1 | Add the sentence at the end: All data/items under 6.1.1 to 6.1.7 shall be specified by the manufacturer | Added as proposed |
| CECIP | 12 | 6.1.3 | Replace vmin by vmin | Amended |
| CECIP | 12 | 6.1.4 | Suggest inserting: *“****where there would be a risk of confusion about type of load*** *, “*  For instance, if a load cell can only be mounted for compression, and it is impossible to apply it by mistake for tension, a special classification is superfluous. | Added as proposed |
| CECIP | 13 | 6.1.5 | e) humidity symbol, if applicable  f) could be deleted | Amended, retained "f" |
| CECIP | 14 | 6.2 | There is no 6.2.2 | Amended |
| CECIP | 15 | 6.2.1.1  and others | In spite of secretary stating “References to “pattern” changed to type”, still mixed use of the expressions type and pattern.  In clauses 6.2.1.1, Table 4, 9.7.2, Annex C (4x), Annex D.5 (2x), Annex E.2.3 (2x)  6.2.1.1 New title can be: MPE on type evaluation. | Amended |
| CECIP | 15 | 6.4.1 | Suggest inserting: ….and the reading observed within and after 30minutes of exposure to…… | Clause amended per Germany's comment |
| CECIP | 16 | 6.4.2 | Add an asterisk to Dmax and add the following remark:  Remark: or as close as possible to Dmax, considering the technical shortcoming of the test equipment. | This to be considered at future TC9 p1 meeting |
| CECIP | 16 | 6.5 | 6.8.1 – 6.8.3 do not exist; expect this should be 6.5.1 – 6.5.3 ? | Paragraph numbering amended |
| CECIP | 16 | 6.5.1.1 | Modify the note as follows:  National legislation may prescribe alternate temperature limits with a range of 50°C or more as appropriate for local climatic conditions and the environmental conditions that can be anticipated. | Added as proposed |
| CECIP | 11 | 6.5.1.2 | There is no 6.2.2 | Reference amended |
| CECIP | 17 | 6.5.1.3 | 6.8.1.1 and 6.8.1.2 do not exist. Should be 6.5.1.1 and 6.5.1.2 ?or local climatic conditions and the environmental conditions that can be anticipated. | References amended |
| CECIP | 17 | 6.5.3 | Remark: CH is Standard. Please delete CH in the second sentence. | "CH" deleted in second sentence |
| CECIP | 17 | 6.5.3.1 | Please modify the part as follows:  The difference between the average of the reading of the minimum load output and of the maximum output attributed to cyclic changes in humidity as determined using test procedures in 9.10.5 shall not exceed the limits specified in 9.10.5.15 | This phrase (now relocated to 9.10.5.15) amended as proposed. See also NL comment and response. |
| CECIP | 18 | 6.6.1 | Delete in 1st paragraph *“(including load cells using strain gauge technology)”* which introduces confusion.  6.6.1, 2nd paragraph and 6.6.1.2: Considering that this is a recommendation for legislation, the expression *“.. with substantial electronic functions ..*” is too vague and would introduce a risk on different interpretations within the OIML Certificate System.  Suggest to change to:  In addition to other requirements of this Recommendation, a load cell equipped with electronics shall comply with the following requirements. For the following requirements tests the MPE shall be determined using an apportionment factor, Plc equal to 1.0 (Plc=1.0) substituted for the apportionment factor, Plc that is declared by the manufacturer and applied to the other requirements.  “*If a load cell is configured with substantial additional electronic functions of an electronic weighing instrument then it may be considered outside the scope of this Recommendation and need to undergo additional evaluation against other requirements contained in the OIML Recommendation for a complete weighing instrument. E.g. as per OIML R76 T2.2.7* | "including load cells using strain gauge technology" deleted.  Language amended |
| CECIP | 18  19 | 6.6.1.1, b)  6.6.1.2  6.6.1.5 | According to 6.1.1, this also applies for load cells with “only” strain gauge technology. In such a case, it will be the electronics/software of the indicator that shall have provisions to detect this and take action.  Modify the note as follows:  A fault smaller than the load cell verification interval, v is allowed.  By reference to 6.6.1.1, b), the same problem in 6.6.1.5 | 6.1.1 amended:  "including load cells using strain gauge technology" has been deleted  Language in note amended as proposed by Germany |
| CECIP | 19 | 6.6.2.1 | Is this (like 6.6.1.1 where it is explicitly mentioned) also meant to be applicable for load cells with “only” strain gauge technology? If so, there is the same problem that the load cell shall detect and react! ( See comment on 6.1.1)  Moreover do not refer to test specifications as being a requirement. A test is to be applied to verify the compliancy to the requirement. Therefore insert the summarized specifications in table in part 1  Modify the last sentence:….shall not exceeds the minimum load cell verification interval Vmin of the “load cell” shall detect and react to a significant fault. | Strain gauge technology statement removed from 6.6.1.  Table relocated to Part 1 |
| CECIP | 19 | 6.6.2.2 | Please change the paragraph as follows:  A load cell equipped with electronics shall be subjected to the span stability test specified in 6.9.2.1 and 9.11.7.8……..  Remark: If possible the load cell should never be dismounted from the force-generation system during the whole period of the test. (< 28 days) | References corrected.  Additional language added to 9.7.4.14  See also comment from NL |
| CECIP | 19 | 6.6.2.3 | 6.11.1.1 , 6.11 1.2 , 6.11.3 , and 6.9.2 do not exist. | References corrected |
| CECIP | 20 | 7.1 | Please modify last sentence of the second para as follows: Any weighing instrument function shall be evaluated under other appropriate Recommendations for weighing instruments. | Language amended per Germany's comment |
| CECIP | 21 | 7.2 | Information to be submitted for type evaluation belongs in Part 2. Therefore delete *“under evaluation.”* | Amended as proposed |
| CECIP | 21  to  23 | 7.2.1  to  7.2.4.6 | We suggest to restructure these sub-clauses (no intention for real changes, but we think this proposed structure will be more clear and consistent):  *7.2 Inscriptions and presentation of other information*  *7.2.1 Minimum load cell markings*  *The following mandatory markings shall be clearly and indelibly marked on the load cell:*  *a) Name or trade mark*  *b) Manufacturer’s type destination or load cell model*  *c) Serial number*  *d) Maximum capacity as: Emax = …. (1)*  *e) Year of production*  *If, due to small size of the load cell, it is impossible to apply all this information on the load cell, at least the type designation and the serial number shall be marked on the load cell itself, and the other prescribed information shall be given in the accompanying document mentioned in 7.2.2*  *7.2.2 Mandatory additional information*  *The following mandatory information shall be provided in a document accompanying the load cell (or, if space permits, they may be marked on the load cell):*  *a) Name or trade mark*  *b) Type designation*  *c) Accuracy class(es); see 7.2.3.1*  *d) Type of load; see 7.2.3.2*  *e) Working temperature*  *.) Humidity symbol*  *f) Maximum capacity as: Emax = …. (1)*  *g) Minimum dead load as: Emin = … (1)*  *h) Safe load limit as: Elim = … (1)*  *i) Minimum load cell verification interval as vmin = … (1)*  *j) Value of the apportionment factor, PLC, if not equal to 0.7*  *k) Other pertinent conditions that must be observed to obtain the specified performance (for example, electrical characteristics of the load cell such as output rating, input impedance, supply voltage, cable details, etc.); and*  *l) OIML certificate number (if applicable)*  *7.2.3 Information in code*  *7.2.3.1 Accuracy class designation*  *[Text of present 7.2.4.1]*  *7.2.3.2 Designation of the type of load applied to the load cell*  *[Text of present 7.2.4.3, incl. Table 5]*  *7.2.3.3 Working temperature designation*  *[Text of present 7.2.4.4]*  *7.2.3.4 Humidity symbols*  *[Text of present 7.2.4.5]* *Notes* *(1) in ISO mass units g, kg, t,* | Section restructured and amended according to proposal  Note regarding the use of recognized units of measure added under 7.2.2 |
| CECIP | 23 | 7.2.4.5 | Delete *“submitted for evaluation” as*  referencing to the “*evaluation”* concerns the Part 2 | Amended as proposed |
| CECIP | 23 | 7.2.4.6 | Additional information e.g. mounting torque, force transmission / introduction, cable type and length should be added here. | Added to 7.2.2(m) |
| CECIP | 35 | 8.2.1 | Headline, delete “uncertainty of test results”. This paragraph covers the measuring means, not the test results. | Amended as proposed |
| CECIP | 36 | 9.3 | 4th (& 5th) paragraph: In our view, a repair (contrary to a modification) usually relates to one single unit. So in this case, repair of other specimens is not relevant.  Suggested new text:  “*If during the evaluation the specimen experiences malfunction or breakage that necessitates a repair in order to complete the test, the applicant shall verify whether this repair concerns an incident or whether a modification will need be made to the design. In the latter case the modification is to be applied to all specimens supplied for the test and the applicable documentation to be updated accordingly.”* | Language modified as proposed |
| CECIP | 37 | 9.4 | New wording would help:  All accuracy and influence tests, including span test for digital load cells, shall be performed on the same unit. Disturbance test on digital load cells may be carried out on an additional load cell. (With this wording the Table 6 could be deleted.) | Amended as proposed |
| CECIP | 37 | 9.4.1 | Although already stated in the last sentence of 9.4, it shall be absolutely clear that these load cells shall belong to the same family/group. Change to *“Where Load cells of the same family and the same capacity...”* | Clarification made. Paragraph modified with suggested changes per Australia's comments |
| CECIP | 37 | 9.4.2 | Although already stated in the last sentence of 9.4, it shall be absolutely clear that these load cells shall belong to the same family/group. Change to: *“Load cells of the same family with a capacity...”* | Clarification made. Paragraph modified with suggested changes per Germany's comments |
| CECIP | 38 | 9.4.4 | There is no reason to forbid a ratio smaller than five. So, please use the old wording. | Wording was modified based on NL comment from WD. This language has been replaced by new language. TC9 p1 to determine preference between modified language and 2000 edition language at future meeting. |
| CECIP | 38 | 9.4.6 | New title can be: Selection of load cells equipped with electronics.  A new wording shall be.  *“For load cells /load cell families load cells equipped with electronics all applicable test shall be performed on the load cell with the minimum, μV/vmin as input of the analogue digital converter.*  (Same principle as OIML R76, Annex C, Table 12) | Paragraph title changed.  Paragraph modified as proposed, see also comments from Australia and Germany |
| CECIP | 38 | 9.5 | Suggested new wording:  d) Specify installation requirements: physical and electrical  e) The *“user*” is the manufacturer of the complete weighing instrument (not the end-user of the weighing instrument). May be clearer to use the word *“installer”* ? | d) amended  e) existing language retained. "User" may indicate the manufacturer of a complete weighing instrument or the operator of that instrument. It may also indicate the official performing the type evaluation. |
| CECIP | 39 | 9.6 | a) There is no 7.3.4.1  b) \* There is no 7.3.4.2  \* Why *“(maximum number of verification)”* in brackets? Remove brackets.  f) 7.1 instead of 7.2  g) There is no 7.3 | References corrected. Parenthesis removed |
| CECIP | 39 | 9.7.2 | “*Suitable linear instrument”* applies typically to analogue (strain gauge) load cells. Digital load cells should also be taken into account. Therefore delete the word *”linear”* | Text amended |
| CECIP | 40 | Table 7 | b) Humidity 65% is a comparably high value, especially when performing temperature tests at e.g.40°C.  Please replace with: For performing tests at the specified high temperature the relative humidity shall not exceed 20g/m³. (Source OIML R76 ,A.5.3.1)  c) Please be aware that in practise, the ambient pressure depends on the weather conditions, and controlling this pressure leads to significant costs. Taking into account clause 9.7.4.7, it is sufficient to record the actual atmospheric pressure. After the influence of atmospheric pressure has been established according to 9.7.4, it is possible to correct other measuring results for this effect, if necessary.  Consider the introduction of a statement concerning such a correction. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations.  The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| CECIP | 41 | 9.7.4.3 | Suggestion:  \* The proposed upper limit of Emin + 10 % E**max** for the minimum load seems very high (typing error?). We suggest Emin + 10 % E**min** (see also proposal in next bullet).  \* For simplicity, we suggest combining the 1st two sentences, and “compressing” the text as follows: *“The minimum load, Dmin, (hereafter referred to as “minimum test load”) shall be between the minimum dead load, Emin, and Emin + 10%. The maximum load, Dmax, (hereafter referred to as “maximum test load”) shall be between 90 % of Emax and Emax (refer to Fig. 1).”* | This added statement was not a typing error but a proposal for amendment from France. The value has been changed as proposed however, will need to be accepted by TC9 p1 members.  Other language amended according to proposed changes |
| CECIP | 42 | 9.7.4.10 | Considered superfluous.  Moreover, if maintained, considering the contents of this sub-clause, we suggest to include the indicating instrument in the title; for instance: *“Stability of test equipment”* | Paragraph deleted |
| CECIP | 43 | 9.7.5 | \* Replace “*measuring instrument”* by *“load cell*” (prevents confusion with the load cell indicator)  \* Wrong reference: MPE is specified in 6.2.1 (not in 9.9) | Amended as proposed |
| CECIP | 43 | 9.8.2 | Replace “*Table 1”* by “*Table 4”*. | Amended |
| CECIP | 44 | Table 8 | Time allowed for: Loading and Stabilization bring together as one time as in the old OIML R60. It’s too difficult especially with high loads. | Table 8 reformatted per Japan's comments. Changes need to be considered by TC9 p1 at future meeting. |
| CECIP | 44 | 9.8.3.2 | \* Word processing problem (?): In the clean version, text of b) “glued” to the end of a). No problem in marked text.  \* In b), we suggest prescribing that the actual times shall in **all cases** be recorded in the Test Report. | Formatting corrected,  wording change to indicate that actual times to be recorded in all cases |
| CECIP | 44 – 45 | 9.9 | Taking into account clauses 9.10.2 and 9.10.3, the entire clause 9.9 / 9.9.1 / 9.9.2 seems superfluous.  If these (sub-)clauses are maintained, the suggestions 9.9.1 and 9.9.2 apply. | 9.9.1 and 9.9.2 amended |
| CECIP | 45 | 9.9.1 | \* We suggest clarifying that the initial reading (1st line) shall also be with a load Dmax.  \* 3rd line: *“… not differ greater …”* might be replaced by: *“… not differ more …”* or *”… have no greater difference than ...”*.  For proposed new wording, see remark 9.9.2 | Paragraph amended per Australia's comments |
| CECIP | 45 | 9.9.2 | Suggested new wording:  *In order to test compliance with 6.4.2, the test shall be performed as follows:*   1. *During at least 30 minutes, the load cell shall be loaded Dmin* 2. *Record output load cell (reading 1)* 3. *Apply load Dmax (which shall be between 90 % and 100 % of Emax), during 30 minutes ± 5 minutes* 4. *Return to load Dmin* 5. *Wait stabilization time according to Table 8* 6. *Record output load cell (reading 2)* 7. *Compare readings 1) and 2)*   *The difference between readings shall not exceed the value specified in 6.4.2.*  And similar for 9.9.1. | Paragraph amended per Australia's comments |
| CECIP |  | 9.9 and 9.10  in general | Editorial:  We would prefer a similar style like suggested for 9.9.2. | Preference noted. Existing editorial style maintained. |
| CECIP | 45 | 9.9.3 | (End of field 9.9.2): This clause 9.9.3 is “empty” (probably, this number should be deleted.) | Amended |
| CECIP | 45 | 9.10 | It is difficult to navigate in the present structure of sub-clauses of 9.10. Therefore some suggestions:  For ease of reading, preferred style, like suggested in 9.9.2.  Alternatively:  \* Reconsider numbering;  \* Print the subject in bolt face;  \* Add sub-clauses to Contents on page i. | Sub-clauses under 9.10 have been added to Contents for easier navigation. |
| CECIP | 45 | 9.10.1.2 | Please add the following sentence to that para: In case the total temperature range has been shifted, the initial (reference) temperature may differ from 20°C (e.g. range from -20°C to 30°C, reference / initial temperature: 10°C).  Replace: +/-2K instead of +/-2°C | Amended as proposed |
| CECIP | 46 | 9.10.1.8 | This wording is confusing and should be replaced with the corresponding wording of OIML R76-1 saying: “values at or near those at which the maximum permissible error changes”. This includes that at these values the smaller error limit applies.  Table 4 concerns 6.2.**1.1** | Language amended to harmonize with R76. Reference number amended. |
| CECIP | 47 | 9.10.1.14 | Replace 6.2.2 by 6.2.**11** | Amended |
