



ROAD RACE COURSE MEASUREMENT

Instructions for international measurement report

1. General information

The basis for course measurement and its documentation is the International Competition Rules in the current version in conjunction with „Course Measurement Book“(v2023) from World Athletics / AIMS. With the experience of 3 1/2 decades and practices, the author has compiled a guide for manufacture the documentation of measurement report.

This manual requires a solid basic knowledge of the current PC operating systems (Microsoft, Apple, Linux) and of office software products MS Office with the program parts WORD and EXCEL as well as comparable open-source software (Libre Office & Open Office).

The measurement report digit is saved as a coherent file in PDF format and can be sent in a reasonable file size (< 10 megabytes). Compressed PDF files are created using suitable software tools; in the context of digitization and for environmental reasons, a printout on paper may be omitted.

Since the measurement arrangement can vary greatly due to the individual framework conditions at the events, no claim is made to completeness for the set of forms. The author is happy to provide further information and assistance in individual cases; he is also grateful for hints that serve further development.

2. Form „EXCEL “

The form protection set up in the spreadsheets serves to protect the stored formulas and links; it can be revoked or re-established without a password. When the form protection is removed, the version that has been insured and checked by the author expires.

The tables regularly cover pages 1 to 3 of the documentation to be created.

The cells for data entry are conveniently selected with the TAB key of the keyboard. The data required by the rules and regulations - in prepared and already pre-formatted cells - are recorded; pull-down menus complement the simplified entry.

The input fields have the "Note" hint function, which become visible when selected with the mouse; they provide e.g. hints for formatting.

Note: The colour background, which is only visible on the screen, is set neutral by data entry; fields that are not required lose the colour background when a space is entered.

2.1 Basic data

Page 1 is used to record the basic data. Depending on the application, 1 to 4 course lengths can be covered; all of them are characterised by the fact that the basic data only have to be entered once, thus creating page 1. In the rare case of more than 4 course lengths, further spreadsheets can be created as copies in the file; the page numbering, etc. must then be adjusted.

The measurement is generally carried out with two independent measurements; this also applies to pushing distances that are measured with the counter or with the steel measuring tape. The second measurement can also be carried out by another, accredited course measurer; in this case, the second person must be recorded in the documentation. This usually economic case is used in the case of high traffic volumes on the routes to be measured or for long distances.

Special case of auxiliary person: If, in exceptional cases, the second measurement is carried out by a non-accredited person in the presence and under the supervision of the responsible course measurer, this can be explained separately in the documentation for this individual case.

2.2 Calibration course

Principle: The quality of the calibration course and the care taken by the executing persons are decisive for the informative value, accuracy and safety of the measurement results.

The determination or verification of the length of the reference course must be documented regularly. The evaluation of the measurement of the calibration course with a steel tape measure is the rule.

If there is an already created calibration course in the immediate vicinity of the measurement that meets the criteria for the measurement order, it can be used for the order after verification. A calibration course created by official or public surveying bodies can also be used. An electro-optically measured calibration course with a geodetic precision instrument (e.g. tachymeter/total station) can also be used for measurement. For your own safety, it is advantageous to add documentation of the calibration course used to the protocol; this then replaces the form table, page 2.

Note on measuring tape measurement of the calibration course: When a new calibration course is created, the length of the roadway is unknown. The true length of the roadway can be determined with a steel tape measure under ideal conditions (20°C) by double measurement. At lower temperatures, steel contracts, i.e. a longer track value is read from the tape; the correction to the true length of the line is made with a negative correction value. At higher temperatures, steel expands and the correction value to the true length is a positive value and this is added to the read value.

The length of the calibration course should be at least 300 m; there is no need to measure a "round" section length – the length can be based on local conditions (safety points, manhole covers, etc.). For later purposes, the start and end points should always be marketed and calibrated points or conditions that cannot be changed in the locality and can be permanently proven with the measurement and sketch. Shorter lengths of the calibration course are possible for special cases; this must be justified in the protocol.

The data is recorded in the "Page 2" spreadsheet. If a rounded calibration course is to be determined in the locality, the adjustment measure is measured after the measurement; the rounded calibration course with the adjustment measure is then shown in the form.

In the table, an auxiliary calculation can be used to ensure the "full strip lengths"; it serves as a control and prevents gross measurement errors.

Note: With the "Removal of leaf protection" pictures or sketches of the calibration course can be inserted in the lower part of the A4 page.

2.3 Jones-Counter calibration and evaluation

The "Calibration" or "Calibration 2Meas" sheet is used to evaluate the calibration of the Jones-Counter before, during and after the local measurement; the rule is pre- and post-calibration. For further calibrations, the form sheet must be used as a copy.

Note: A second, different calibration course can be used, e.g. for recalibration. A calibration section is automatically specified; for a second calibration course, the location, measurement method and length must be entered and verified separately.

The readings at the "Jones-Counter" are usually taken as an integer value during the measurement run. When pre- and post-calibrating the counter, the accuracy can be increased to 1/2 of the integer value with reading (as a rule).

For the 4 calibration runs, 5 reading values must be recorded. According to the doctrine, the common calibration procedure is "the blocking of the front wheel with the left handbrake when moving the bicycle after the calibration run".

