

Leica Geosystems Calibration Certificates White paper



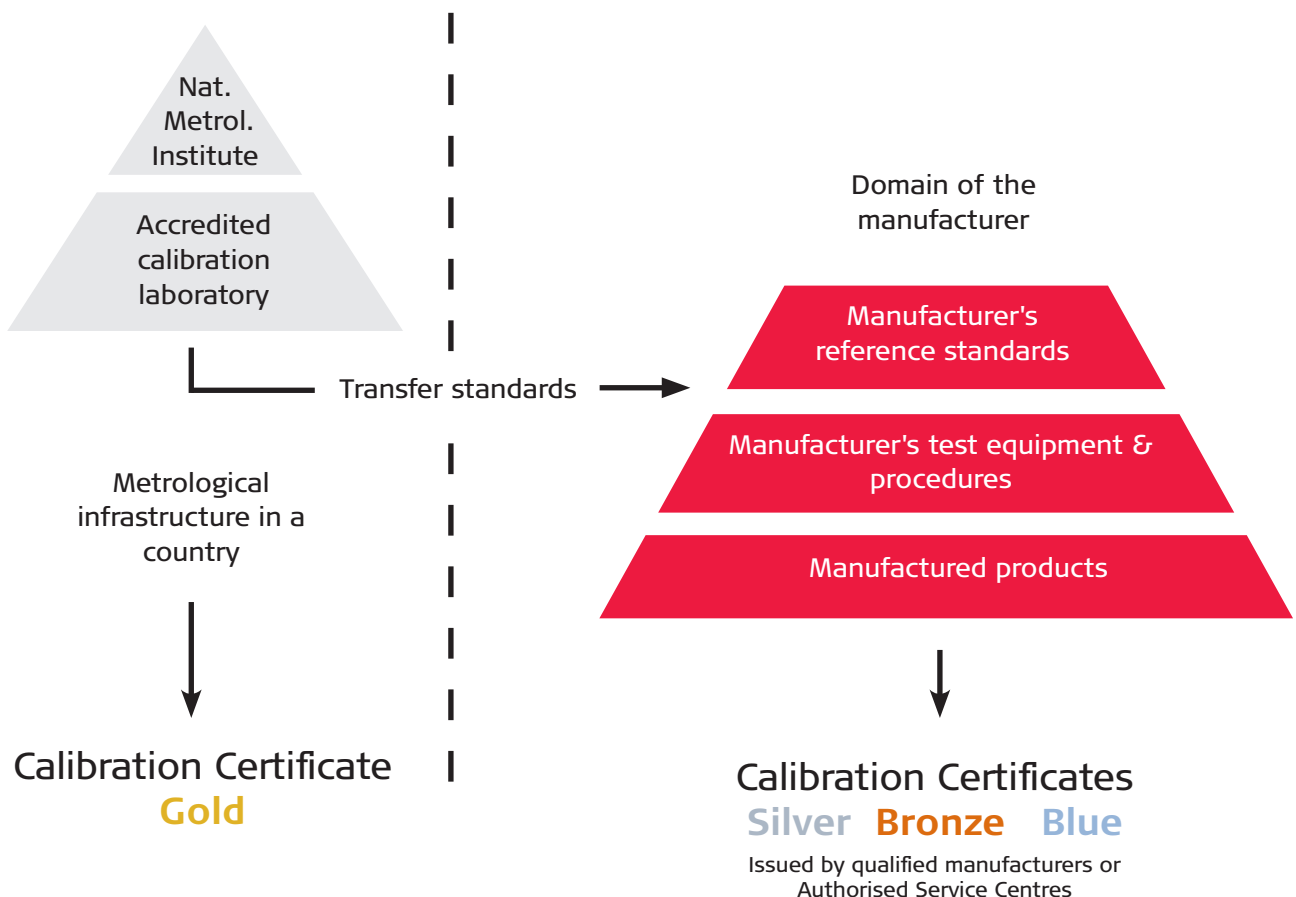
The overall demand for calibration certificates confirming the measurement quality of new or used surveying equipment is increasing. This is mainly due to the fact that more and more surveying companies or their contractors are becoming ISO 9001 certified and therefore need to confirm the accuracy of their equipment periodically.

A number of calibration certificates are available for Leica Geosystems total stations, digital levels, GNSS sensors and controllers - at the initial purchase of the equipment and periodic recalibrations at our authorised service centres. Leica Geosystems has Accredited Calibration Laboratories (SCS079) for distances and angles granted by the Swiss Accreditation Service (SAS) in accordance with the standard ISO/IEC 17025.

Leica Geosystems offers a large variety of calibration certificates at different levels. At the highest level, Calibration Certificates Gold are issued by the Accredited Calibration Laboratories, at the next level, Calibration Certificates Silver and Bronze and at the simplest level Calibration Certificates Blue.

Calibration Certificates Gold are internationally acknowledged certificates that are only issued by Leica Geosystems Accredited Calibration Laboratories in Heerbrugg, Switzerland.

