



SVHM certification

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Senior Approval Expert



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Overview NMI Certin & UK (TIC) Ltd.

Offering solutions with global reach to suit client needs



+100
Employee head count



1,400+ m²
Lab & office space

Head Office
Thijssseweg 11,
2629 JA Delft The
Netherlands



**Accredited QMS according to
ISO 17020/21/25/65
ESG certified**

- EU Notified Body
- NL, BE and UK Approved Body
- DE Designated Body
- OIML Issuing Authority
- NSCIB Certification Body



Certificates per annum

- >90k Calibrations
- >4.5k Type Approval and evaluation documents
- >500 Audits



Top 3
In the global ATICC
Legal Metrology



+150years
Industry knowledge
and track record of
success



NMI – @ a glance

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The NMI Group

NMI Group businesses positioned to drive recurrent value propositions across the full ATICC value chain: From Market Access to In-Life Device asset management



Measuring tomorrow

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Scope of Services

SERVICES	NMI CERTIN & NMI UK (TIC) LTD.	YOUNG CALIBRATION	CHAMOIS METROLOGY	AVON DYNAMIC CALIBRATION	TRUSTCB	MINERVA METROLOGY & CALIBRATION
ADVISORY	✓	✓	✓	✓	✓	✓
TESTING	✓	✓(2)		✓		
INSPECTION	✓	✓		✓(4)		
CERTIFICATION	✓				✓(5)	
CALIBRATION	✓(1)	✓	✓	✓		✓
EQUIPMENT REPAIRS			✓	✓		✓
EQUIPMENT SALES			✓	✓		✓
MANAGED SERVICES				✓		✓
OTHER SERVICES		✓(3)		✓(4)	✓	

(1) Force and hardness calibration within Verification & Calibration with RvA accreditation for ISO 17025

(2) Testing of heat exchanger for motorsports and automotive applications. Parts performance and durability testing with high-end requirements (i.e., F1, Mercedes AMG, Porsche)

(3) Cleaning service for Microscopic Particle Analysis and Heat Exchanger under ISO-16232

(4) Avon-Dynamic provides Interferometry and a component inspection service in its own laboratory, or onsite at customers premises. The business also provides a delivery service within the UK.

(5) Certifies whether products such as: chips, apps and smart meters meet cyber security requirements set by the EU

GROUP CALIBRATION SERVICES																
TYPE	AIR VELOCITY	ACOUSTIC DENSITY	DIMENSIONAL	ELECTRICAL	FLOW	FORCE	HUMIDITY	INTER- FORMERTRY	MASS	MEDICAL	PRESSURE	REFERENCE MATERIAL	TEMPERATURE	TORQUE	VIBRATION	OTHER
NMI CERTIN & NMI UK (TIC) LTD.			✓			✓						✓		✓		✓
YOUNG CALIBRATION	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓
CHAMOIS METROLOGY			✓	✓					✓		✓		✓			✓
AVON DYNAMIC CALIBRATION			✓	✓				✓			✓		✓	✓		✓
MINERVA METROLOGY & CALIBRATION				✓					✓		✓		✓			

✓ = RvA or UKAS accreditation, ✓ = Traceable only service

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Agenda



- **Legislation of Static Liquid Quantity Meters** (SVHM = Statistische vloeistofhoeveelheidmeter)
 - Introduction of SVHM
 - Transition arrangements
 - Decision tree for certification
- **Practical challenges with SVHM**
 - International standards and guidance
 - How to measure?
 - Measurement uncertainty
 - Who is the manufacturer of the SVHM?
- **Certification process**
 - Type approval
 - Verifications



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Legal metrology in NL



In the 'Metrologiewet' is a regulated measuring task defined as:

- Article 1 e. "geregelde meettaak: meettaak ten behoeve van een specifieke toepassing, bedoeld in artikel 5, eerste lid;"
- Article 5 makes reference to: 'wetten, besluiten en regelingen'

'Besluit meetinstrumenten en marktdeelnemers'

- Article 4: "Een meettaak ten behoeve van een specifieke toepassing als bedoeld in artikel 5, eerste lid, van de wet is het bij het **drijven van handel**, bij **levering** uit hoofde van beroep of bedrijf en bij het vaststellen van **belastingen of van andere heffingen**:
 - a. meten van een hoeveelheid vloeistof in een meetreservoir, anders dan een scheepstank;
 - ..."