| CECIP | 47 | 9.10.1.16 | The added sentence *“The minimum load output shall be taken after the load cell has thermally stabilized at ambient temperature.”*  *\* “...be taken..”* is strange rather undefined wording; please enlighten.  \* Moreover the sentence may be superfluous while applicable to all tests | Statement deleted |
| CECIP | 51 | 9.10.4.6 | In our opinion, it is sufficient to perform the test by comparing the output of the “bare” (unloaded) load cell at only 2 different pressures: the atmospheric pressure at the moment, and one higher pressure (higher pressure is easier to achieve than lower pressure); just as in R 60 (2000).  And although in favour of keeping the test as is in R 60 (2000), it may be considered to describe performing the 2nd measurement at a pressure level of 5 kPa higher than atmospheric pressure. (instead of 1 kPa).  Prescribing higher pressure levels and/or more measurements will result in the need for purchase of more expensive equipment and require longer testing time resulting in more (and unnecessary) costs. | To be considered by TC9 p1 at future meeting |
| CECIP | 57 | Table 9 | Statement below the table: *“…all functions that are performed or initiated via an interface shall operate correctly.”*  There is a contradiction with 6.6.2.1, stating: *“When a load cell equipped with electronics is subjected to the disturbances specified in 9.10.7.1, the difference between the load cell output due to a disturbance and the load cell output without disturbance (****fault****) shall not exceed the load cell verification interval, vmin, or the load cell shall detect and react to a significant fault.”*  Last sentence is not applicable; delete   * The Surge test is missing in the table. | Table relocated to Part 1, Surge test added to Table.  6.6.2.1. Associated statement deleted. |
| CECIP | 58 | 9.10.7.2 | Title: The expression *“load cells with digital output interval*” is not defined. And it seems impossible that a “non-digital load cell” will have a “digital output interval”.  Therefore it is suggested to change the title of this sub-clause to: “*Evaluation of error for digital load cells*” or *“digital load cell error evaluation”*.  “E”: There should be a differentiation between ”E” as measuring range and “E” as the symbol for error. An additional index for the E as Error could be introduced. | Title changed.  "E" as a symbol for error is only found in this particular clause. This does not seem to warrant an additional index to identify it as such, particularly when it is expressly identified as such within the clause. |
| CECIP | 61  62 | 9.10.7.5  9.10.7.6 | Is this for load cells powered by AC or DC mains supply, or also for battery power, or even for the load cells powered by the indicator?  Anyhow, it shall be clear that these tests are not applicable for load cells not directly powered by mains supply!  These specifications of test severity differ from those OIML R76 and other recommendations on weighing instruments. It is advisable to adopt the procedure and test levels from OIML R76/2006, B3.1 | This suggestion should also be a part of the larger TC9 p1 discussion regarding issues of power supply.  To be considered by TC9 p1 at future meeting |
| CECIP | 63  64 | 9.10.7.7  9.10.7.8 | Not relevant for load cells with only strain gauges (without active electronic components)  The frequency range should be adapted to the state of the art of e.g. OIML R76/2006 that is to 80MHz to 2000MHz at least.  The “conducted immunity test” should be also adopted from OIML R76/2006, B3.6 using the same wording but “v” instead of “e”. | Section 9.10.7 expressly notes that these tests are applicable to load cells equipped with electronics. References in other paragraphs that were added previously indicating that various requirements were also applicable to strain gauge type load cells have been deleted.  Frequency range amended as proposed.  Conducted immunity test added - see 9.10.7.10 in 2CD |
| CECIP | 65 | 9.10.7.9 | \* 1st paragraph and most of the contents of this clause are not typical for this test, but applicable for the majority of the other tests as well. So no need mentioning here.  \* 3rd paragraph indicates that this 9.10.7.9 is only meant for load cells directly powered from the (public) mains supply. This should be mentioned very clearly in the beginning of the text.  \* In our opinion, there is no need for this span stability being a separate test. Instead, it will do to compare the span of the load cell at the end (after the “maltreatment” by the all the tests) with the span measured during the first test. | 1st paragraph deleted. Language amended.  3rd paragraph includes the possibility of power supply by battery.  The notion of including the span stability test as being conducted in conjunction with other performance tests should be discussed by TC9 p1 at future meeting |
| CECIP | A-5 | Annex A | \* No subscript used (Emax etc.)  \* A.2.5, last words *“deemed to be approved”*:  After all tests have been successfully performed, the “approval” is a separate (legal) action; often by a different institute. So we suggest changing the text: *“.... is supposed to comply with the requirements”.* | Amended, see response to NL comment |
| CECIP | E-1 ... E-8 | Annex E | No reference to old VIM: delete E.1 | References to old VIM deleted. |
| CECIP | Bibliography | I | Referring to 2 different versions of the “VIM” ([1] and [2]) is very confusing! See also our remark clause 3.  Only refer to the present version, and take care that this is properly applied throughout the Recommendation. | References to old VIM deleted. |
| China |  | 6.3.3 | For the "Test procedures and requirements for load cells equipped with electronics":  What does "The mains power" described in item 6.3.3 and item A.4.7.3 of R60 refers to? This test is for the LCs performance test. In our comprehension, "mains power" should be refer to excitation voltage of load cells. Therefore the all tests listed in Table 7 should be fully implemented for the digital load cells. | Comments from: **Proposals and points of discussion for the 2nd Revision of R60** which was point of discussion at September 2011 TC9 meeting.  Mains power refers to the public power supply.  Paragraph 6.3.3 was deleted as a result of the September 2011 meeting of TC9. 1CD does not contain this clause.  Paragraph A.4.7.3 (9.10.7.4 in 1CD) – see UK comment and Secretariat response |
| China |  |  | For the "Load transmission":  1) Whether Table.1 and Table.2 should be added? Whether the options for the load transmission device and the photos of load cell and its matching load transmission device should be added in the “Test report”?  2) For the item X.3, if there is no criterion of selecting load transmission devices on mutual recognition of type, the two sides would recognize "load transmission devices" each other? | Comments from: **Proposals and points of discussion for the 2nd Revision of R60** which was point of discussion at September 2011 TC9 meeting.  Table 1 and Table 2 will be included in 2CD  Special load transmission conditions to be specified by manufacturer. This should be included under “special conditions” on OIML Certificate (see Annex C).  Specific instructions for load transmission device and photos of load cell to be included on OIML Certificate (see Items 3 and 5 in Annex D)  Question 2 (on item X.3) to be discussed by TC9 p1 at future meeting |
| China |  |  | For the "Test and environmental conditions":  1) For "Remark" of item a), If the temperature and humidity will change, MDLO may have different results, how to deal with this situation? Whether the humidity should be specified for the test?  2) For the item b), thermal insulation devices installed in the bottom and pad of the load cell may reduce the influence of thermal gradients. It should reach a consensus for thermal insulation devices and their installation methods. Besides, how to measure the temperature of the "mounting plate and load introduction"? | Comments on: **Proposals and points of discussion for the 2nd Revision of R60** which was point of discussion at September 2011 TC9 meeting.  These questions to be discussed by TC9 p1 members at future meeting in order to provide answers based on consensus. |
| China | (B-1) | Annex B (Informative) Load transmission to the load cell | 5. For test of small-scale load cell, the ratio of the mass of "load transmission device" and Emax or Dmax should be quantified. If the mass of "load transmission device" is larger than a certain quality, it should be noted in test report. Otherwise, “Emin = 0 or Dmin = 0” would not be regarded. | Acceptable value(s) for ratio should be stated. To be discussed by TC9 p1 at future meeting |
| China |  | (R60 - Part 3) | Figure C.1 in R60 may be wrong, error curve of rising course should be cross the horizontal axis in the point of n=2250 (referencing indication of 75% testing load). | Comment to be incorporated in revision of Part 3 (test report format) |
| China |  | (R60 - Part 3) | For the item C2.7.2 in R60, “CHmin must not exceed 0.04nmax”. In our experience, CHmin of the load cells to be tested are smaller than 0.01 nmax in most cases. Therefore, the specified value “0.04nmax”should be discussed. | Comment to be incorporated in revision of Part 3 (test report format) |
| France | 7/111  (of “pdf” marked version) | 3.3.1  Strain gauge | We suggest an alternative definition which is more correct :  “Device for translating a deformation of a solid body in terms of electrical resistance.” | Amended according to CECIP comment |
| France | 8/111  (of “pdf” marked version) | 3.4.2  Load cell family | Editorial : The term “approval” in the first line of 3.4.2 should be deleted because “type evaluation” replaces “pattern approval”.  This correction shall be done for all the document. | Amended as proposed |
| France | 9/111  (of “pdf” marked version) | 3.5.9  Minimum dead load output return (DR) | We suggest to not add a special value of the load, i.e. Emax, because is not in line with 6.4.3, but add i.e. Dmax. | Amended as proposed |
| France | 12/111  (of “pdf” marked version) | Deleted 3.7.4 (2.4.4)  Fault | The definition of “fault” has been relocated to Annex D.  We suggest for a better reading of this recommendation, to locate in the definitions of chapter 3 as it was, because 3.7 includes “3.7.4 Fault detection output” and “3.7.13 Significant fault” | In keeping with the prescribed template, definition has been retained in Annex D |
| France | 16/111  (of “pdf” marked version) | 4  Description of Load Cells | 2 comments :  1/ We wonder if it is necessary to use the whole chapter without any division and suggest to relocate in chapter 3 to give this additional interesting information to the definition of a load-cell.  2/ In the second sentence of the first paragraph, we suggest to delete “in a system” to read :  “Designs of load cells include those intended for use with other load cells and those used as a single transducer within a weighing instrument/system.” | Location of "Description of Load Cells" follows OIML template.  Paragraph has been amended. |
| France | 16/111  (of “pdf” marked version) | 5  Units of measurement | We agree with this proposed wording | Wording amended slightly as proposed by UK |
| France | 20/111  (of “pdf” marked version) | 6.2.1.1  Type evaluation | According to the 1st sentence of 6.2, this paragraph should be numbered 6.2.2. | Corrected reference |
| France | 21/111  (of “pdf” marked version) | 6.4.1  Creep  And 6.4.1.1  MPE for creep | We suggest to delete 6.4.1.1 and to add a note to 6.4.1 :  “Note : Regardless of the value declared by the manufacturer for the apportionment factor, PLC, the MPE for creep shall be determined from Table 4 using the apportionment factor, PLC = 0.7. “ | Amended as proposed |
| France | 23/111  (of “pdf” marked version) | 6.5  Influence quantities (Rated operating conditions) | The wording is corresponding to the discussion on that issue.  However, we think there should be somewhere a warning to avoid that manufacturers of a complete weighing instrument - including certified load-cells - might think that all functions performed by an OIML-R60-certified-load-cell have been assessed to issue the certificate of this instrument. | Language amended |
| France | 23/111  (of “pdf” marked version) | 6.5.1.1  Temperature limits | A note has been added. We wonder the interest of it because 6.5.1.2 introduces special range of temperature. | Note was added in response to comment on WD to consider climatic variations found in members states |
| France | 24/111  (of “pdf” marked version) | 6.5.2  Barometric pressure | We think this point should be discussed together with 9.10.4.6 as suggested in the inserted comment n°112 in 9.10.4.6 (i.e. page 54/111 of “pdf marked version”). | To be considered by TC9 p1 at future meeting |
| France | 24/111  (of “pdf” marked version) | 6.5.3  Humidity | 2 comments about 6.5.3  1/ We think the concept of “humidity class” is not in line with what should be expected from OIML D11. In the sense of OIML D11, humidity classes are H1, H2 and H3 corresponding to locations expected for the use of instruments.  2/ this paragraph names 4 humidity classes. Then, 6.5.3.1 and 6.5.3.2 deal only with CH or SH load-cells. Standard class and NH are not described. NH is already a known concept. But we wonder what a standard humidity class is.  Therefore we suggest to change “there are 4 humidity class : Standard, CH, NH, and SH”  to read something like “this recommendation defines 3 cases : NH, SH and CH”.  Note : OIML D11 has also a “Water Test” for a humidity class named H3, mainly applicable for instruments or parts of instruments typically being used in the open air and that, in their normal use, can be directly exposed to water, for instance platforms of weighbridges. | Concept of only 3 classifications is acknowledged. Paragraph amended as proposed |
| France | 27/111  (of “pdf” marked version) | 6.6.2.1  Disturbances | In the last line of the paragraph, we think the value not to be exceeded should be “v” and “vmin“ should be the value when testing during type evaluation ; so we suggest to replace “vmin” with “v” | Language amended in 1CD is retained, see comments from CECIP, Austria, Australia, Canada, Germany |
| France | 32/111  (of “pdf” marked version) | 7.2.3. Mandatory additional information | As 7.3.4 doesn’t exist, we suggest to replace it by 7.2.4. | Amended as proposed |
| France | 33/111  (of “pdf” marked version) | 7.2.4.3  Designation of the type of load applied to the load cell | We suggest to add the words “transmission principles” in the title of Table 5 to read :  “Symbols for Different Types of loads transmission principles” | Amended as proposed |
| France | 34/111  (of “pdf” marked version) | 7.2.4.5  Humidity symbols | As suggested in the comment of 6.5.3 above, the reference to a standard class should be deleted or completely thought about.  Then, we wonder the reason why CH should not be marked every time a load-cell conforms to the CH criteria. | Standard class introduced in error. Future references to standard class will be replaced by CH |
| France | 35/111  (of “pdf” marked version) | 7.2.4.6  Non-mandatory additional information | We agree with the principle of “c” but we suggest to take the comment of 6.1.3 above into account. | Unable to find 6.1.3 comment |
| France | 37/111  (of “pdf” marked version) | 8.2  Responsibility for compliance with the requirements | In the second paragraph, “…, the owner of the load cell has the responsibility that the instrument is well maintained…”, “the owner of the load cell” should be replaced with “the owner of an instrument including the load cell(s)”. | Wording in paragraph amended but not expanded to include "the owner of the instrument including the load cell." It was considered that addition of this language would extend the scope of R60 beyond the established limits. This change to be considered by TC9 p1 at future meeting |
| France | 37/111  (of “pdf” marked version) | 8.2.1  Measurement standards , uncertainty of test results | Editorial comment.  In the second line, the opening bracket should be moved to exclude the word “used” from the brackets. Thus, “… indicating instrument (used during the tests…)” should be “ indicating instrument used during the tests…”. | Parenthesis removed |
| France | 39/111  (of “pdf” marked version) | 9.3.1  Number of load cells to be tested | We suggest to replace at the end of the paragraph :  - “minimized” with “optimized”  - Annex B with Annex A | Language modified |
| France | 43/111  (of “pdf” marked version) | 9.7.3.1  Environmental conditions | We wonder, concerning humidity, where the value “65% RH ± 5%” comes from and, concerning ambient pressure, if “stable within 10 hPa” means during each test or during the complete set of tests. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations.  The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| France | 47/111  (of “pdf” marked version) | 9.8.3  Initial readings | In Table 8, we suggest to replace column “Loading” by “Loading or unloading”. | Table 8 reformatted per Japan's comments. Changes need to be considered by TC9 p1 at future meeting. |
| France | 48/111  (of “pdf” marked version) | 9.9.2  Minimum dead load output return | We suggest to add that “Dmax shall be applied for 30 minutes”. | Paragraph amended |