Calibration Certificates Silver, Bronze and Blue are based on Leica Geosystems reference standards and test equipment and procedures and can be issued by production facilities and Leica Geosystems Authorised Service Centres.



Accredited Calibration Laboratories

Leica Geosystems has Accredited Calibration Laboratories for distances and angles. The accreditation (SCS 079) is in accordance with the standard ISO/IEC 17025 and is granted by the Swiss Accreditation Service (SAS).

The Swiss Accreditation Service is a member of the ILAC (International Laboratory Accreditation Cooperation) and signatory of the Mutual Recognition Agreement (MRA). The ranges and best uncertainties of measurement are listed in the official SCS-Directory of the accredited calibration laboratories. More information can be found on: www.sas.ch.



Currently, Leica Geosystems has the following Accredited Calibration Laboratories for distance measurements:

- Measurement laboratories for the determination of the linearity and the zero point correction
- 3000 m baselines for the determination of the standard deviation and for the verification of the zero point correction



- Frequency measurement laboratories to determine the measuring frequency at various temperatures



For angles, Leica Geosystems has the following Accredited Calibration Laboratory:

- An angle measurement laboratory (Theodolite Testing Machine "TPM2", designed and developed by Leica Geosystems) for the determination of the standard deviation of angle measurements (vertical and horizontal)



ISO 9001 / 14001 Certification

The Management System of Leica Geosystems has been certified according to the international standard ISO 9001. The certification applies to production and development locations and to most of the sales and service organisations.

The production facilities of Leica Geosystems also fulfill the requirements for environmental management standard of ISO 14001. The integrated management system also includes the requirements for social responsibility, work safety and health management.

Through regular internal reviews and audits as well as audits by an external, independent, accredited assessment and certification body, Leica Geosystems guarantees that the management system is regularly reviewed and updated to ensure continual improvement.







Calibration Certificates

Leica Geosystems offers a variety of calibration certificates at different levels. At the highest level Calibration Certificates Gold are issued by the accredited calibration laboratories, at the next level Calibration Certificates Silver and Bronze and at the simplest level Calibration Certificates Blue.

Calibration certificates are available for Leica Geosystems total stations, digital levels and GNSS sensors - for new equipment at initial purchase or for used equipment at Leica Geosystems Authorised Service Centres.





Calibration certificates are available to download on myWorld @ Leica Geosystems: (www.myworld.leica-geosystems.com) and as a paper printout.

For **new** equipment the following calibration certificates are available:

	Blue	Bronze	Silver	Gold
TPS 	✓		○	○
GNSS 	✓		○	
DNA 	✓		○	
Controller 	✓			

- ✓ Always included (available for download on myWorld)
- Option

For **used** equipment the following calibration certificates are available at Leica Geosystems Authorised Service Centres:

	Blue	Bronze	Silver	Gold
TPS 	✓	○	○*	○**
GNSS 	✓	○	○*	
DNA 	✓	○	○*	
Controller 	✓			

- ✓ Always included (also available for download on myWorld)
- Option

* Not available in all local authorised service centres.
May require shipping equipment to central service location.
** Requires shipping to central service location.

Calibration Certificates

Gold

Calibration Certificates Gold confirms that the product was inspected and explicitly state the traceability to national standards, the uncertainty of measurement and compliance of the measurement values with the published product specifications at the time of inspection. These certificates are supplemented by detailed measurement reports.

Calibration Certificates Gold are internationally acknowledged certificates that can only be issued by calibration laboratories with national accreditation. The accreditation (SCS 079) is in accordance with the standard ISO/IEC 17025 and is granted by the Swiss Accreditation Service (SAS), member of ILAC (International Laboratory Accreditation Cooperation).

The national accreditation is indicated by the registered accreditation mark (SCS) and number on the calibration certificate (079).

Calibration Certificates Gold can only be issued at the Accredited Calibration Laboratories in Heerbrugg, Switzerland, either at the initial purchase of the equipment or for periodic recalibration.

After successful calibration a sticker is placed on the instrument.



For total stations, the following tests are done at the Accredited Calibration Laboratories in Heerbrugg, Switzerland:

Distance (Prism)

- Laboratory (Measuring Base Distance): automated measuring of 24 to 28 distances up to 122 m, compare to reference distances measured with interferometer
- Field (Field Base "Rheindamm"): measure 21 distances between 7 pillars up to 500 m

Distance (Non-Prism)

- Laboratory (Measuring Base Distance): automated measuring of 12 distances up to 61 m, compare to reference distances measured with interferometer

Distance (Frequency)

- Laboratory: measure modulation frequency of EDM at different temperatures in climate chamber (from -20°C to +50°C)

Angle (Hz and V)

- Laboratory (Theodolite Testing Machine): automatic measuring of 36 V and 36 Hz angles

Calibration Certificates Gold are required in measuring tasks for applications with public interest (e.g. public health, public safety, sports events, selected legal procedures).



Calibration Certificates

Silver

Calibration Certificates Silver confirms that the individual product was inspected and that the published specifications were met at the time of inspection.