'Regeling nationaal autonoom geregelde meetinstrumenten':

- Definitions "meetreservoir: reservoir bestemd voor de bewaring of aflevering van vloeistoffen, niet zijnde een scheepstank, dat specifiek is ingericht om de hoeveelheid vloeistof die het bevat of de hoeveelheid erin geplaatste of eruit verplaatste vloeistof te bepalen;"

Legal metrology is also called custody transfer.

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Introduction SVHM



Dutch legislation changed 1 November 2016:

"Regeling nationaal autonoom geregelde meetinstrumenten"

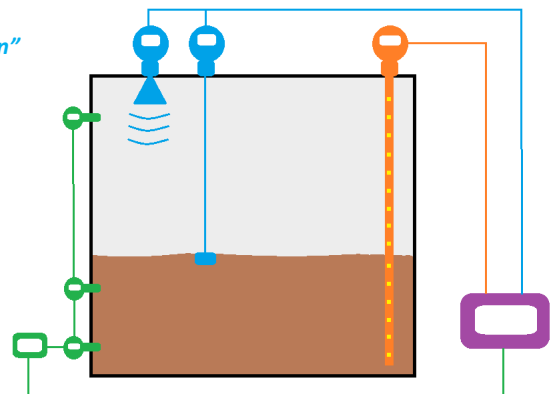
Static Liquid Quantity Meter =
"Statische vloeistofhoeveelheidmeter" or SVHM

SVHM = measuring reservoir (i.e. storage tank) + measuring device

Possible measuring devices:

- Dipstick with volume units
- Dipstick with length units
- Automatic level gauge
- Mass meter (i.e. HTG with pressure sensors)

Including road tankers with these measuring principles



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In the past...



Before 1 November 2016:

- Dutch legislation:
Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters
- Separate certification and verifications of:
 - Measuring reservoir (i.e. storage tank)
 - Measuring device (i.e. dipstick or automatic level gauge)
 - Not including mass meters (i.e. HTG)
- Not covered:
 - Temperature measurements
 - Volume, conversion and mass calculations



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Transition arrangements



Artikel 79 Regeling nationaal autonoom geregelde meetinstrumenten

Meetreservoirs, vloeistofhoogtemeters, discontinue brandstofmeters en peilstokken waarvoor voorafgaand aan de inwerkingtreding van deze regeling een **verklaring van toelating** als bedoeld in artikel 34 van het Besluit meetinstrumenten en marktdeelnemers, **dan wel** een **certificaat van overeenstemming** als bedoeld in bijlage G van Richtlijn 2004/22/EG van het Europees Parlement en de Raad van 31 maart 2004 betreffende meetinstrumenten (PbEU 2004, L 135) of een **conformiteitscertificaat** als bedoeld in bijlage I, module G, van de richtlijn meetinstrumenten, is afgegeven worden beschouwd te voldoen aan de relevante eisen in deze regeling wanneer:

- a. deze in gebruik zijn genomen **voorafgaand aan of binnen tien jaar** na de inwerkingtreding van deze regeling, en
- b. deze voldoen aan de bij de Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters gestelde eisen.



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Transition in short...



Artikel 79 Regeling nationaal autonoom geregelde meetinstrumenten

Transition period of 10 years, so **until 1 November 2026**

Only applicable:

- If a measuring reservoirs has a conformity certificate ("Certificaat van Meting") which is issued before 1 November 2016

AND

- If the measuring instruments (Automatic level gauges or Dipsticks) has a type approval certificate ("Toelating") which is initially issued before 1 November 2016

Still needs to covered by:

- Dutch legislation:
Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters

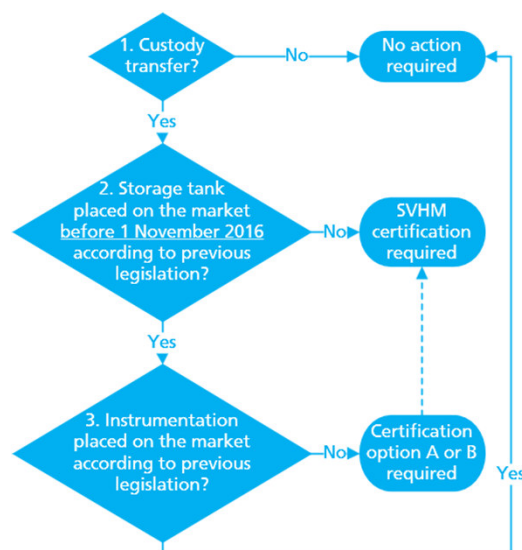


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Decision tree for SVHM certification



Custody transfer:

Is legal metrology applicable?
Measurements of liquid quantities are done related to selling, taxes or other payments?
See article 4 'Besluit meetinstrumenten en marktdeelnemers'.