| France | 51, 53/111  (of “pdf” marked version) | 9.10  Test procedures | We suggest to move 9.9.1 and 9.9.2 inside 9.10, i.e. in 9.10.2 for creep and 9.10.3 for minimum dead load output return (DR). | Paragraphs have been amended however, to adhere to the OIML template format, the current location of 9.9.1 and 9.9.2 will be maintained |
| France | 62/111  (of “pdf” marked version) | 9.10.7.4  Power voltage variations | We think the former comment from Australia should be discussed.  For practical configuration of the test, a decision should be made on where the variations shall apply.  We had a particular example where we issued 2 test reports because we didn’t agree on what to do between the certification service and the test center. One test report was dealing with the variations applied to terminal+load cell and the second one was dealing with the variations applied to the load cell alone.  As we are dealing with modular approach, a load cell might be associated with a lot of compatible indicators.  As the text is written, the test applies to both indicator and load cell and the danger is that another combination with another indicator would be different in matter of power variations test.  Therefore, we are not so in favour of the existing text and suggest to apply variations only on load cell. | To be considered by TC9 p1 at future meeting  See response to NL regarding 9.10.7.5, 9.10.7.6, and 9.10.7.10 |
| France | 65-66/111  (of “pdf” marked version) | 9.10.7.8  Electromagnetic susceptibility | We wonder why the frequency range of the electromagnetic field is “26 MHz to 1 000 MHz” and not “26 MHz to 2000 MHz” to harmonize with R76 as the value of field strength. | Frequency range amended |
| France | 66-67/111  (of “pdf” marked version) | 9.10.7.9  Span stability | We suggest to discuss about the wording of “Test duration” which is not enough clear. | Test procedure reads that "the manufacturer's operating instructions shall be considered" - TC9 p1 should address this lack of specificity in this clause at future meeting. Current version of test report does not specify duration. See also comments from CECIP. |
| France | 68-69/111  (of “pdf” marked version) | 9.10.7.10  Surge | We agree surge test needs to be integrated but we suggest to include it among other disturbances tests, e.g as 9.10.7.7 and then to number.  D11 provides for severity levels and level 2 is not in line for example with class E2 of OIML D11.  As nobody can know all cases of conditions of use of load cells, we suggest either to delete the first paragraph or change to indicate that the certificate should include conditions of use if this test is not performed | Test procedures for Surge relocated. See 9.10.7.7.  D11 references for tests to be updated, see response to NL comment 9.10.7  Qualifying statement added as proposed |
| France | 94/111  (of “pdf” marked version) | Annex D  4. Documentation | If this annex is chosen as pattern for issuing a certificate, we suggest to remove acronym “PTB” from the line :  “Test Report No. PTB xxx; C3; Y=xxx; Z=xxx; Emax=xxx kg; SN: xxx” | Amended |
| France | 95/111  (of “pdf” marked version) | Annex D  6.  Data sheet and dimensions | In the table describing the Specifications of the Load Cell Family, we suggest to delete the line “Degree of protection according to IEC529 [18]” as this is not directly related to tests performed (for example, there is no test for protection against dust and in the example given, IP65, the figure 5 relates to water sprays). | Deleted as proposed |
| France | 110/111  (of “pdf” marked version) | Bibliography | The reference n° [18], i.e. IEC529, should be removed for the reason specified in previous comment. | Deleted as proposed |
| Germany |  | General | Significant improvements have been made compared to the 1 WD. |  |
| Germany |  | General | Present version of templates for OIML recommendation concerns informal draft. Suggest removing all references to these templates from the (draft) R60. | Amended as proposed |
| Germany |  | General | Suggestion to adapt the next WD with the “***G****uide to the Expression of* ***U****ncertainty in* ***M****easurement” in cases of doubt.* | TC9 p1 recommendations to adapt R60 specific content to the GUM will be given appropriate consideration |
| Germany |  | General | This 1CD contains mainly editorial changes. Metrological aspects (see document “Proposals and points of discussion for the 2nd Revision of R60” and “ Meeting Summary OIML TC9 – R60 revision“) are largely unconsidered and should be discussed within the next R60-WD. | "Proposals and points of discussion for the 2nd Revision of R60" was a primary topic at the TC9/R60 meeting in Braunschweig Sept. 2011. To a large degree, the conclusions of that meeting did not support the proposals in that document. Those issues that received support at that meeting have been incorporated into R60.  Proposals from TC9 p1 members related to that document may be considered in future drafts if specifically recommended. |
| Germany | 2 | 2.1 | 1st line: suggest “characteristics” by “requirements”. | Paragraph amended, see also Australia and U.S. comments |
| Germany | 2 | 2.1 | Please add the following sentence: Weighing modules as per R76, T.2.2.7, “Weighing modules”, are not covered by this recommendation. | Clause amended |
| Germany | 2 | 2.2 | Suggest inserting: “…hysteresis and other influence factors“ | Amended per CECIP comment |
| Germany | 2 | 3 | It is confusing to refer to 2 different versions of the “VIM” ([1] and [2]). | Amended |
| Germany | 3 | 3.1.1 | „Force transducer“ is not defined. We suggest to add 3.x.x measuring transducer according to WIM 3.7 (4.3) | Amended. Definition added to Annex E |
| Germany | 3 | 3.1.1 | Change text:  measuring transducer that, … will provide… | Amended |
| Germany | 3 | 3.3.1 | Device for measuring strain the changes in distances between points in solid bodies that occur when the body is deformed | Amended according to CECIP comment |
| Germany | 4 | 3.4.2 | We had proposed to insert a figure / sketch after the note (see PTB-Document “Proposals and points of discussion | Figure and additional language incorporated in draft (9.4.1). Need to be approved by TC9 p1 – to be discussed at future meeting |
| Germany | 4 | 3.5.2 | Load cell measuring range (DR)  Please add the following sentence:  DR is the range between the maximum load of the measuring range Dmax and minimum load of the measuring range D min  DR = (Dmax – Dmin) | Amended as proposed |
| Germany | 5 | 3.5.5 | Please insert a new chapter 3.5.X, as follows:  3.5.X Maximum measuring range (ER)  Range between maximum capacity Emax and minimum dead load Emin  ER = (Emax – Emin) | New paragraph (3.5.7) added as proposed |
| Germany | 5 | 3.5.9 | Dmax instead of Emax | Amended as proposed |
| Germany | 6 | 3.5.13 | Ratio of the load cell measuring range DR ~~maximum capacity, E~~~~max~~, to two times the minimum dead load output return, DR. This ratio is used to describe multi-interval instruments. | Amended as proposed |
| Germany | 6 | 3.5.14 | Ratio of the load cell ~~maximum~~ measuring range DR capacity to the minimum load cell verification interval, vmin. This ratio describes the resolution of the load cell independent from the load cell capacity. | Amended as proposed |
| Germany | 7 | 3.7.2 | pLC instead of PLC  The abbreviation for the apportionment factor should be a small “p” because this would be in line with R76, R51, R106 and R107. The capital “P” is used for the error prior to rounding (see R76-1, T.9) | Amended |
| Germany | 8 | 3.7.6 | This definition can hardly be applied to a load cell, because the majority supply an electrical output signal while the load is given in units of mass or force. Re-install former definition from OIML R60 (2000), 2.4.7, because this seems to be more adapt to load cells, especially analogue load cells. | "Per comment from NL  Removed definition. Inserted definition for ""measurement error"" in Annex E  As suggested, note added (6.2)" |
| Germany | 9 | 3.8.1 | generally the indication, in case there is one at all, should be considered a measurement result. If not, what could it be then? We propose “Quantity that is not the subject of the measurement but which influences the values of the measurand or the indication of the instrument.” From R76/2006, T.6.1 | Old definition removed. New definition from R76 as proposed added to Annex E, E.5.2 |
| Germany | 11 | 4 | Please modify first sentence as follows: “A load cell, as sensor of a weighing instrument, provides an output proportionately related to an applied force or load | Language modified as per comments from NL, Australia, and UK |
| Germany | 11 | 6.1 | Please add the following sentence at the end of that paragraph: “All items / data under 6.1.1 to 6.1.7 shall be specified by the manufacturer.” | Amended as proposed |
| Germany | 12 | 6.1.3 | Please modify as follows: “The minimum load cell verification interval, vmin, shall be defined by the manufacturer as per T.3.5.10 in combination with T.3.5.14.” | Amended as proposed |
| Germany | 13 | 6.1.5 | Please modify item “a)” as follows: “a) … (see 6.1.1 and 7.2.4.1); | Amended |
| Germany | 13 | 6.1.5 | Please modify item “b)” as follows: “b) … (see 6.1.2 and 7.2.4.2); | Amended |
| Germany | 13 | 6.1.5 | Please modify item “c)” as follows: “c) … (see 6.1.4 and 7.2.4.3); | Amended |
| Germany | 13 | 6.1.5 | Please modify item “d)” as follows: “d) … (see 7.2.4.4); | Amended |
| Germany | 13 | 6.1.5 | Please modify item “e)” as follows: “e) humidity symbol, if applicable necessary (see 7.2.4.5); and” | Amended |
| Germany | 15 | 6.2.1.1  and other | Please reword title as follows: “*MPE on type evaluation”, and consequently replace “pattern” by “type” in the whole para.* | Amended |
| Germany | 15 | 6.4.1 | Please modify paragraph as follows:  The difference between the reading taken upon the application of a maximum load (Dmax) and the reading observed within and after 30 minutes of exposure of 90% to 100% of ~~D~~~~max~~ Emax shall not exceed 0.7 times the value of MPE for the applied load. The difference in readings taken after 20 minutes of exposure to 90% to 100% of ~~D~~~~max~~ Emax and at 30 minutes of exposure to 90% to 100% of Emax ~~D~~~~max~~shall not exceed 0.15 times the absolute value of MPE. | Amended as proposed |
| Germany | 16 | 6.4.2 | The difference between the initial reading of the minimum load output (Dmin) and the reading of Dmin after being exposed to a ~~maximum~~ load of 90% to 100% of Emax ~~(D~~~~max~~~~)~~ for 30 minutes shall not exceed half the value of the load cell verification interval (0.5 v). | Paragraph amended. Further amendments per France, Japan's comments |
| Germany | 16 | 6.5 | Only a remark to the last sentence:  This should perhaps be mentioned in the “scope” of this new version of R60 as well. | Covered under 2.3 |
| Germany | 16 | 6.5 | 6.8.1 – 6.8.3 do not exist | Amended |
| Germany | 16 | 6.5 | Discussion:  Should a test as per A.6 Endurance test (3.9.4.3) of R76 be introduced?  R76, 3.9.4.3:  The durability error due to wear and tear shall not be greater than the absolute value of the maximum permissible error. Adherence to this requirement is assumed if the instrument has passed the endurance test specified in A.6, which shall be performed only for instruments with Max ≤ 100 kg. | It was a conclusion from the September 2011 meeting of TC9 that durability is a characteristic that is best equated with a complete weighing instrument. Another conclusion of that meeting was that durability is addressed sufficiently in existing requirement (6.7.1.3) |
| Germany | 16 | 6.5.1.1 | Please modify note as follows:  *Note*: National legislation may prescribe alternate temperature limits with a range of 50 °C or more as appropriate for local climatic conditions and the environmental conditions that can be anticipated.  [Reason: For some outdoor installations in several European states a temperature range of more than 50 K is required] | Amended |
| Germany | 16 | 6.5.1.2 | 6.2.2 do not exist | Standard class was added in error - see response to France's comment |
| Germany | 17 | 6.5.3 | With respect to humidity conditions, there are ~~4~~3 humidity classes: ~~Standard,~~ CH as Standard, NH, and SH. In case of class ~~CH,~~ NH and~~, or~~ SH, the class designation shall be marked on the load cell. | Standard class was added in error - see response to France's comment |
| Germany | 17 | 6.5.3.1 | Please modify the part as follows:  The difference between the average of the readings of the minimum load output and of the maximum output attributed to cyclic changes in humidity as determined using test procedures in 9.10.5 shall not exceed the limits specified in 9.10.5.15  Remark:  The error limits should be given here because the requirements should normally be separate from the test procedures. | Language amended.  Paragraph relocated to Part 2 as a test procedure. |
| Germany | 17 | 6.5.3.2 | Remark:  The error limits should be given here because the requirements should normally be separate from the test procedures. | Relocated. See response to comment regarding 6.5.3.1 |
| Germany | 18 | 6.6.1 | Please change that paragraph as follows:  In addition to the other requirements of this Recommendation, a load cell equipped with electronics (including load cells using strain gauge technology) shall comply with the following requirements. For the following requirements / tests The the MPE shall be determined using an apportionment factor, p~~P~~LC, equal to 1.0 (p~~P~~LC = 1.0) substituted for the apportionment factor, p~~P~~LC, that is declared by the manufacturer and applied to the other requirements. | Language amended as per CECIP and NL comments |
| Germany | 18 | 6.6.1 | Remark: Re-instate former table 7 (R60/2000) because requirements shall be listed here, not under tests. | Table relocated to Part 1 |
| Germany | 18 | 6.6.1.1 | Please modify the note as follows:  *Note:* A fault equal to or smaller than the load cell verification interval, v, is allowed irrespective of the value of the error in output.  Remark: As well as in R76 the significant fault should never be smaller than 1 v. See also Annex C, table 12 of R76.] | Amended as proposed |
| Germany | 19 | 6.6.2.1 | Please replace “v” with “vmin”  Remark: Corresponds to the minimum input voltage per verification scale interval as defined in R76) | Amended as proposed |
| Germany | 19 | 6.6.2.2 | Please change paragraph as follows:  A load cell equipped with electronics (including load cells using strain gauge technology) shall be subjected to the span stability test specified in 6.9.2.1 and 9.11.7.8. The aim of this test is not to measure the influence on the metrological perform­ances of mounting or dismounting the load cell on or from the force-generating system, so the installation of the load cell in the force-generating system shall be carried out with particular care.  Supplementary remark: If possible the load cell should never be dismounted from the force-generating system during the whole period of the test (≤ 28 days). | Language stricken. Additional language relocated to Part 2 as test procedures.  Supplementary remark added as note under 9.7.4.14 |
| Germany | 19 | 6.6.2.2 | Remark: Error limits / requirements shall be listed here and removed from 6.9.2.1 and 9.11.7.8. | Reference numbers corrected. Requirements relocated as proposed |
| Germany | 19 | 6.6.2.4 | There’s reference to 6.11.1.1. This number could not be found within the document. | Reference corrected |
| Germany |  |  | General remark on disturbance tests: If battery power supply test is deleted then load cells may not be used in instruments powered by batteries. Moreover, they may not be used within vehicle on-board weighing systems if the tests corresponding to B.3.7 of R76 have not been performed. Should be clarified within the scope of R60. | The deletion of 6.11.3.4 Battery power supply (DC) was a decision of 9/2011 TC9 meeting. TC9 p1 is asked to consider these points raised and determine if scope of R60 will not consider battery power supplies or if this clause is to be reinstated. |
| Germany | 20 | 7.1 | Please modify last sentence of 2nd paragraph as follows:  Any weighing instrument function of the software that results in an indication of mass shall be evaluated under other appropriate Recommendations for weighing instruments. | Language amended as proposed |
| Germany | 21 | 7.2.2 | The following minimum mandatory markings ~~minimum amount of information~~ shall be clearly and indelibly marked on the load cell: ~~, required in 6.7, shall be marked on each load cell:~~   1. a) name or trademark of manufacturer; 2. b) manufacturer’s designation or load cell model; 3. c) serial number 4. d) year of manufacturer 5. e) maximum capacity, Emax = … (1) 6. f) Specific Markings including the humidity class (see 7.2.4 and 6.5.3) 7. g) OIML certificate number   Note:  (1) in ISO mass units g, kg, t | Section reformatted according to NL and CECIP comments |
| Germany | 21 | 7.2.3 | Please change title as follows:  7.2.3 Mandatory accompanying additional information  Reason: Following the paragraph 7.2.2 “Minimum load cell markings” this title makes clearer that this information need not be placed on the load cell. | Amended as proposed |