If the value changes when the bike is moved, it makes sense to set the old, noted reading value exactly again by rotating the front wheel; make sure that the clearance of the driver in the spokes is taken into account when setting the value (always turn the exact value forwards).

Note: The reading unit of the counters of "Jones-Riegel" (USA) and "Cook" (UK) is usually between 9 and 10 cm/count. Cable-guided "Jones-Counters" show approx. 6 cm/count due to a different gear ratio. The German Jones-Counter shows between 7 and 8 cm/count.

The formulas stored in the spreadsheets use the entered measurement data to calculate the working and final constant, based on a mathematical reference distance of 1,000.00 m, including the preventive factor of 0.1% as a safety bonus.

The daily constant is automatically calculated as an average value of the work and final constant; the standard deviation and the counter count per unit are output as indications.

Special case: With the input function a, h or d, it is possible to choose between the averaging of the daily constant (usually case) or the higher or lower value of the determined constant. For example, due to unforeseeable changes in the external conditions during calibration and/or measurement runs (e.g. measurement duration, wetness, strong wind, solar radiation, temperature differences, etc.), a differentiated evaluation of the measurement results may become necessary; this case then requires an explanation during the evaluation and serves your own safety.

Note: If the course measurement is carried out over a longer period or on different surfaces, it may make sense to calibrate the "Jones-Counter" several times. This circumstance can be considered by duplicating the spreadsheets as well as further calibrations and evaluations.

Evaluation:

The evaluation of the measurement results can be carried out directly in the respective spreadsheet used; the sheet view is preset to "normal view". To check the layout, you can switch to page view; undesired page breaks can then be corrected after the form protection has been removed, e.g. by deleting or adjusting rows/columns. Empty table rows can be removed or inserted for this purpose. It is recommended to reactivate the sheet protection after the corrections due to the formula protection.

The headings of the evaluation columns are self-explanatory and should usually be used; however, they can also be freely overwritten and adapted to individual practice.

The stationing with the description and the reading values for measurements 1 and 2 are entered in the rows and columns of the form. The evaluation is carried out with the other columns by creating differential values in the rows and columns of the form. In the columns "Sections" the individual sections are shown, and the values of the double measurement are compared.

Note: The maximum deviation between the first and second measurement, which is defined according to common doctrine, should not be exceeded at 0.8‰.

The last column "valid part of the course" then contains the value valid for the evaluation.

Tip: From practice, it is advisable not to copy the valid part, but to enter the valid value from the comparison of the sections manually (2 digits after the decimal point). This prevents the "dragging" of infinite digits for the evaluation and allows a mathematically clean evaluation for the measured competition distances.

2.4 Continued evaluation

The evaluation of the measurement results can continue to be carried out on this spreadsheet if there is not enough space on page 3 or if the evaluation is generally carried out on page 4.

3. Form „WORD“

This file is intended for the descriptive part of the documentation. The page numbering is preset on page 5; it must be adjusted as required. Document protection is not set up.

Many, including international course measurer, supplement the descriptive part with a schematic course diagram or a stored map of the location. Here the measuring points as well as the stationing, turns, etc. can be entered. The diagram is helpful for the later association and course supervisor or assigned course measurer to understand the measurement structure and the special features of nested competition routes. A true-to-scale sketch is not always helpful.

Note: It is recommended to integrate the documentation relevant to the measurement arrangement with photos/graphics etc. into this form after the descriptive part of the course(s). Due to the later file size, pay attention to the resolution of the images (e.g. 150 mm width / resolution up to 100 dpi - this also helps).

As a rule, photo credits of the kilometre points are not the subject of the documentation; as part of the measurement service, additional photo documentation can be made available to the organiser.

4. Course map

Principle: According to the regulations, the documentation of the course with the measured corridor must be so precise that a remeasurement can be carried out at any time by the officials appointed by the associations on the basis of the course map or the possibility of checking the measurement for its correctness is given.

Copyright guidelines must be observed for externally generated map documents. In the case of e.g. www.openstreetmap.org this is the note: © www.openstreetmap.org contributors

The course map or individual plans for the measured course sections are an essential part of the documentation. The plan shows the course, barriers, special corridors and the kilometre points with start and finish as well as the necessary turning points and barriers.

It is advisable to create the necessary plans with common graphics and layout programs. Manually created drawings can be scanned and used as image files. As an order criterion, it is advisable to number the pages after the pages of the "Form WORD" and to enter the pages in the basic data of page 1.

5. International report of measurement

The measurement report is generated as a coherent PDF document; the file name can be chosen freely.

The documentation created with the international forms is transmitted to the responsible international administrator. The certificates issued for the measured courses are transmitted with the documentation to the client and organizer.

The measurement forms provided have proven themselves nationally and internationally for over 20 years. The developer provides them free of charge in German, English/French; they are based on the recommendations of the international associations and course measurers (Grade A/B).

In the event of further developments based on these forms and their predecessors (since 2008), the developer expressly reserves the copyright!

Konz, September 2026

Karl Josef Roth • Dipl. Ing. (FH) für Vermessung
Int. Straßenstreckenvermesser WA/AIMS [Grade A]
Im Sonnenschein 40 • D-54329 Konz
Tel +491703837807
Mail kjrun1957@gmail.com • info@laufstreckenvermessung.de
Service-Homepage <https://laufstreckenvermessung.de>
Sales Jones-Counter counter@laufstreckenvermessung.de