Previous legislation:

'Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters' or 'onthefing' for HTG

Placed on the market:

Initial verification is successfully performed and i.a. sealing is still in place.

Certification options:

- A. Allowed up to 1 November 2026 →
Separate instrument certification based on a type approval certificate initially issued before 1 November 2016.
This option is not allowed for HTG.
- B. All other cases SVHM certification required

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Version date: 2 October 2024
Subject to current insights into the legislation.
No rights can be derived from this information.

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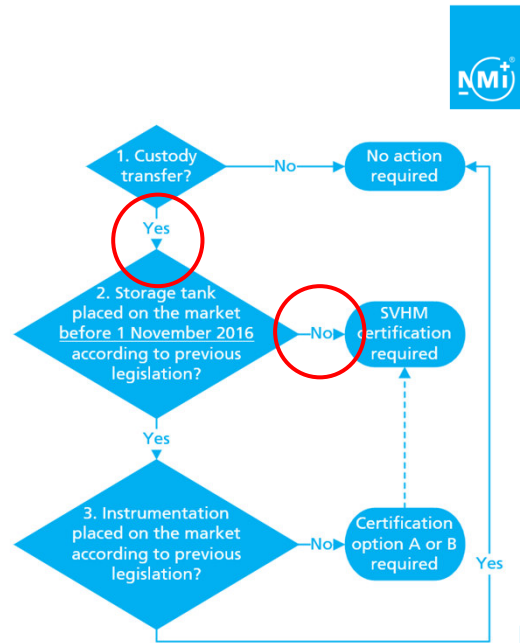
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Example 1

- Tank only used for inventory measurements for taxes
- Level gauge and tank installed without initial verification / calibration

Certification required:

- a) SVHM complete certification



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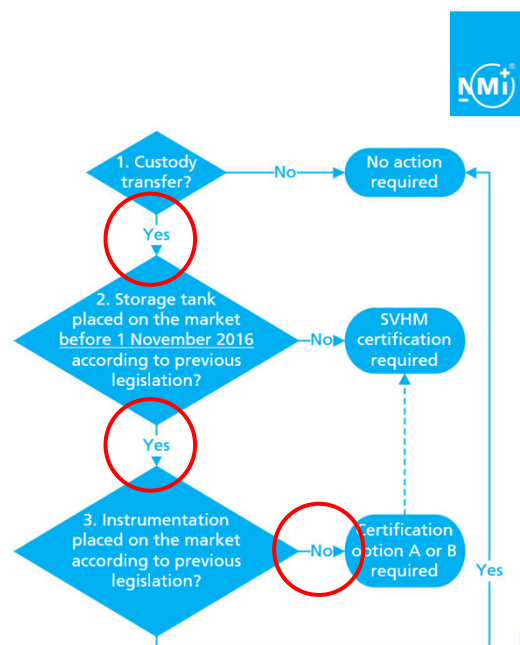
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Example 2

- Tank only used for inventory measurements for taxes
- Tank with conformity certificate issued in 2015
- New level gauge installed in 2024 according to existing type approval certificate initial issued in 2014

Certification required:

- a) SVHM complete certification (future proof)
 b) Old separate certification 'Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters' (allowed up to 1 November 2026)



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Example 3

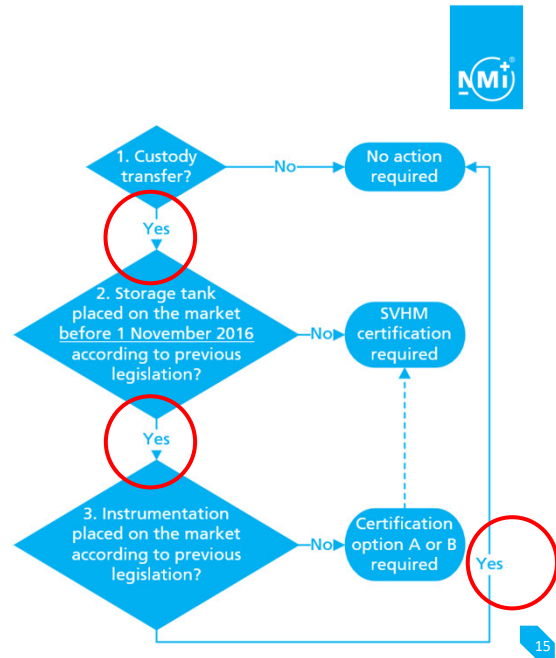
- Tank used for custody transfer
- Tank with conformity certificate issued in 2015
- Level gauge with existing type approval certificate initial issued in 2012 and initial verification successfully performed in 2014 (including NMi sealing)

No action required

Note:

No additional functionality is allowed to be added. Otherwise certification is required.