| Germany | 21 | 7.2.3 | Please modify paragraph:  The following mandatory information shall be provided in a document accompanying the load cell (or, if space permits, they may be marked on the load cell):   1. a) name or trademark of manufacturer; 2. b) manufacturer’s designation or load cell model; 3. c) OIML certificate number 4. d) serial number (1) 5. e) Specific Markings (see 7.2.4)   f) Working temperature  g) Humidity symbol (if applicable, see 6.5.3)   1. h) maximum capacity, Emax = … (2) 2. i) minimum dead load, Emin = … (2) 3. j) Safe load limit, Elim = … (2) 4. k) Minimum load cell verification interval as vmin = … (2) 5. or relative vmin = … or Y = … 6. l) Relative DR or Z 7. m) Value of the apportionment factor, pLC, if not equal to 0.7 8. n) Mounting torque 9. o) Specifications of the load transmission / introduction 10. p) cable length (if applicable)   q) Other pertinent conditions that must be observed to obtain the specified performance (for example electrical characteristics of the load cell such as output rating, input impedance, supply voltage, cable details, ect.)  Note:  (2) in ISO mass units g, kg, t | Section modified according to NL and CECIP comments |
| Germany | 21 | 7.2.4.5 | Delete “submitted for evaluation” | Amended as proposed |
| Germany | 21 | 7.2.4.6 | With the changes in 7.2.2 and 7.2.3 this paragraph could be deleted | Deleted as proposed |
| Germany | 35 | 8.2.1 | Please delete “uncertainty of test results” in the title because this paragraph covers the measuring means, not the test results as such. | Amended as proposed |
| Germany | 36 | 9.3 | Change title: Selection of specimens for evaluation | Amended as proposed |
| Germany | 36 | 9.3 | Add the following sentence to paragraph 2: “The test laboratory decides what kind of load transmission is to be used if the manufacturer does not prescribe a specific load transmission. (see also Annex B)” | Similar statement added to 9.5 Documentation |
| Germany | 36 | 9.3 | Modify 3rd para as follows:  If a specimen does not pass a specific test as a result of the design of the type and therefore has to be modified, the applicant shall carry out this modification to all the specimens supplied for test. After this modification, the at least 2 different specimens specimen shall be subjected not only to this particular test but shall be subjected to all tests. If the modification has been applied to all sub-types of the family which have had the design shortcomings, then also the other specimens that have been submitted shall be completely tested.  Remark: It seems unclear why two specimen have to undergo the tests and why they don’t have to undergo all the tests. | Paragraph modified |
| Germany | 36 | 9.3 | Please reword last para as follows:  If the issuing authority has reason to assume suspect that the modification or repair may does not have a negative influence on tests that have already had a positive result, these tests need not shall be repeated. The reason shall be given within the scope of the test report. | Paragraph modified |
| Germany | 37 | 9.4 | Proposed new wording:  All accuracy and influence tests, including span test for digital load cells, shall be performed on the same unit. Disturbance tests on digital load cells may be (simultaneously) carried out on not more than 2 an additional load cell instruments. (See Table 6)  REMARK: With this wording table 6 could be deleted.  Where a family composed of one or more groups of load cells of various capacities and characteristics is presented for type evaluation, the following provisions shall apply. | amended as proposed |
| Germany | 37 | 9.4.2 | Please add the following partial sentence: “…provided that with the change of capacity there is no change of measurement principle or material (from bending beam to shear beam; stainless steel replaces aluminium). | Paragraph modified. See also comments from CECIP and NL |
| Germany | 38 | 9.4.4 | There is no reason to ***forbid*** a ratio smaller than five. So, re-instate the old wording. | Wording was modified base on NL comment from WD. This language has been replaced by new language. TC9 p1 to determine at a future meeting preference between modified language and 2000 edition language. |
| Germany | 38 | 9.4.6 | Should have a new title  “Selection of load cells equipped with electronics” because it deals not only with selection for humidity test. | Paragraph title changed as proposed |
| Germany | 38 | 9.4.6 | We propose a new wording:  For load cells / load cell families equipped with electronics all applicable tests Only one cell shall be subjected to the additional tests when applicable, that being the load cell selected for shall be performed on the load cell with the minimum µV/vmin as input of the analogue digital converter or that with the most severe characteristics (e.g., the greatest value of nmax or the lowest value of vmin).  [REMARK: Following the same principle as in R76, Annex C, table 12]  Notwithstanding the requirement above the criteria for assignment of a load cell to a family and selection of test specimens shall be observed (9.4.1 to 9.4.5). | Paragraph modified as proposed, see also comments from CECIP and Australia |
| Germany | 38 | 9.5 | Please add an item on the load transmission:  b) mechanical drawings; including documents on the load transmission(s) as per Annex B | Amended as proposed |
| Germany | 38 | 9.5 | Suggested new wording:  d) Specify installation requirements: physical and electrical  e) The *“user*” is the manufacturer of the complete weighing instrument (not the end-user of the weighing instrument). May be clearer to use the word *“installer”* ? | d) amended e) existing language retained. "User" may indicate the manufacturer of a complete weighing instrument or the operator of that instrument. It may also indicate the official performing the type evaluation. |
| Germany | 39 | 9.7.3.1 | Table 7, b) “Humidity”: This (65% RH) a comparably high value, especially when performing temperature tests at the specified high temperature (e.g. 40 °C) and will in some cases exceed the 20 g water per cubic meter air as recommended by R76 / IEC.]  Replace with; “For performance ~~weighing~~ tests at the specified high temperature the relative humidity shall not exceed 20 g/m3”. [From R76, A.5.3.1] | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. |
| Germany | 39 | 9.7.3.1 | Table 7, c) Atmospheric pressure: Please add the following text in brackets “(If the load cell is sensitive to pressure variations and the pressure is varying by more than 10 hPa, then a correction shall be made.)” | The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| Germany | 39 | 9.7.3.1 | Table 7, f): DC voltage should also be considered because there are DC mains networks  GENERAL REMARK on 9.7.3.1: What about load cell excitation voltage? carrier frequency of AC, and so on? | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. |
| Germany | 39 | 9.7.3.1 | GENERAL REMARK:  What about load cell excitation voltage? carrier frequency of AC, and so on? Point of discussion | The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| Germany | 41 | 9.7.4.3 | Please change title as follows: *Load cell measuring range limits* | Amended as proposed |
| Germany | 44 | 9.8.3 | A REMARK to table 8:  Are absolute time figures necessary? Difficult especially with high loads with the loading time! Re-instate wording of OIML R60 (2000) | Changes proposed by NL and implemented in the 1CD.  Table 8 (Table 9 in 2CD) reformatted per Japan's comments. Changes need to be considered by TC9 p1 at future meeting. |
| Germany |  | 9.8.3.2 | Creep has an exponential time dependency. Is it acceptable to assume a linear time dependency of the output? | To be considered by TC9 p1 at future meeting |
| Germany | 44 | 9.9.2 | REMARK / proposal:  We’d recommend to define period of time (recommendation: 30 Minutes) within which the reading is being recorded in order to detect transient disturbances. The difference in these readings shall comply with the limits specified in 6.4.1, 6.4.1.1 and 6.4.2. | Paragraph amended |
| Germany | 46 | 9.10.1.5 | REMARK: There is no stability criterion. | To be considered by TC9 p1 at future meeting |
| Germany | 46 | 9.10.1.8 | This wording is confusing and should be replaced with the corresponding wording of R76-1 saying: “values at or near those at which the maximum permissible error changes”. This includes that at these values the smaller error limit applies. | language amended to harmonize with R76. |
| Germany | 47 | 9.10.1.13 | Remark: Meaning of “approximate”? | To be considered by TC9 p1 at future meeting |
| Germany | 47 | 9.10.1.13 | Recommendation:  For load cells with extended temperature ranges, the accuracy and creep tests should be conducted at the "standard" temperatures -10°C, +20°C and +40°C. In addition (NOT instead), the accuracy and creep tests should be conducted at the extended lower and higher temperature limits, e.g. at -40°C and +70°C. There should not be a difference of more than 30 Kelvin between any two temperatures tested. It will be necessary to define the sequence of these temperatures during the tests e.g. +20 +40 +70 -10 -40. | To be considered by TC9 p1 at future meeting |
| Germany | 47 | 9.10.1.13 | Recommendation:  It should be also possible to measure at lower temperature first and then at higher temperature. But the first and last measurements should be carried out with 20°C. | To be considered by TC9 p1 at future meeting |
| Germany | 51 | 9.10.4.6 | REMARK: There is a kind of contradiction to 6.5.2 because there absolute values are listed.  Change text:  Change the barometric pressure in increments of 1 kPa within a range of 105 kPa (5 kPa greater than atmospheric pressure) to 95 kPa (5 kPa less than atmospheric pressure) and … | To be considered by TC9 p1 at future meeting |
| Germany | 57 | 9.10.7.1 | Table 9: Surge test is missing in the table. | Surge test added to Table |
| Germany | 58 | 9.10.7.2 | REMARK on “E”: There should be a differentiation between “E” as measuring range and “E” as the symbol for error. For example an additional index “rr” could be introduced | E as a symbol for error is only found in this particular clause. This does not seem to warrant an additional index to identify it as such. Particularly when it is expressly identified as such within the clause. |
| Germany | 61 | 9.10.7.5 | These specifications of test severity differ from those of R76 and other recently revised recommendations on weighing instruments, such R50, R51, R106 and R107. It is advisable to adopt the procedure and test levels from R76/2006, B.3.1. | This suggestion should also be a part of the larger TC9 p1 discussion regarding issues of power supply |
| Germany | 64 | 9.10.7.8 | The frequency range should be adapted to the state of the art of e.g. R76/2006 that is to 80 MHz to 2000 MHz at least.  The “conducted immunity test” should be adopted from R76/2006, B.3.6, using the same wording but “v” instead of “e”. | Frequency range amended.  Requirement added as proposed. |
| Germany | 66 | 9.10.7.9 | Delete the sentence “Allow at least 3 hours….”  This is not in correspondence with OIML R76 and thus can be deleted. | Amended as proposed |
| Germany | 67 | 9.10.7.10 | Please supplement the sixth paragraph as follows: “The test shall be applied to power supply lines, communication lines (internet, dial up modem, etc.), and other lines for control, data or signal mentioned above (lines to temperature sensors, gas or liquid flow sensors, etc.).”  (see corresponding paragraphs in OIML R76) | Amended as proposed |
| Japan |  | General | We request that the technical requirements in R 60, in particular those for EMC (electromagnetic susceptibility) tests, shall be in conformity with the requirements in R 76. This conformity shall be kept also in the future revisions of these two recommendations. Please also refer our comments to 9.10.7.8. | Amended |
| Japan |  | General | Please inform us the draft schedule for publishing Part 3: Test Report Format of R60. | Part 3 is expected to be circulated summer of 2013 |
| Japan | 3 | 3.1.2 Load cell equipped with electronics | We recommend reviewing the present categorization of load cells with a new criterion for example, whether the load cell employs a digital processing. At present, it is classified whether they have an ‘active’ electric component with a recognizable function regardless a use of the digital processing. | To be considered by TC9 p1 at future meeting |
| Japan | 3 | 3.3. Construction of load cells | We request adding a newly developed method “*Vibration of tuning fork*” to *“3.3 Construction of load cells”*. We believe that any kinds of new measurement method which may be employed in the future should be included in the scope of R 60. Therefore, the following sentences should be added after the clause 3.3.1.  *“3.3.2 Vibration of tuning fork*  *Device to detect a change of resonance frequency of a tuning fork caused by an external load.*  *Note: New measurement methods of load may be employed in the future.”* | Term and definition as proposed added. Additional terms may also be added if deemed necessary by TC9 p1 to be discussed at future meeting |
| Japan | 13 | Table 2 | The symbol “” is missing although it is indicated as “*compression*” in the description.  Therefore, add a symbol of compression to the classification symbol as “**C3 5/35**“. | Amended |
| Japan | 15 | Table 4 | Correct a misprint in “20 000 v < m ≤ 100 00 v” as “20 000 v < m ≤ 100 00**0** v". | Amended |
| Japan | 15 | 6.4.1. Creep  6.4.2. Minimum dead load output return | The descriptions in these clauses seem neither consistent nor clear. Although the MPEs in Table 4 are already multiplied with PLC (equivalent normally to 0.7), clause 6.4.1 specifies that the difference shall not exceed “0.7 times of the value of MPE”. Shall the number (0.7) be multiplied twice? In addition, 6.4.2 specifies that the minimum dead load output return shall not exceed 0.5 v. However there is no requirement for multiplying PLC to 0.5 v. Please clarify. | Clause amended per France's comment.  The variation of load cell output between these two readings must not exceed 0.5v. There is no apportionment factor applied to this limit for the variation. |
| Japan | 17 | 6.5.3. Humidity | In the 1CD, a new “standard class” of humidity has been added to the three classes in existence; CH, NH and SH. What is the difference between the new “standard class” and CH class which was considered as a standard before? Please explain or define the new standard class in the main text. | Standard class was added in error - see response to France's comment |
| Japan | 18 | 6.6.1. General requirements | We consider the words in a parenthesis in the first paragraph ***“(including load cells using strain gauge technology)”*** are not necessary. | Language deleted |
| Japan | 20 | 7.1. Software | Regarding the sentence *“The requirements given in OIML D 31 Edition 2008 (E) [8] have to be fulfilled for the load cell by taking into account the following aspects”*, we believe that D 31 is a reference document contains all the requirements applicable to all OIML recommendations. Therefore, it is not required (or not possible) to fulfil the whole content of D 31. Only necessary requirements in D 31 shall be selected and described explicitly in R 60 as it is seen in other OIML recommendations. | Language amended to clarify that not all requirements in OIML D31 will apply |
| Japan | 21 | 7.2.2. Minimum load cell markings  7.2.3. Mandatory additional information | The difference between 7.2.2 and 7.2.3 is not clear. We understand that 7.2.2 means a marking on the surface of load cell and 7.2.3 means additional documents accompanied with the load cell. Is it correct? In addition, what “7.3.4” in the clause 7.2.3 indicates? | Section reformatted according to NL and CECIP comments  7.2.2 (now 7.2.1) designates mandatory markings that are to be inscribed on the load cell unless the size of the cell does not allow.  7.2.3 (now 7.2.2) designates mandatory markings to be included on documents provided by the manufacturer. If the size of the load cell permits these may also be inscribed on the load cell.  Reference numbers corrected. |
| Japan | 44 | 9.8.3 Initial readings  Table 8 | It is not realistic to apply a constant value for loading and stabilization time for all kinds of load cell because a longer waiting time is generally required for a load cell with high resolution (i.e. classes A and B). We propose assigning different values of waiting time for different classes as given by the revised table 8 shown below.  **Table 8 Combined Loading and Stabilization Times to be Achieved Prior to Reading (revised)**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Change in load** | | **Time allowed for:** | | | | | | | **Classes C&D** | | **Class B** | | **Class A** | | | **Greater than** | **Up to and including** | **Loading** | **Stabilization** | **Loading** | **Stabilization** | **Loading** | **Stabilization** | | 0 g | 10 kg | 5 sec | 5 sec | 8 sec | 8 sec | 10 sec | 10 sec | | 10 kg | 100 kg | 10 sec | 10 sec | 15 sec | 15 sec | 20 sec | 20 sec | | 100 kg | 1 000 kg | 15 sec | 15 sec | 23 sec | 23 sec | 30 sec | 30 sec | | 1 000 kg | 10 000 kg | 20 sec | 20 sec | 30 sec | 30 sec | 40 sec | 40 sec | | 10 000 kg | 100 000 kg | 25 sec | 25 sec | 38 sec | 38 sec | 50 sec | 50 sec | | 100 000 kg |  | 30 sec | 30 sec | 45 sec | 45 sec | 60 sec | 60 sec | | Table 8 reformatted as proposed. Change will need to be considered by TC9 p1 at future meeting. |