The certificate specifies the measurement standard deviation and includes a product specific summary of the relevant measurement values obtained, partly supplemented by measurement reports.

Calibration Certificates Silver are defined by the manufacturer based on the manufacturer's defined standards and comply with ISO 9001 requirements. The applied test procedures are traceable to national standards or to recognised procedures. Calibration Certificates Silver correspond to the Producer Inspection Certificate M in accordance with DIN 55 350 Part 18-4.2.2.

Calibration Certificates Silver are issued at laboratories using test procedures which are traceable to national standards or recognised procedures. Calibration Certificates Silver can be issued in Heerbrugg, Switzerland, either at the initial purchase of the equipment or for periodic recalibration at the Central Technical Service in Heerbrugg. Calibration Certificates Silver can also be issued for periodic recalibration at selected authorised Leica Geosystems service centres that are equipped with the respective testing facilities and competencies ("Lab Method").

For total stations, the following tests are done at the Accredited Calibration Laboratories in Heerbrugg, Switzerland and at Authorised Service Centres:

Distance (Prism)

- Laboratory (Baseline): measuring of 3 distances between 12 m and 150 m 3 times each

Distance (Non-Prism)

- Laboratory (Baseline): measuring of 3 distances between 12 m and 150 m 3 times each

Angles

- Laboratory (Collimators):
 Hz: measuring 1 series of 3 sets with 5 directions in both faces to horizontally distributed collimators, total 30 measurements
 V: measuring 1 series of 3 sets with 5 directions in both faces to vertically distributed collimators, total 30 measurements

For GNSS, the following tests are available at Authorised Service Centres:

GNSS

- Laboratory: measuring procedure and calculations according ISO 17123-8: 3 measurement series with 5 measurement sets with 90 min interval

Calibration Certificates Silver or higher are required by companies or departments that are either ISO 9001 certified or contracted by a party that is ISO certified is obliged to fulfill the verification aspects of a "control of monitoring and measuring devices" system.



Calibration Certificates Blue

Calibration Certificates Blue confirms that the individual product was inspected and that the published specifications were met at the time of inspection.

Calibration Certificates Blue do not specify the measurement standard deviation and are not supplemented by measurement reports.

Calibration Certificates Blue are defined by the manufacturer based on the manufacturer's defined standards. Calibration Certificates Blue correspond to the Producer Inspection Certificate O in accordance with DIN 55 350 Part 18-4.2.1.

Calibration Certificates Blue are issued by laboratories using test procedures that are based on the manufacturer's defined standards. Calibration Certificates Blue are issued in Heerbrugg, Switzerland at the initial purchase of the equipment and for inspections, periodic maintenance or repairs at Leica Geosystems Authorised Service Centres.

Calibration Certificates Blue can be used in specific areas to prove the applied duty of care in measuring tasks. However, Calibration Certificates Blue do not formally fulfill the verification aspects of a 'control of monitoring and measuring devices' system based on the ISO 9001 requirements. Very often Calibration Certificates Blue are accepted to confirm formal conformity in financing services (e.g. leasing contracts) or shipping declaration cases.



Summary

Depending on the application and the ISO 9001 certification of the company, department or contractor many companies or departments are obliged to fulfill the verification aspects of a "control of monitoring and measuring devices" system.

Leica Geosystems Calibration Certificates confirm the accuracy of the surveying equipment to offer the highest level of confidence for surveying equipment.

	Service Report	Calibration Certificate Blue	Calibration Certificate Bronze	Calibration Certificate Silver	Calibration Certificate Gold
Pre-Authorised Leica Geosystems Service Centers	Always issued in combination with a repair or maintenance				
Authorised Leica Geosystems Service Centers	Always issued in combination with a repair or maintenance	Always issued in combination with a repair or maintenance	Can be issued in combination with a repair or maintenance		
Authorised Leica Geosystems Service Centers with "Lab Method" infrastructure	Always issued in combination with a repair or maintenance	Always issued in combination with a repair or maintenance	Can be issued in combination with a repair or maintenance	Can be issued in combination with a repair or maintenance	
Central Technical Service Heerbrugg, Switzerland	Always issued in combination with a repair or maintenance	Always issued in combination with a repair or maintenance	Can be issued in combination with a repair or maintenance	Can be issued in combination with a repair or maintenance	Point of contact for periodic re-calibration
Production Facilities, Heerbrugg, Switzerland		Always issued for initial delivery (myWorld)		Can be issued with initial delivery	
Calibration Laboratory Heerbrugg, Switzerland					Can be issued with initial delivery or for re-calibration

Leica Geosystems owns Accredited Calibration Laboratories for distances and angles. The accreditation (SCS 079) is granted by the Swiss Accreditation Service (SAS) and is in accordance with the standard ISO/IEC 17025 and with ILAC (International Laboratory Accreditation Cooperation).

Leica Geosystems Calibration Certificates offer the highest level of confidence for surveying equipment.

When it has to be right.

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