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Example 4

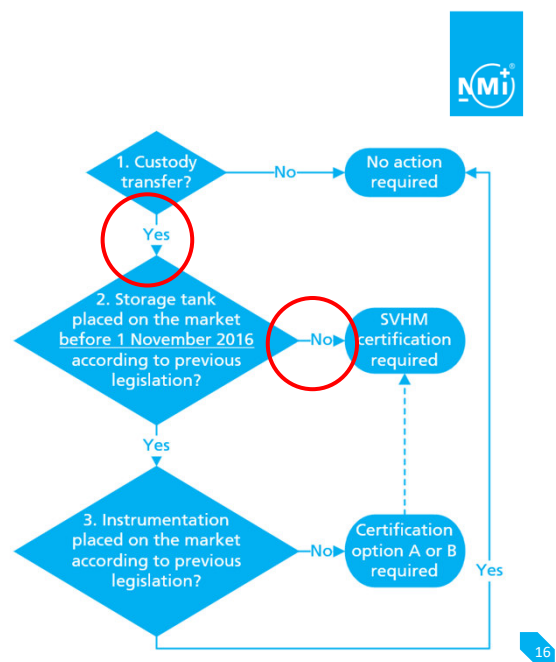
- Tank used for custody transfer
- Tank with conformity certificate issued in 2017
- Level gauge with existing type approval certificate initial issued in 2012 and initial verification successfully performed in 2014 (including NMi sealing)

Certification required:

As the tank is placed on the market after 1 November 2016:

- a) SVHM complete certification

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Maximum permissible error SVHM



Article 17 of the NL Regulation

The **maximum permissible error (MPE)** of the measured or converted quantity* is:

- At the initial conformity assessment: $\pm 0,8\%$
 - After commissioning: $\pm 1,0\%$
- * = e.g. mass or volume at 15 °C

Valid for **ALL operational conditions**:

- Ambient temperature and other influences
- Liquid temperature
- Liquid density
- Expansions of the reservoir
- Inventory and transfers
- Vapour content
- ...

How can this be tested with the SVHM as a whole instrument?



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Interpretation of the Dutch Regulation



More details about testing and certification are NOT included in the Dutch Regulation...
However as mentioned in the elucidation ('Toelichting') → **International common requirements**

For components:

- Measuring reservoir → OIML R71, OIML R95, ISO 4512, ISO 4269, ISO series 7507 and ISO 12917
- Dipstick with volume / length unit → OIML R80
- Automatic level gauge → OIML R85
- Mass meter (HTG) → OIML R125 / ISO 11223
- Automatic tank thermometer (ATT) → API MPMS Chapter 7.3

For combination:

- Measuring reservoir + Measuring device = SVHM → **No known standard...**



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Field testing



Field testing is practical not possible

Challenges/ practical impossibilities:

- SVHM with a measuring device and measuring reservoir is too big (e.g. 40 m high)
- Ambient temperature and influences (e.g. sunlight, wind, rain and snow)
- Liquid temperature and density
- Transferring to another tank is often not possible
 - i.a. tank capacity or contamination of liquid
- Time consuming
- What to use as a reference test equipment?
- Not ALL conditions are covered with a single or a pair of tests...

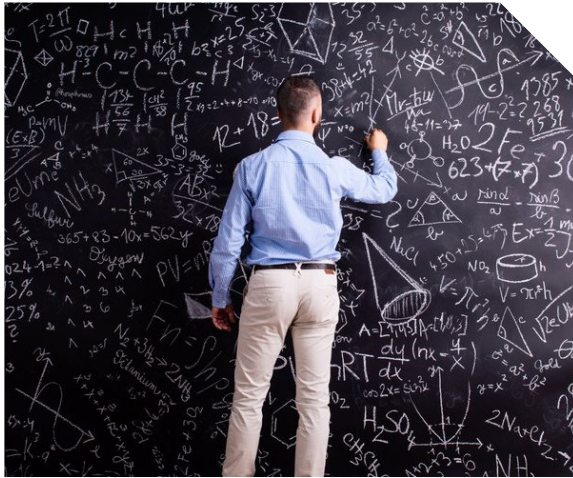
So how to check the SVHM with compliance with the MPE in all situations?