| Japan | 64 | 9.10.7.8 | The requirements for electromagnetic susceptibility shall be revised in conformity with those in R76. Therefore, we propose the following changes (additions are shown with underlines).  *9.10.7.8 Electromagnetic susceptibility (see 6.6.2.1)*  ***Radiated immunity test***  *Test procedure in brief:*  *.......................................*  *Test severity:*  *Level 2 (in accordance with IEC 61000-4-3 (2006-02) Ed 3.0 Consolidated edition, No. 6)*  *Frequency range: ~~26~~* ***80*** *MHz to ~~1 000~~* ***2 000*** *MHz;* | Amended as proposed |
| Japan | D-3 | Annex D  5. Further information | Regarding the first sentence, “*The manufacturing process ...... essential changes are only allowed with the permission of the notified body*”, what is the practical criterion for “***essential changes***”? In addition, we consider that “***notified body***” is a term used only in EU. | Term "essential changes" to be defined by TC9 p1 at future meeting.  "notified body" changed to "issuing authority" |
| METAS | 48 | 5.3.1 | The formulation of the creep test is so strict that most of load cells used for dynamic weighing will fail the test and this test is not relevant for load cells used only dynamic weighing.. This difficulty was discussed at the meeting in September 2011 at the PTB. Would it be possible, for example, to provide a possibility of not performing the creep test and not providing creep test results with a justification of doing so, like it is mentioned for the atmospheric pressure test (A4.4). | This proposal to discussed by TC9 p1 at future meeting |
| Netherlands |  | General | Significant improvements have been made compared to the 1 WD.  From the grammatical point of view the draft may quite improve by rephrase some clauses formulated in or containing some foreign phrasing style and therefore could easily be misinterpreted. | Rephrasing of specific language will be done as needed |
| Netherlands |  | General  (Application and reference to templates) | Present version of templates for OIML Recommendations concerns informal **draft**. Suggest removing all references to these templates from the (draft) R 60. | References removed as proposed |
| Netherlands |  | General | In the draft the terms “load” , “force” and “mass” are applied where referring to loading the load cell.  Please review the draft on the correctness of applying these terms in the several statements. Force and mass should be applied where quantitative statements are concerned and “load” only in case of a qualitative statement.  For example in 2.2 “...*as a function of the applied load (mass*)...” should be amended and could for example be changed to:  *“….as a function of the force introduced by the applied load (converted into mass units) ….”* Similar 3.5.6 could better read: *“ Largest value of force introduced to a load cell during test or use (converted into mass units)”*. Also accounts for 3.5.8, 3.5.9, 3.5.15 | Amendments made according to comments from NL and UK |
| Netherlands | 1 | 1 | Suggest removing the 3rd bullet and the sentences *“Thus a number of requirements …in the template … evaluation of load cells. In addition … within the template … testing procedures.”* as well as the next paragraph: *“Rather than … existing context.*  Suggest removing the end of the last sentence *“and will be presented in a future draft.”*  Suggest replacing *“… apply to* ***complex*** *instruments …”* by *“… apply to* ***complete measuring*** *instruments …”* | Amended as proposed |
| Netherlands | 2 | 2.1 | 1st line: suggest “*characteristics*” by “*requirements*”. | Paragraph amended, see also Australia and U.S. comments |
| Netherlands | 2 | 3  general | Terminology should only contain the term and the explanation of the term in such format that this explanation (definition) can be inserted instead of the term. This also implies that a definition cannot contain 2 or more sentences. It however may contain an informative note.  Several of the definitions in this chapter however contain the value or requirement applicable to the term in the scope of this Recommendation. This applies for the terms 3.5.11, 3.5.13, 3.5.14, 3.5.15, 3.7.2, 3.7.5, 3.7.13, 3.8.1.  It is suggested to split up terminology and specific requirements and also to shift some text to a note to the definition | Amended as proposed  Metrological requirements added as needed |
| Netherlands | 2 | 3 | Referring to 2 different versions of the “VIM” ([1] and [2]) should not be applied.  Please also take into account the 24th resolution of CIML 2011 (Prague) and if not strictly necessary do not deviate from the vocabularies. Where deviations are needed no reference to the vocabularies should be made.  Furthermore: Be aware that it is highly probable that a new VIML will be published before the publication of a new R 60 | Amended as proposed |
| Netherlands | 3 | 3.1.1 | \* “Force transducer” not defined;  Suggest to add  3.x.x  **measuring transducer VIM 3.7 (4.3)**  *device, used in measurement, that provides an output quantity having a specified relation to the input quantity.*  and to amend the definition accordingly to:  3.1.1. Load cell  *measuring transducer that, in response to an applied load, will provide an ~~measurable~~ output quantity proportional to the force introduced by the load. This output may be converted into measurement units such as mass.*  *(rationale: suggest to delete “measurable” to allow for digital output which would not be measurable)* | Amended as proposed |
| Netherlands | 3 | 3.1.2 | 1st note: “*stain gauge bridge circuits*” simplify to: “*strain gauges”*  Suggest to amend to:  *“Note:* passive elements like strain gauges are not considered electronic components for the purpose of this recommendation” | Amended as proposed |
| Netherlands | 4 | 3.5.3 | Amend to:  Measurable quantity into which a load cell converts the measured input quantity ~~(mass)~~  *(rationale: Suggest to delete mass, while it is not clear if this refers to the input or the output quantity. Furthermore the input quantity will be force and the output quantity in many cases is a voltage, furthermore one should be able to replace a term by its definition. The definition should therefore not include any explanation. For explanation a note could be used. This is also the reason why for terminology there is the convention not to use capitals. So not for the term and not at the start of the definition itself*) | Amended as proposed |
| Netherlands |  | 3.5.6 | See general remark concerning use of terms | Amended per comments from NL and UK |
| Netherlands |  | 3.5.8 | Smallest load ~~that~~ which may be applied to a…  *“Smallest value of force introduced by a load (converted into mass units), which may be applied to a*..” | Amended per comments from NL and UK |
| Netherlands | 5 | 3.5.11 | In the way in which the definition is formulated it contains a requirement. Suggest to reedit in the following way  Smallest value of a quantity (mass) within the maximum load cell measuring range which is applied to a load cell during test or use. ~~This value shall not be less than Emin (see 3.5.8).~~  Note: For the limits on Dmin during testing, see 9.7.4.3. | Amended as proposed |
| Netherlands | 7 | 3.7.5. | Suggest to rephrase:  Difference ~~between~~ in load cell output readings for the same applied ~~load~~ force between the one obtained by increasing the load from minimum load (Dmin), and the one obtained by decreasing the load from maximum load (Dmax). | Amended as proposed |
| Netherlands | 8 | 3.7.6. | See NL comment on 3. Definition is not to be amended/ adapted. Suggest the following approach:  define  **measurement error**  **error**  VIM 2.16  measured quantity value minus a reference quantity value  and further on all occasions applied replace “load cell error” by “measurement error”  Introduce a note indicating that where “measurement error” is applied for this Recommendation it concerns the load cell measurement error. | Removed definition. Inserted definition for "measurement error" in Annex E  As suggested, note added (6.2) |
| Netherlands | 8 | 3.7.7 | See NL comment on 3. Definition is not to be amended/ adapted. (No need to do so) | Removed definition. "Maximum permissible measurement error" definition located in Annex E (E.1.7.) |
| Netherlands | 11 | 4 | Suggestions for minor editorial changes of the text:  \* Delete the last 2 words “*or load*” at the end of the 1st sentence. Reason: the load causes a force. Alternatively one could say:  *“... related to a force caused by applying a load”* or *“... related to a force caused by loading of the cell”*  Suggest to change the next line “*Designs of load cells include those intended for use in a system with other load cells and those used as a single transducer within a weighing instrument/system*.” to :*“Load cells may be used as a single transducer within a weighing instrument/system or applied together with other load cells in one weighing system where the design allows such application.”* | Paragraph amended |
| Netherlands | 12 | 6.1.3 | Replace vmin by vmin | Amended |
| Netherlands | 14 | 6.2 | There is no 6.2.2 | Amended |
| Netherlands | 14 | 6.2.1 | The phrase is a bit complex formulated. This could introduce problems when translated. Often splitting up can prevent misinterpretations. But in this clause there is no use for including the part between brackets. This while ...is related to.. cannot be transformed in an exact formula. Suggest to move the part between brackets to part 2 | Amended as proposed |
| Netherlands | 15 | 6.2.1.1  and others | In spite of secretary stating “References to “ pattern” changed to type”, still mixed use of the expressions type and pattern  In clauses 6.2.1.1, Table 4, 9.7.2, Annex C (4x), Annex D.5 (2x), Annex E.2.3 (2x) | Amended |
| Netherlands | 15 | 6.2.1.1  Table 4 | Load, .m  “m” is not defined and “Load” is not a quantitative term.  “m” could perhaps be defined as “mass value representing the load introduced force” | Amended |
| Netherlands | 16 | 6.5 | 6.8.1 – 6.8.3 do not exist; expect this should be 6.5.1 – 6.5.3 ? | Paragraph numbering amended |
| Netherlands | 11 | 6.5.1.2 | There is no 6.2.2 | Reference amended |
| Netherlands | 17 | 6.5.1.3 | 6.8.1.1 and 6.8.1.2 do not exist. Should be 6.5.1.1 and 6.5.1.2 ? | References amended |
| Netherlands | 17 | 6.5.3.1 | *“… shall not exceed the limits specified in 9.10,5.15”.*  It would be more consistent to describe this the other way around: by specifying these limits in 6.5.3.1 (requirements) and refer in the test to these requirements.  These requirements extracted from 9.10.5.15 suggested to move to part 1 concern:”   * The influence of exposure to 12 x 24-hours humidity cycles on the load cell output for minimum load shall not be greater than 4 % of the difference between the output on the maximum capacity, Emax, and that at the minimum dead load Emin. * The influence of exposure to 12 x 24-hours humidity cycles on the load cell output for the maximum load shall not be greater than the load cell verification interval v. “ | Requirements from 9.10.5.15 have been relocated to 6.5.3.1, and the limits specified in 6.5.3.1 have been relocated to 9.10.5.15 |
| Netherlands | 17 | 6.5.3.2 | Changes suggested similar to those for 6.5.3.1 | Amended as proposed |
| Netherlands | 18 | 6.6.1 | Delete (including load cells using strain gauge technology) which introduces confusion  Further if PLC is 1.0 the cell is outside the scope and should be tested against other recommendations (for example R76) The second sentence of this paragraph further is unclear.  6.6.1, 2nd paragraph and 6.6.1.2: Considering that this is a Recommendation for legislation, the expression *“.. with substantial electronic functions ..*” is too vague and would introduce a risk on different interpretations within the OIML Certificate System.  Suggest to change last paragraph to:  “*If a load cell is configured with substantial additional electronic functions of an electronic weighing instrument then it may be considered outside the scope of this Recommendation and need to undergo additional evaluation against other requirements contained in the OIML Recommendation for a complete weighing instrument. This is applicable where the adjustment measures can be made between the load cell obtained load proportional signal and the output in order to provide information representing the actual load on the load cell.”* | "including load cells using strain gauge technology" deleted.  Language amended |
| Netherlands | 18  19 | 6.6.1.1, b)  6.6.1.2  6.6.1.5 | Electronics of load cells may not be sufficient intelligent to detect and act upon a significant fault. In such a case the electronics/software of the indicator shall have provisions for such functionality. This may also concern 6.6.2.1. Suggest to add some wording. | This proposal will need to be considered by TC9 p1 at future meeting. Any note added to indicate that the LC may not be capable of detecting and acting upon a significant fault and placing that responsibility on the weighing instrument would seem to be beyond the desired scope of this Recommendation. |
| Netherlands | 19 | 6.6.2.1 | Reference is made to test specifications (9.10.7.1) as being a requirement. A test is to be applied to verify the compliancy to the requirement. Therefore insert the summarized criteria in a table in part 1. | Table relocated to Part 1 |
| Netherlands | 19 | 6.6.2.2 | The referred clause numbers are to be corrected. 9.7.4.14 covers the second sentence. The formulation in both clauses may be misinterpreted. Suggest to delete in 6.6.2.2 and to amend to 9.7.4.14 to something like: “*The installation of the load cell in the force-generating system shall be done with particular care, since the effect on the metrological performance caused by mounting/dismounting the load cell on/from the force-generating system should be negligible in order to establish the magnitude of the test parameter”.* Also note comment on 9.7.4.14 where it is requested to move and insert this clause in 9.7.4.2 | References corrected.  6.6.2.2 and 9.7.4.14 amended as proposed.  See also comment from CECIP. |
| Netherlands | 19 | 6.6.2.3 | 6.11.1.1, 6.11 1.2 , 6.11.3 , and 6.9.2 do not exist. | References corrected |
| Netherlands | 20 | 7.1 | In the case that software may be modified in our opinion the instrument is outside the scope of this Recommendation. Other Recommendations (like R 76) would be applicable. Where it concerns non exchangeable firmware, no tests on the software need to be performed. See conclusions R 60 meeting first bullet page 4 (19-09-2011) . This firmware is to be considered an intrinsic part of the loadcell and will therefore be taken into account during the performance tests. No additional software tests therefore are required.  \* 2nd paragraph *“Any embedded …. weighing instruments”* and 3rd paragraph *“Functionality …. weighing instruments”* contain performance criteria as well as instructions concerning the execution of the evaluation and tests. The latter should to be moved to clause 9 in Part 2  \* 7th paragraph: “… the following definitions …”: there are no definitions in the text. Suggest to change to “the following statements apply:  The exception in D31, 5.1.1 is not allowed because there is no guarantee for conformity of the software anymore. This would lead to big problems in the EU region. Also in R76 which can be considered the typical “habitat” of a load cell such an exception is not allowed. Furthermore many counties do not allow updating (part of) an instrument in the field (so in use). For a load cell this seems very inappropriate. | Third paragraph under 7.1 states that software function of the instrument will be evaluated under other Recommendations.  The potential for load cells to incorporate functioning software internally is purposely not excluded. Additional software testing is included therefore.  Language in paragraph 7 amended as proposed. |
| Netherlands | 21 | 7.2 | Information to be submitted for type evaluation belongs in Part 2. Therefore delete *“under evaluation.”* | amended as proposed |
| Netherlands | 21  to  23 | 7.2.1  to  7.2.4.6 | Suggest for consistency reasons to restructure these sub-clauses:  *7.2 Inscriptions and presentation of other information*  *7.2.1 Mandatory markings on the load cell*  *The following mandatory markings shall be clearly and indelibly marked on the load cell:*  *a) Name or trade mark*  *b) Type designation*  *c) Serial number*  *d) Maximum capacity as: Emax = …. (1)*  *e) Year of production*  *If, due to small size of the load cell, it is impossible to apply all this information on the load cell, at least the type designation and the serial number shall be marked on the load cell itself, and the other prescribed information shall be given in the accompanying document mentioned in 7.2.2*  *7.2.2 Mandatory additional information*  *The following mandatory information shall be provided in a document accompanying the load cell and submitted to the user (or, if space permits, they may be marked on the load cell):*  *a) Name or trade mark*  *b) Type designation*  *c) Accuracy class(es); see 7.2.3.1*  *d) Type of load; see 7.2.3.2*  *e) Working temperature*  *.) Humidity symbol*  *f) Maximum capacity as: Emax = …. (1)*  *g) Minimum dead load as: Emin = … (1)*  *h) Safe load limit as: Elim = … (1)*  *i) Minimum load cell verification interval as vmin = … (1)*  *j) Value of the apportionment factor, PLC, if not equal to 0.7*  *k) Other pertinent conditions that must be observed to obtain the specified performance (for example, electrical characteristics of the load cell such as output rating, input impedance, supply voltage, cable details, etc.); and*  *l) OIML certificate number (if applicable)*  *7.2.3 Non-mandatory additional information*  *[Text of present 7.2.4.6]*  *But in my opinion, this is information about the weighing instrument that is not really relevant in R 60.*  *7.2.3 Information in code*  *7.2.3.1 Accuracy class designation*  *[Text of present 7.2.4.1]*  *7.2.3.2 Designation of the type of load applied to the load cell*  *[Text of present 7.2.4.3, incl. Table 5]Suggest to add in Table 5 after “Beam (shear or bending)”Near the point where the load will be applied.*  *7.2.3.3 Working temperature designation*  *[Text of present 7.2.4.4]*  *7.2.3.4 Humidity symbols*  *[Text of present 7.2.4.5]* *Notes* *(1) in units g, kg, t, N, kN, or MN , as applicable*  (Please note the added unit newton) | Section restructured and amended according to proposal  Note regarding the use of recognized units of measure added under 7.2.2 |
| Netherlands | 23 | 7.2.4.5 | Delete *“submitted for evaluation”*  referencing to the “*evaluation”* concerns the Part 2 | amended as proposed |
| Netherlands | 35 | 8.2.1 | There is a general trend to use 1/5 MPE | To be considered by TC9 p1 at future meeting |
| Netherlands | 36 | 9.3 | 4th (& 5th) paragraph: In our view, a repair (contrary to a modification) usually relates to one single unit. So in this case, repair of other specimens is not relevant.  I*f during the evaluation the specimen experiences malfunction or breakage that necessitates a repair in order to complete the test, the applicant shall verify whether this repair concerns an incident or whether a modification will need be made to the design. In the latter case the modification is to be applied to all specimens supplied for the test and the applicable documentation to be updated accordingly.* | Language modified as proposed |
| Netherlands | 37 | 9.4.1 | Although already stated in the last sentence of 9.4, it shall be absolutely clear that these load cells shall belong to the same family/group. Change to Where Load cells of the same family and the same capacity... | Clarification made. Paragraph modified with suggested changes per Australia's comments |
| Netherlands | 37 | 9.4.2 | Although already stated in the last sentence of 9.4, it shall be absolutely clear that these load cells shall belong to the same family/group. Load cells of the same family with a capacity... | Clarification made. Paragraph modified with suggested changes per Germany's comments |
| Netherlands | 38 | 9.4.6 | Suggest to delete “severe”. Since “critical” is applied the word “severe” is redundant | Paragraph modified. See also comments from CECIP, Australia, and Germany |
| Netherlands | 38 | 9.5  e) | Suppose that in e) the “user” is the manufacturer of the complete weighing instrument (not the end-user of the weighing instrument) May be to use the word “purchaser“, “installer”, “assembler” or ”manufacturer of the complete weighing instrument” | In this case, the "user" could be any of the examples provided. It may also identify the official performing the type evaluation.  "User" seems to aptly cover all of the above. |
| Netherlands | 39 | 9.6 | a) There is no 7.3.4.1  b) \* There is no 7.3.4.2  \* Why *“(maximum number of verification)”* in brackets? Remove brackets.  f) 7.1 instead of 7.2  g) There is no 7.3 | References corrected. Parenthesis removed |
| Netherlands | 39 | 9.7.2 | “*Suitable linear instrument”* applies typically to analogue (strain gauge) load cells. Digital load cells should also be taken into account. Therefore delete :*”linear”* | Text amended |
| Netherlands | 39 | 9.7.3 | Consider deleting 9.7.3. This is obvious so no need stating this in an OIML Recommendation. | Paragraph deleted |
| Netherlands | 40 | Table 7 | c) Please be aware that in practice, the ambient pressure will depend on the weather conditions, and controlling this pressure leads to significant costs. It is sufficient to record the atmospheric pressure. Taking into account clause 9.7.4.7, it is sufficient to record the atmospheric pressure. After the influence of atmospheric pressure has been established according to 9.10.4, it is possible to correct other measuring results for this effect if necessary.  Consider the introduction of a statement concerning such a correction. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations.  The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| Netherlands | 42 | 9.7.4.10 | Considered superfluous. Moreover, if maintained, considering the contents of this sub-clause suggest to include the indicating instrument in the title; for instance: *“Stability of test equipment”* | Paragraph deleted |
| Netherlands | 43 | 9.7.4.14 | This clause is not only applicable to and important for span stability, move to 9.7.4.2 | The language from this clause has been relocated to 9.7.4.2. Paragraph deleted. |
| Netherlands | 43 | 9.7.5 | \* Replace “measuring instrument” by “load cell”  \* Wrong reference: MPE is specified in 6.2.1 (not in 9.9) | Amended as proposed |
| Netherlands | 43 | 9.8.2 | Replace “*Table 1”* by “*Table 4”*. | Amended |
| Netherlands | 44 | 9.8.3.2 | Carriage Return missing before “For example” | Amended |
| Netherlands | 44 - 45 | 9.9 | Taking into account clauses 9.10.2 and 9.10.3, the entire clause 9.9 / 9.9.1 / 9.9.2 seems superfluous.  If these (sub-)clauses are maintained, the suggestions 9.9.1 and 9.9.2 apply. | 9.9.1 and 9.9.2 amended |
| Netherlands | 45 | 9.9.1 | \* Suggest clarifying that the initial reading (1st line) shall also be with a load Dmax.  \* 3rd line: *“… not differ greater …”* might be replaced by: *“… not differ more …”* or *”… have no greater difference than ...”*. | Paragraph amended per Australia's comments |
| Netherlands | 45 | 9.9.2 | Suggested new wording:  *In order to test compliance with 6.4.2, the test shall be performed as follows:*   1. *During at least 30 minutes, the load cell shall be loaded Dmin* 2. *Record output load cell (reading 1)* 3. *Apply load Dmax (which shall be between 90 % and 100 % of Emax), during 30 minutes ± 5 minutes* 4. *Return to load Dmin* 5. *Wait stabilization time according to Table 8* 6. *Record output load cell (reading 2)* 7. *Compare readings 1) and 2)*   *The difference between readings shall not exceed the value specified in 6.4.2.*  And similar for 9.9.1. | Paragraph amended per Australia's comments |
| Netherlands |  | 9.9 and 9.10  in general | Editorial:  We would prefer a similar style like suggested for 9.9.2. | Preference noted. Existing editorial style maintained in 2CD. |
| Netherlands | 45 | 9.9.3 | (End of field 9.9.2): This clause 9.9.3 is “empty” (probably, this number should be deleted.) | Amended as proposed |
| Netherlands | 45 | 9.10 | It is difficult to navigate in the present structure of sub-clauses of 9.10. Therefore some suggestions:  For ease of reading, preferred style, like suggested in 9.9.2.  Alternatively:  \* Reconsider numbering;  \* Print the subject in bolt face;  \* Add sub-clauses to Contents on page i. | Sub-clauses under 9.10 have been added to Contents for easier navigation. |
| Netherlands | 47 | 9.10.1.3. | Suggest to use “preload” instead of “exercise” . also at all similar occasions in the draft | Amended as proposed |
| Netherlands | 46 | 9.10.1.8 | Table 4 concerns 6.2.**1.1** | Amended |
| Netherlands | 47 | 9.10.1.14 | Replace 6.2.2 by 6.2.**11** | Amended |
| Netherlands | 47 | 9.10.1.16 | The added sentence *“The minimum load output shall be taken after the load cell has thermally stabilized at ambient temperature.”*  *“...be taken..”* is strange rather undefined wording; please enlighten. Moreover the sentence may be superfluous while applicable to all tests | Statement deleted |
| Netherlands | 51 | 9.10.4.6 | Method outdated, It is sufficient to perform the test by comparing the output of the “bare” (unloaded) load cell at only 2 different pressures: the atmospheric pressure at the moment, and one higher pressure (higher pressure is easier to achieve than lower pressure); just as in R 60 (2000).  And although in favour of keeping the test as is in R 60 (2000), it may be considered to describe performing the 2nd measurement at a pressure level of 5 kPa higher than atmospheric pressure. (instead of 1 kPa).  Prescribing higher pressure levels and/or more measurements will result in the need for purchase of more expensive equipment and require longer testing time resulting in more (and unnecessary) costs. | To be considered by TC9 p1 at future meeting |
| Netherlands | 57 | Table 9 | Statement below the table: *“…all functions that are performed or initiated via an interface shall operate correctly.”*  There is a contradiction with 6.6.2.1, stating: *“When a load cell equipped with electronics is subjected to the disturbances specified in 9.10.7.1, the difference between the load cell output due to a disturbance and the load cell output without disturbance (****fault****) shall not exceed the load cell verification interval, vmin, or the load cell shall detect and react to a significant fault.”*  *So the last sentence is not applicable; suggest to delete* | Table relocated to Part 1, 6.6.2.1. Associated statement deleted. |
| Netherlands | 58 | 9.10.7.2 | Title: The expression *“load cells with digital output interval*” is not defined. And it seems impossible that a “non-digital load cell” will have a “digital output interval”.  Therefore it is suggested to change the title of this sub-clause to: *“digital load cell error evaluation”* | Title changed |
| Netherlands |  | 9.10.7 | All tests in the sub clauses of 9.10.7 need to be reviewed and updated on basis of the last publication of OIML D11. (The DD of D11 at present is posted and open for on-line preliminary vote) After the approval the secretariat TC 5/SC 1 offers to supply such input if requested to do so. Furthermore it would probably be useful to more or less copy the tables from OIML D11 and add some specific R60 text. (See attached examples) | Secretariat of TC5/SC1 will be requested to supply input for updating test references from D11  TC9 p1 to be polled about the use of tables copied from D11 as suggested (examples provided)  Examples mentioned are shown below |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NL Example tables:**   |  |  |  | | --- | --- | --- | | Table xx AC mains voltage variation | | | | Applicable standards | IEC/TR3 61000-2-1 [24], IEC 61000-4-1 [27] | | | Test method | Applying low and high level AC mains power voltage (single phase) | | | Applicability | Only applicable for loadcells which are temporarily or permanently connected to an AC mains power network while in operation | | | Object of the test | Verification of compliance with the provisions stated in clause 6 under conditions of AC mains network voltage changes between upper and lower limit | | | Test procedure in brief | The test comprises subjecting the load cell to variations of mains voltage. For a period sufficient for achieving temperature stability and subsequently performing the required measurements. | | | Mains voltage  (1), (2) | Upper limit | ***U*nom1 + 10 %** | | Lower limit | ***U*nom2 – 15 %** | | Test sequence | A load test is performed in accordance with 9.11.1.1 to 9.11.1.12 at 20°C (± 2 °C), with the load cell powered at reference voltage. The test is repeated with the load cell powered at the upper limit and at the lower limit of power voltage. | | | Maximum allowable variations: | All functions shall operate as designed.  All measurement results shall be within maximum permissible errors. | | | Notes | (1) For three phase mains power supplies, the voltage variation is applicable for each of the phases successively.  (2) The values of *Unom* are those as inscripted on the measuring instrument. ***U*nom1** concerns the highest and *U*nom2 concerns the lowest value in the case a range is specified. If only one nominal mains voltage value (***U*nom)** is presented then ***U*nom1 = *U*nom2 = *U*nom.** | | |
| **NL Example tables:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Table yy AC mains voltage dips, short interruptions and reductions | | | | | | Applicable standards | | IEC 61000-4-11 [34], IEC 61000-6-1 [39], IEC 61000-6-2 [40] | | | | Test method | | Introduction short-time reductions of mains vol­tage using the test set-up defined in the applicable standard | | | | Applicability | | Only applicable for load cells with rated input current of less than 16 A per phase which are temporarily or permanently connected to an AC mains power network while in operation | | | | Object of the test | | Verification of compliance with the provisions in 6.6.2.1 under conditions of short time mains vol­tage reductions | | | | Test procedure in brief | | A test generator is to be used which is suitable to reduce the amplitude of the AC mains vol­tage for the required period of time.  The performance of the test generator shall be verified before con­necting the EUT.  The mains voltage reduc­tion tests shall be repeated 10 times with intervals of at least 10 s between the tests. | | | | Voltage dips | Test a | Reduction to | **0** | % | | Duration | **0.5** | cycles | | Test b | Reduction to | **0** | % | | Duration | **1** | cycles | | Test c | Reduction to | **40** | % | | Duration | **10/12** (1) | cycles | | Test d | Reduction to | **70** | % | | Duration | **25/30** (1) | cycles | | Test e | Reduction to | **80** | % | | Duration | **250/300** (1) | cycles | | Test load: | | During the test, the effect of any automatic zero-setting or zero-tracking features shall be switched off or suppressed, for example by applying a small test load. The test load need not be than necessary to accomplish this suppression. | | | | Maximum allowable variations: | | The difference between the measurement result due to the voltage reduction and the measurement result at nominal voltage shall not exceed one minimum load cell verification interval, vmin, or the load cell shall detect and react to a significant fault. | | | | Notes | | (1) Values applicable for 50 Hz / 60 Hz respectively | | | |

| **Member State** | **Page** | **Paragraph** | **Comment** | **Secretariat Response** |
| --- | --- | --- | --- | --- |
| Netherlands | 61  62  67 | 9.10.7.5  9.10.7.6  9.10.7.10 | It is not clear whether these clauses concern load cells powered by AC or DC mains supply, or also for battery power, or even for the load cells powered by the indicator  Anyhow most of these tests are not applicable for load cells not powered by mains supply. In this case the test 9.10.7.6 is applicable to I/O lines only | TC9 p1 at future meeting will need to propose new language to identify type of power source affected. |
| Netherlands | 63  64 | 9.10.7.7  9.10.7.8 | Not relevant for load cells with only strain gauges (without electronic components ) | Section 9.10.7 expressly notes that these tests are applicable to load cells equipped with electronics. References that were added previously indicating that various requirements were also applicable to strain gauge type load cells have been deleted. |
| Netherlands | 65 | 9.10.7.9 | First of all the grammar of this clause is rather poor. Try to rephrase. The similar R 76 clause is somewhat better formulated  Further:  1st paragraph and most of the contents of this clause are not typical for this test, but applicable for the majority of the other tests as well. So no need mentioning here.  Try to implement in the same manner as in R76 | 1st paragraph deleted. Language amended |
| Netherlands |  | Annex A | Some editorial upgrading needed like use of subscript e.g. for Emin | Amended |
| Netherlands |  | A.2.5 | Last words : suggest to amend “… is deemed to be approved” to “..is presumed to comply the requirements of this Recommendation | Amended as proposed |
| Netherlands |  | Annex C | Format to be reduced by deleting redundancies | Amended |
| Netherlands |  | Annex D | Format to be reduced by deleting redundancies | Amended |
| Netherlands |  | Annex E | E1 should not be referenced. No reference to be made to old VIM | References to old VIM deleted. |
| Netherlands | Bibliography | I | Referring to 2 different versions of a publication like “VIM” ([1] and [2]) is not acceptable. Very confusing!  Only refer to the present version, and take care that this is properly applied throughout the Recommendation | References to old VIM deleted. |
| SCAIME |  | general | New numbering but wrong references inside a lot of paragraph (document difficult to read because it is not a real clean version, e.g. § 6.5 what are the conditions specified in 6.8.1 -6.8.3 inexistent in the document) | Paragraph numbering verified and amended as needed |
| SCAIME | 5 | 3.5.9 | Read DMAX instead of EMAX to be coherent with test procedures | Amended as proposed |
| SCAIME | 13 | Figure 2 | Very bad resolution in final without marks (clean) edition | Illustration amended |
| SCAIME | 19 | 6.6.2.2 | Wording ambiguous (does it concern only digital LC equipped with strain gages?). If the requirement apply on both digital LC and analog LC, write “*a load cell shall be subjected to the span stability test…*” | Strain gauge technology statement removed from 6.6.1.  Requirement explicitly applies to load cells with electronics. See also comment and response to Australia |