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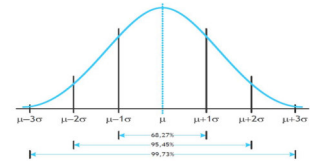
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Uncertainty calculation



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Determine what you **KNOW** and what you do **NOT KNOW** of the measurement



Uncertainty calculation model:

- All uncertainty sources needs to be included
- Per uncertainty source the contribution needs to be determined
 - Type approval investigation
 - Separate measurements
 - Traceable data
 - Calculations based on assumptions

Final results:

Determining operational conditions and limits of SVHM related to the maximum permissible error

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Sharing knowledge about measurement uncertainty

Operational conditions and tank design do influence the measuring capabilities of the SVHM.

Multiple measurement uncertainties are **not instrument related**.

Risk is that manufacturers will handle operational conditions differently, such as:

- Temperature stratification
- Water sediment
- Floating roof influence
- Vapor content
- Etc...

A manufacturer / technical expert group would be benefitable to all involved parties for a **harmonized approach** for these calculations.



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Who will be the manufacturer of the SVHM?



Manufacturer of the SVHM

?

Manufacturer measuring instrument / Manufacturer measuring reservoir / any other party ...?



Manufacturer of the SVHM does require **knowledge of the combination** measuring instrument and measuring reservoir

Tasks can be outsourced such as making uncertainty calculation

The manufacturer is responsible for correct measurements and other legal requirements (e.g. ATEX and Cyber Resilience Act)

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Type approval



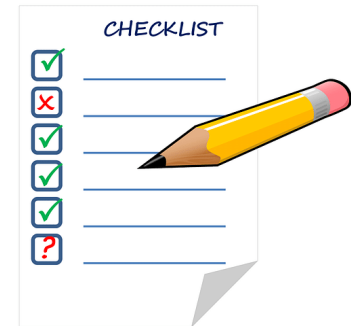
As per MID and Dutch legislation → Manufacturer is responsible

Each of the measuring devices component needs to have a type approval certificate according to the Dutch Regulation

Type approval certificate SVHM can be based on the uncertainty calculation of SVHM and resulting in conditions stated in the certificate:

- Minimum measured quantity (MMQ)
- Liquid product types and ranges (temperature and density)
- Conversion methods (e.g. volume at 15 °C per API MPMS standard...)
- Registration of the measurement (printer and/or memory device)
- Installation instruction / determinations
 - Gauge reference height
 - Stilling well
 - Measuring reservoir (e.g. insulation, floating roof)
 - Tank mixer
 - Vapour
 - ...

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Initial verification



On basis of type approval certificate and applicable conditions

The main steps for conformity assessment on site:

- **Measuring reservoir**
 - Marking according [Artikel 8 Regeling nationaal autonoom geregelde meetinstrumenten](#)
 - Calibration certificate or so called 'Certificaat van Meting' according [Artikel 11 Regeling nationaal autonoom geregelde meetinstrumenten](#)
- **Measuring device**
 - According to type approval certificate
 - Calibrated on full range (in factory or lab)
 - Tests on site (e.g. setting reference height or zero point)
- **Complete SVHM**
 - According to type approval certificate (e.g. conditions, markings, etc.)
 - Correct measuring ranges applied
 - In line with uncertainty calculation

After positive result of the initial verification:

- Certificate of conformity (CoC) / 'Conformiteitscertificaat' per SVHM (per tank)

Clarity about measuring range and conditions of the SVHM

- Stated on CoC of the SVHM and markings on the name plate

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Final resulting paperwork for SVHM



Per 'statisch vloeistofhoeveelheidmeter' (static liquid quantity meter):

Issued by the designated body (e.g NMI):

- 'Conformiteitscertificaat' / Certificate of conformity (CoC)

Issued by the SVHM manufacturer:

- 'Conformiteitsverklaring' / Declaration of conformity (DoC)

As basis for SVHM CoC, the *component certification* can be used:

- 'Conformiteitscertificaat' / CoC of **measuring device** (E.g. level gauge or HTG system) on the basis of the applicable type approval certificate
- 'Certificaat van Meting' / calibration certificate of **measuring reservoir**



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Trusted Technical Experts In Legal Metrology and Measuring Technology

Advice

Insight for 1st-time success once development reach testing and approval

Test

Examine measurement devices & components for critical compliance and qualification requirements

Inspect

Ensure mass production quality and identify critical issues before product market entry

Certify

Dispense trusted NMI seal of approval for market access to Europe, the UK and beyond

Calibrate

Evaluate and adjust the precision and accuracy of vital equipment

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