| SCAIME | 20 | 7.1 | We propose the suppression of *“for achieving the severity level II, the use of cryptographic methods for protection are necessary”.* It is an acceptable solution under terms of OIML D31, not a mandatory requirement. | This must be addressed by TC9 p1 at future meeting. See France's, Australia's comment |
| SCAIME | 36 | 9.3 | It should be mandatory to add information on the test report if a repair occurred during an evaluation. Give information and details on which sample and at which step.  3rd paragraph, we consider that allowing repairs and modifications is subject to contestation, and we will prefer to amend the paragraph. Any modification should be forbidden during the evaluation. Repairing for digital LC may eventually be accepted during any of the required additional tests. | To be considered by TC9 p1 at future meeting |
| SCAIME | 57 | 9.10.7.1 | Wording ambiguous. It seems that analog LC have to be submitted to performance test described below!  Suppress *”(including strain gauge type LC)”* Information is done earlier in the document at § 6.6.2.2 | "including strain gauge type load cells" deleted |
| SCAIME | 66 | 9.10.7.9 | We think it is the most important point we require to take account. It is necessary to allow for the span stability test after a damp heat humidity test, **a recovery time of minimum 3 days** to make the recovery really effective.  If not the effect will be to increase the requirement of the damp heat test (because of the 0.5 EMT requirement of stability test!)  This can also apply to the cycled humidity test (not excluded in the second para of § 9.10.7.9) | Time between measurements and duration of recovery periods to be addressed by TC9 p1 members at future meeting. See also France, CECIP, and UK comments |
| SCAIME |  | Humidity tests SH CH | I think the requirements for both these tests have been lost!  Because of cross respective reference in the specifics paragraphs. | See 9.10.5 and 9.10.6 in 2CD |
| SCAIME | D-4 | ANNEX D | In the schematics associated to the wiring, it includes symmetrical compensations. A much more simple schematic of the Wheatstone bridge will be more suitable. | Replacement schematic diagrams may be offered to TC9 p1 as options. Secretariat will post any alternatives provided for the TC to choose from |
| UK | 1 | 2 | Scope 2.1.  This Recommendation prescribes the principal metrological static characteristics and static evaluation procedures for load cells used in the measurement of mass. It is intended to provide authorities with uniform means for determining the metrological characteristics of load cells used in measuring instruments that are subjected to metrological controls. Although strain gauge technology is commonly recognized as the conventional form or benchmark of load cell of load cell design,  *The measured quantity is not mass, but is a Load, which is converted into an electrical quantity, therefore proposed text, therefore a suggested change of scope  Scope 2.1 This Recommendation prescribes the principal metrological static characteristics and static evaluation procedures for load cells used in the* ***determination of conformity to this recommendation****. It is intended to provide authorities with uniform means for determining the metrological characteristics of load cells used in measuring instruments that are subjected to metrological controls. Although strain gauge technology is commonly recognized as the conventional form or benchmark of load cell of load cell design,  { Determination The act of making or arriving at a decision. Measurement: Comparing a quantity with a standard/reference unit. }* | Paragraph amended, see also Australia and U.S. comments |
| UK | 3-10 | 3 | Terms and definitions should be presented in accordance with B6-2 **A.2.1 Layout**. The definition shall be placed on a new line, starting with a lower case letter, for example:  3.1.1 **load cell** force … | Definitions formatted as proposed |
| UK | 2 | 3.1.1 | Load Cell Force transducer that, in response to an applied load will produce a proportional and measureable output. [Note: This output may be converted, by another device, into units such as mass]. | Amended as proposed |
| UK | 3 | 3.3.1 | **Strain Gauge** A device consisting of a very fine wire or, more commonly, metallic foil arranged in a grid pattern, which is used for measuring the changes in distances between points in solid bodies, by the linear change in electrical resistance (of the wire or metallic foil) which is in proportion to the amount of strain in the device that occurs when the body is deformed. | Amended according to CECIP comment |
| UK | 4 | 3.5.2 | **Load cell measuring range** Range of values of the measured quantity (mass) for which the result of measurement should not be affected by an error exceeding the maximum permissible error (MPE) (see 3.7.8).  *The measured quantity is not mass, but is a Load, which is converted into an electrical quantity, therefore proposed text:.*   Load cell measuring range  *Range of values, of the measured quantity, for which the Load cell is approved to operate.* | Term "mass" deleted as proposed, remaining language retained. |
| UK | 5 | 3.5.3 | **Load cell output** Measurable quantity into which a load cell converts the measured quantity (mass)  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing (mass).  Load cell output Measurable quantity into which a load cell converts the measured quantity.* | Amended as proposed by Netherlands |
| UK | 5 | 3.5.4 | **Load cell verification interval (v)** Load cell interval, expressed in units of mass, used in the test of the load cell for accuracy classification.  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing (mass).*  Load cell verification interval (v) Load cell interval, as a ration of the output signal (mV) / excitation signal (V), , used in the test of the load cell for accuracy classification. | Added "as a ratio of the output signal (mV)/excitation signal (V)" however maintained "expressed in units of mass" |
| UK | 5 | 3.5.5 | **Maximum capacity (Emax)** Largest value of a quantity (mass) which may be applied to a load cell without exceeding the MPE (see 3.7.8).   Maximum capacity (Emax) Largest load which may be applied to a load cell without the output value exceeding the MPE (see 3.7.8). | Amended per comments from NL and UK |
| UK | 5 | 3.5.6 | **Maximum load of the measuring range (Dmax)** Largest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be greater than Emax (see 3.5.5). For the limits on Dmax during testing, see 9.7.4.4.   Maximum load of the measuring range (Dmax)) Largest value of the load which is be applied to a load cell during test or use. This value shall not be greater than Emax (see 3.5.5). For the limits on Dmax during testing, see 9.7.4.4. | Amended per comments from NL and UK |
| UK | 5 | 3.5.10 | **Minimum load cell verification interval (vmin)** Smallest load cell verification interval (mass) into which the load cell measuring range can be divided.  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing (mass).  Minimum load cell verification interval (vmin) Smallest load cell verification interval into which the measuring range, of the load cell, can be divided.* | Amended as proposed |
| UK | 6 | 3.5.11 | **Minimum load of the measuring range (Dmin)** Smallest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be less than Emin (see 3.5.8). For the limits on D min during testing, see 9.7.4.3.  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing (mass).  Minimum load of the measurin range (Dmin) Smallest value of the load which is applied to a load cell during test or use. This value shall not be less than Emin (see 3.5.8). For the limits on D min during testing, see 9.7.4.3.* | Amended as proposed |
| UK | 7 | 3.7.2 | **Apportionment factor (PLC)** The value of a dimensionless fraction expressed as a decimal (for example, 0.7) used in determining MPE (see 3.7.8). It represents that apportionment of a whole error (as may apply to a weighing instrument) which has been assigned to the load cell alone.   Apportionment factor (PLC) *The value of a dimensionless fraction expressed as a decimal (for example, 0.7) used in determining MPE (see 3.7.8). It represents that apportionment of a whole error (as may apply e.g. to a weighing instrument) which has been assigned to the load cell alone.* | Language amended according to NL recommendation |
| UK | 11 | 4 | **Description of Load Cells** A load cell provides an output proportionately related to an applied force or load. Designs of load cells include those intended for use in a system with other load cells and those used as a single transducer within a weighing instrument/system. The term “load cell” in this Recommendation is not limited to a particular type of technology or design principle.  Remove reference “ within a weighing instrument/system”  *Description of Load Cells A load cell provides an output proportionately related to an applied force or load. Designs of load cells include those intended for use in a system with other load cells and those used as a single transducer. The term “load cell” in this Recommendation is not limited to a particular type of technology or design principle.* | Paragraph amended |
| UK | 11 | 5 | **Units of measurement** The units of measurement of mass resulting from the output of a load cell that is incorporated as a component of a weighing instrument are required to conform to the Recommendation(s) applicable to the weighing instrument.  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing mass  Units of measurement The units of measurement resulting from the output of a load cell that is incorporated as a component of a weighing instrument are required to conform to the Recommendation(s) applicable to the weighing instrument.* | Amended as proposed |
| UK | 11 | 6.1 | **Principl of load cell classification** The classification of load cells into specific accuracy classes is provided to facilitate their application to various mass measuring systems. In the application of this Recommendation, it should be recognized that the effective performance of a particular load cell may be improved by compensation within the measuring system with which it is applied. Therefore, it is not the intent of this Recommendation to require that a load cell be of the same accuracy class as the measuring system in which it may be used. Nor does it require that a measuring instrument, giving indications of mass, use a load cell which has been separately approved.  *The output is (usually) an electrical or a digital value, not a mass value, and therefore suggest removing mass*  *Principle of load cell classification The classification of load cells into specific accuracy classes is provided to facilitate their application to various measuring systems. In the application of this Recommendation, it should be recognized that the effective performance of a particular load cell may be improved by compensation within the measuring system with which it is applied. Therefore, it is not the intent of this Recommendation to require that a load cell be of the same accuracy class as the measuring system in which it may be used. Nor does it require, for example, that a measuring instrument, giving indications of mass, use a load cell which has been separately approved.* | Amended as proposed |
| UK | 12 | 6.1.3 | The minimum load cell verification interval symbol (vmin) should have the “min” in subscript, e.g. (vmin) | Amended |
| UK | 15 | 6.2.1.1 | “Type evaluation” and “pattern evaluation” are used interchangeably throughout the document. Propose using “Type evaluation” only, in accordance with B6-2 and the trend in other weighing Recommendations. | Amended |
| UK | 18 | 6.6.1.4 | **Compliance requirement** A load cell equipped with electronics is presumed to comply with the requirements in 6.11.1.1 and 6.11.1.2, if it passes the examinations specified in 6.11.3 and 6.9.2   There is no section 6.11.1.1, 6.11.1.2, 6.11.3 or 6.9.2 | References verified |
| UK | 19 | 6.6.2.4 | **Application of the requirements in 6.11.1.1** The requirements in 6.11.1.1 may be applied separately to each individual cause or significant fault. The choice of whether 6.11.1.1 a) or 6.11.1.1 b) is applied is left to the manufacturer.   There is no section 6.11. 1.1 a) or b) | References corrected |
| UK | 21 | 7.2.2 | The following minimum amount of information, required in 6.7, shall be marked on each load cell:  6.7 is not defined anywhere in the draft | Language amended. Reference removed. |
| UK | 21 | 7.2.4.1 | In addition to the information included in 7.3.4 the following  7.3.4 is not defined anywhere in the draft | Incorrect references amended |
| UK | 22 | 7.2.4.4 | The special limits of working temperature, as referred to in 6.5.1.2, shall be specified when the load cell cannot perform within the limits of error in 6.2 to 6.5 over the temperature range specified in 6.4.1.1.  Wrong reference: 6.4.1.1 should be 6.5.1.1 | Reference amended |
| UK | 28 | 7.2.3 | **Mandatory additional information** In addition to the information included in 7.3.4 the following information shall be specified: There is no section 7.3.4 (7.2.4 ?) | Reference numbers corrected. |
| UK | 37 | 8.1.1 | **Imposition of controls** This Recommendation prescribes performance requirements for load cells used in weighing instruments subjected to legal metrological control. National legislation may impose metrological controls that verify compliance with this Recommendation.   Unless the wording of the Introduction (or scope) is reworded so that this Recommendation is for Load Cells used in weighing instruments subjected to legal metrological control, I would suggest the following text so as to be more general  Imposition of controls  This Recommendation prescribes performance requirements for load cells used in systems subjected to legal metrological control. National legislation may impose metrological controls that verify compliance with this Recommendation. | Language amended |
| UK | 38 | 9.1 | **Scope** This section provides test procedures for pattern type evaluation testing of load cells used in the measurement of mass.  Suggest the following text (see comment re: 8.1.1)  **Scope** This section provides test procedures for pattern type evaluation testing of load cells. | "used in the measurement of mass" deleted. |
| UK | 38 | 9.2 | **Test requirements** Test procedures for the pattern type evaluation of load cells are provided in Section 9 and the Test Report Format is provided in Part 3. Initial and subsequent verification of load cells independent of the measuring system in which they are used is normally considered inappropriate if the complete system performance is verified by other means.  Consider deleting the 2nd sentence, as I am not sure that “Initial and subsequent verification of load cells independent of the measuring system in which they are used” is appropriate. | Statement makes the point that testing of independent load cells beyond the type evaluation stage is not seen as appropriate. This statement itself is perceived as valid. |
| UK | 38 | 9.4.5, 9.4.6, etc. | If more than one load cell of a family has been submitted for testing, only one cell shall be tested for humidity when applicable.  For consistency, “load cell” should be used instead of “cell” | Amended as proposed |
| UK | 39 | 9.6 | **Examinations** For consistency, “load cell” should be used instead of “cell” … In particular, the following aspects shall be examined … f. software (7.2); (if applicable) | Paragraph amended |
| UK | 40 | 9.7.2 | **Test equipment** The basic equipment for pattern evaluation tests consists of a force-generating system and a suitable linear instrument, which measures the output of the load cell (see 8.2.1).   Section 8.2.1 is Measurement standards , uncertainty of test results  Therefore amend text:   Test equipment The basic equipment for pattern evaluation tests consists of a force-generating system and a suitable indicating instrument, which measures the output of the load cell. The equipment shall satisfy 8.2.1. | Text amended |
| UK | 39 | 9.7.3.1 | Except for the parameter being tested, the reference conditions in Table 7shall be kept by  Editorial. | Amended |
| UK | 40 | 9.7.3.1 b) | 65% RH +/- 5% is unsuitable for laboratory conditions – this will potentially result in corrosion of weights and steelwork in many Deadweight machines, and will be a difficult parameter to maintain. We do not see the need for specifying humidity for the laboratory, as humidity tests are carried out on the cell as part of the R60 test | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 40 | 9.7.3.1 c) | Specifying atmospheric pressure to be stable within 10hPa is unreasonable, as normal weather fluctuations can easily result in larger deviations than this over the duration of the test. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 40 | 9.7.3.1 j) | This parameter needs clarification – it does not specify whether this is peak-to-peak, RMS, etc. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 40 | 9.7.3.1 r) | Stating ‘none’ is not possible. Surges are always present on AC and DC mains power supplies – the maximum allowable magnitude needs defining. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 40 | 9.7.3.1 (1) | The term ‘If applicable’ needs clarification, as this could result in confusion. | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 40 | 9.7.3.1 (2) | As a normal laboratory will meet these conditions, why are they being referenced at all? Is this not going to lead to potential confusion? | These values come from the suggestions contained in the OIML template used for reformatting Recommendations. The validity as well as the application of the values must be decided upon by TC9 p1 at future meeting |
| UK | 42 | 9.7.4.1 | **Acceleration of gravity** The mass standards used in testing shall be corrected, if necessary, for the site of testing and the value of the gravity constant, g, at the test site shall be recorded with the test results. The value of the mass standards used to generate the force shall be traceable to the appropriate national or international standard of mass.   Suggested rewording of text:  Acceleration of gravity The mass standards used to generate the force applied during testing shall be corrected, if necessary, for the site of testing and the value of the gravity constant, g, at the test site shall be recorded with the test results. The value of the mass standards used shall be traceable to the appropriate national or international standard of mass. | Amended as proposed |
| UK | 41, 45,etc | 9.7.4.3 9.9.1, 9.9.2, 9.10.1.3, etc | The minimum load, Dmin, (hereafter referred to as “minimum test load”) … The maximum load, Dmax, (hereafter referred to as “maximum test load”) …  Dmax; Dmin; minimum test load, Dmin; maximum test load, Dmax are used interchangeably throughout the document  For consistency and clarity, use the defined terminology or incorporate “minimum test load” and “maximum test load” into the terminology, and not redefine Dmax; Dmin here. | Language in parenthesis deleted |
| UK | 41 | 9.7.4.4  Reference standards | All standards and measuring instruments used for the tests shall be traceable to (inter)national standards.  For consistency (see 9.7.4.1, and clarity use “national or international” | Amended as proposed |
| UK | 42 | 9.7.4.8 | **Humidity effects** The last sentence is preceded by a sub-paragraph number 9.7.4.9 . Is this correct ? If so it should be moved to a new “row” in the “table”{deleting will affect subsequent sub-paragraph numbering} | Numbering of this sentence was in error - removed. |
| UK | 42 | *9.7.4.10* | **Stability of loading means** An indicating instrument and a loading means shall be used which will provide sufficient stability to permit readings within the limits specified in 8.3.   There is no 8.3, should this be 9.8.3? | Paragraph deleted as it is superfluous. (e.g., 9.7.2, 9.7.4.11) |
| UK | 43 | 9.8.2 Limits of error | (Test Report Format for Type Evaluation) | Part 3 is expected to be circulated summer of 2013 |
| UK | 44 | *9.8.3.1* | **Loading/unloading times** The loading or unloading times shall be as shown in Table 8. The tests shall be conducted under constant conditions. Time shall be recorded in the test report in absolute, not relative, units.   Change “units” to “values” | Table 8 reformatted per Japan's comments. Changes need to be considered by TC9 p1 at future meeting. |
| UK | 45 | 9.10.1.3 | **Exercise load cell** Exercise the load cell by applying the maximum test load, Dmax , three times, returning to the minimum test load, D min , after each load application. Wait 5 minutes.   Addition of text for clarity  Wait 5 minutes before commencing any further tests. | Amended as proposed |
| UK | 46 | 9.10.1.13 | *Repeat procedures for different temperatures*  Repeat the operations described in 9.10.1.3 to 9.10.1.12, first at 20 ºC, then at the higher temperature, then at the lower temperature, including the approximate temperature range limits for the accuracy class intended; then perform the operations in 9.10.1.3 to 9.10.1.12 at 20 °C **(± 2 °C).**   Amend text for consistency  *9.10.1.13 Repeat procedures for different temperatures  Repeat the operations described in 9.10.1.3 to 9.10.1.12, first at 20 ºC (± 2 °C), then at the higher temperature* ***(± 2 °C).****, then at the lower temperature* ***(± 2 °C)****., including the approximate temperature range limits for the accuracy class intended; then perform the operations in 9.10.1.3 to 9.10.1.12 at 20 °C* ***(± 2 °C).*** | Language amended per Austria's comment |
| UK | 49 | 9.10.3.3 | Exercise load cell Exercise the load cell by applying the maximum test load, Dmax, three times, returning to the minimum test load, D min, after each load application. Wait one hour.   Addition of text for clarity  Wait one hour *before commencing any further tests.* | amended |
| UK | 53 |  | For consistency maintain a standard format for the test specifications. For example, the IEC references are at the top of tests 9.10.5.15 and 9.10.6.11, while tests 9.10.7.4 to 9.10.7.8 have a section titled “Reference to IEC Publication” at the bottom; and tests 9.10.7.10 is missing a reference to IEC 61000-4-5. | Inserted IEC reference for 9.10.7.10. For consistency, bibliography references located at bottom of pages |
| UK | 55 | 9.10.6.3 | *Exercise load cell  Exercise the load cell by applying the maximum test load, D max, three times, returning to the minimum test load, D min, after each load application.   Addition of text:  Wait 5 minutes before commencing any further tests* | Text added |
| UK | 56 | 9.10.6.11 | ***Conduct damp heat, steady state test  ...*** b) at the high temperature of the range specified in 6.5.1 for the load cell and a relative humidity of 85 %, two days following temperature and humidity stabilization; and...  Change: “two days” to “48 hours”. This provides a more “positive” time period. | Amended as proposed |
| UK | 57 | 9.10.7.*1* | ***Performance and stability tests*** A load cell equipped with electronics (including strain gauge type load cells) shall pass the performance and stability tests according to 9.10.7.2 to 9.10.7.10 for the tests given in Table 9.   The addition of the wording “(including strain gauge type load cells)” needs to be reviewed, as not all of the tests in Table 9 are applicable to strain gauge type load cells. | "including strain gauge type load cells" deleted |
| UK | 60 | 9.10.7.4 | ***Power voltage variations*** This test is applied to verify compliance with condition of both variations in a DC mains network and variation in AC mains power voltage (single phase).   This test applies when the input (excitation) voltage is supplied directly from a DC mains network or an AC mains power voltage (single phase). The input voltage for the majority of load cells is supplied by another unit which transforms the mains to a lower voltage. The input voltage is usually regulated.  Suggested amended text  This test is applied to verify compliance with condition of both variations in a DC mains network and variation in AC mains power voltage (single phase). This test applies when the input voltage is supplied directly from either of these sources.  A test procedure would need to be developed (unless there is an existing IEC Publication) for instruments that are powered with a non-mains network (e.g. transformed / regulated) voltage by another device. | This suggestion should also be a part of the larger TC9 p1 discussion regarding issues of power supply |
| UK | 61 | 9.10.7.5 | ***Short-time power reductions (see 6.6.2.1)*** *Test procedure in brief: This test consists of exposing the load cell to specified short-time power reductions.   Addition of text: “Only applicable where the input (excitation) voltage of the load cell is supplied* ***directly*** *by an AC mains power voltage source.”* | This suggestion should also be a part of the larger TC9 p1 discussion regarding issues of power supply |
| UK | 65 | 9.10.7.9 | The time between measurements is stated as between ½ day (12 hours) and 10 days (240 hours). The damp-heat test has a 12 day duration, so this is not possible. Either the time duration for measurements needs extending, or a statement should be included stating that 2 samples must be tested in parallel. | Inconsistency in test procedures should be addressed by TC9 p1 members at future meeting. See also comments from France and CECIP. |
| UK | 66 | 9.10.7.9 d) | There is a difference in the wording between OIML R60:2012 and OIML R76-1:2006 regarding the calculation of the maximum allowable span stability variation.  R60 states Maximum allowable variations: The variation in the load cell span measurement results shall not exceed half the load cell verification interval or half the absolute value of the MPE for the test load applied, whichever is the greater on any of the measurements. but additional states:  ….determine the span measurement result, which is the difference in output between the mean maximum test load outputs and the mean minimum test load outputs. Compare subsequent results with the initial span measurement result and determine the error.  and, additionally in Form D.171.2 of R60:2000 (not yet incorporated in the R60:2012 draft), the following is present in the notes section:-  1 Variation: the difference in the span value from the span value of run no. 1. 2 Maximum allowable variation: half the load cell verification interval or half the absolute value of the maximum permissible error for the maximum test load applied. These additional clauses are not present in R76, leading to the situation whereby the Maximum Allowable Variation in R60 can be interpreted as ± 0.5e (referenced to the span value of run no 1), whereas in R76 this can be interpreted as just 0.5e, as defined in the clause:- The variation in the errors of indication shall not exceed half the verification scale interval or half the absolute value of the maximum permissible error on initial verification for the test load applied, whichever is greater, on any of the n measurements. Clarification needs adding to OIML R60 (and potentially in the future to OIML R76) to define the required method to be adopted, unless they are intentionally different. | These differences must be addressed by TC9 p1 members at future meeting |
| UK |  | *9.10.7.10* | Surge 3rd paragraph It is also applicable to DC powered instruments if the power supply comes from DC mains.  Amend wording: “It is also applicable to DC powered load cells where the (excitation) power supply comes directly from DC mains. | Amended as proposed |
| UK | C-5 | C.1 Contents of addendum to test certificate (informative) | The contents of this Annex C should normally be in a separate Part 3 Test Report Format. This is necessary in order to comply with the B6-2 Directives. | Unable to find the reference in B6‑2. If found to be necessary, this mandatory Annex will be relocated to Part 3 revision. |
| UK | D-2 | **3** | **Description of the load cell** {Example} The load cells (LC) of the series xxx are double bending beam load cells. They are made of aluminium, the strain gauge application is hermetically sealed. Further essential characteristics are given in the data sheet, see chapter 6 of this annex  Add text: {Example} as shown above. | Amended as proposed |
| UK | D-2 | **4** | **Documentation** [Example}   Test Report No. PTB xxx; C3; Y=xxx; Z=xxx; E max =xxx kg; SN; xxx  Add text: {Example} as shown above | Amended as proposed |
| UK | D-3 | **5** | **Further information** The manufacturing process, material and sealing of the produced load cells have to be in accordance with the tested patterns; essential changes are only allowed with the permission of the notified body.  Replace: “notified body” (European Commission term) with “issuing authority”. | Amended as proposed |
| UK | E-1 | E.1.5 | (For notes, please refer to VIM)Resolution [VIM 4.14] Smallest change in a quantity being measured that causes a perceptible change in the corresponding indication (For note, please refer to VIM)  Delete : (For notes, please refer to VIM) at beginning of paragraph | Amended as proposed |
| UK | E-2 | E.2.6 | E.2.6 verification of a measuring instrument [VIML 2.13]  Procedure (other than type approval) which includes the examination and marking and/or issuing of a verification certificate, that ascertains and confirms that the measuring instrument complies with the statutory requirements  Is it necessary to include this definition for a load cell ? | Deleted |
| UK | E-3 | E.2.8 | E.2.8 initial verification [VIML 2.15]  Verification of a measuring instrument which has not been verified previously.  Is it necessary to include this definition for a load cell ? | Deleted |
| UK | E-3 | E.2.9 | E.2.9 subsequent verification [VIML 2.16] Any verification of a measuring instrument after a previous verification and including:  mandatory periodic verification; verification after repair   Is it necessary to include this definition for a load cell ? | Deleted |
| UK | E-3 | E.2.10 | E.2.10 inspection of a measuring instrument [VIML 2.21] Examination of a measuring instrument to ascertain all or some of the following:  verification mark and/or certificate is valid, no sealing marks are damaged, after verification the instrument suffered no obvious modification, its errors do not exceed the maximum permissible in-service errors  Is it necessary to include this definition for a load cell ? | This definition retained. This may be applicable to equipment necessary during the testing of a load cell |
| UK | E-3 | E.2.13 | E.2.13 verification mark [VIML 3.7] Mark applied to a measuring instrument certifying that the verification of the measuring instrument was carried out with satisfactory results.  Is it necessary to include this definition for a load cell ? | Deleted |
| UK | E-4 | E.3.1 | E.3.1 Electronic measuring instrument (OIML D 11, 3.1) Measuring instrument intended to measure an electrical or non-electrical quantity using electronic means and/or equipped with electronic devices.    Is it necessary to include this definition for a load cell | This definition retained. This may be applicable to equipment necessary during the testing of a load cell |
| US | 6 | 2.1 | Revise to read as follows:  **2.1.**  This Recommendation prescribes the principal metrological static characteristics and static evaluation procedures for load cells used in the measurement of mass. It is intended to provide authorities with uniform means for determining the metrological characteristics of load cells used in measuring instruments that are subjected to metrological controls. Except as otherwise specified, these requirements apply regardless of the technology or operating principle employed.  Rationale:  The revision’s proposed additional wording is superfluous. The words should simply state that, except as otherwise specified, the requirements apply regardless of the technology or operating principle employed.  Any supplementary comment to the effect that “strain gauge load cells are the most common form encountered” is unnecessary and, if maintained, should at the most be relegated to an information-only note. The comment is not performance but design related and it could change with time and technology. The currently employed art should be self-evident to Recommendation users that have load cell competency.  The comment is also demeaning in that it implies that strain gauge load cells serve as the standard (i.e. “benchmark”) by which other types of load cells are measured or judged and that the other types do not employ established techniques (i.e. are not of “conventional form”). R60 should not express such a restrictive position.  *Reference Definitions:*  *Benchmark – something that serves as a standard by which others may be measured or judged.*  *Conventional – according with convention.*  *Convention – an established technique.* | Paragraph amended, see also Australia comments |
| US | 7 | 3.1.1 | Section 3.1.1 properly defines a strain gauge as a device and it is silent as to operating principle; such a device might be mechanical, electrical, optical, etc.  However, often the term “strain gauge” is used within the Recommendation to mean bonded resistive strain gauge devices and especially those whose gauges are connected in a bridge circuit. The use of the term “strain gauge” needs to be better clarified throughout the document. | Definition for strain gauge amended. See 3.3.1 |
| US | 22 | 6.6.1 | With respect to the wording… “In addition to the other requirements of this Recommendation, a load cell equipped with electronics (including load cells using strain gauge technology) shall comply with the following requirements…”, it is not clear as to whether a load cell that employs strain gauge technology but is not equipped with electronics is to meet these requirements or not. Clarification is required. | “including load cells using strain gauge technology” deleted |
| US | 23 | 6.6.2.2 | See comment for 6.6.1 above. | “including load cells using strain gauge technology” deleted |
| US | Annex B | Entirety | While intending to be Informative only, elements of this Annex are worded as requirements. For example:  “This information will be considered for load cell tests and marked on the certificate.”  Such elements should be suppressed or reworded to eliminate any inference of becoming a “back-door” requirement. | Statement amended |
| US | R60 Annexes | Editorial Comment | As to their numbering and order sequence, it would seem proper to align the Mandatory annexes ahead of the Informative annexes because they are more significant. | Amended as proposed |