

# Ultrasound Analyst CERTIFICATION GUIDE

MIBoC Certification according  
to ISO 18436-1 and 18436-8  
**CATEGORY I - II**



ISO/IEC 17024 & ISO 18436 ACCREDITED



**Mobius Institute Board of Certification**  
[www.mobiuscertification.org](http://www.mobiuscertification.org)

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**Version 5; Issued 11 June 2021**

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Welcome

Thank you for your interest in Mobius Institute Board of Certification (MIBoC), an ISO/IEC accredited certification body having certified condition monitoring personnel from over 100 countries. MIBoC certification is delivered through MIBoC authorized examination centers in over 50 countries. See the MIBoC website at [www.mobiuscertification.org](http://www.mobiuscertification.org) to locate an authorized examination center near you.

In addition to sitting your exam through a MIBoC examination center, you also have the convenient option to sit your certification examination at a time and location of your choice using either a paper-based exam or our secure online examination software.

When considering your ultrasound certification provider, you must be assured that the certification does meet the ISO 18436 specification that all ultrasound condition monitoring personnel are measured to. Many equipment vendors, consultants and training organizations offer ultrasound training and certification. Many will advertise that they their training and certification “follows the ISO 18436 standard”, but those not accredited may or may not actually provide you the competency intended by the ISO 18436 standard. Only accredited organizations can and do provide the highest level of recognition associated with the certifying body’s accreditation. Mobius Institute Board of Certification is accredited to ISO/IEC 17024 and ISO 18436-1 by an accredited IAF member organization, to ensure the certification program meets the ISO 18436 specification. IAF organizations include Joint Accreditation System of Australia and New Zealand (JAS-ANZ), American National Standards Institute (ANSI) and the United Kingdom Accreditation Services (UKAS).

## Getting Started

MIBoC is here to help you. We have friendly and knowledgeable staff that will guide you along your way through your ultrasound certification. Never hesitate to contact us with your questions. Because we serve customers through all world time zones, it is best to contact us by email at [certification@mobiuscertification.org](mailto:certification@mobiuscertification.org) and we will respond promptly with email.

## Thank you

We hope that this Certification Guide provides you a good understanding of what ultrasound certification is all about. If you have any further questions please don’t hesitate to contact us.

We wish you the greatest success as you educate yourself and become certified.

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## Introduction

This Certification Guide has been written to provide the reader with the essential information, in layman's terms, about the ultrasound certification scheme of the Mobius Institute Board of Certification.

It contains information about MIBoC's certification scheme, which is accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ). It is therefore internationally recognized and accredited at the same level as organizations which are accredited by the American National Standards Institute (ANSI) and the United Kingdom Accreditation Services (UKAS).

This guide also outlines a roadmap of MIBoC ultrasound certification, as well as the benefits which certification brings, and the requirements that need to be fulfilled to become certified.

This guide should be read in conjunction with the scheme documents, particularly the General Scheme Requirements ([ED002](#)) and the Ultrasound Scheme Requirements ([ED134](#)). These documents can be downloaded from the MIBoC website at [www.mobiuscertification.org](http://www.mobiuscertification.org).

## MIBoC's Ultrasound Certification Roadmap

MIBoC's scheme covers ultrasound certification for Category I and II. Our classification of the ultrasound categories is based on those outlined in standard ISO 18436-8.

Ultrasound personnel who are certified through MIBoC should be justifiably proud of their achievements.

### Category I Ultrasound

Ultrasound personnel certified to Category I will have a good understanding of the fundamentals of ultrasound. They are able to apply a specific ultrasound measurement technique, set up and operate ultrasound equipment for safe data collection, and verify the integrity of collected data. They are also able to perform basic fault detection, severity assessment and diagnosis in accordance with established procedures. Additionally, they can maintain a database of results and trends, verify the sensitivity of measurement instruments, evaluate test results and prevent or control factors that results in the acquisition of poor quality data.



### Category II Ultrasound

In addition to having to knowledge and capability of a person certified to Category I, Category II certified personnel are able to select the appropriate ultrasound measurement technique and understand its limitation as well as set up and verify equipment settings. They are also able to measure and perform diagnosis of ultrasound signals, classify and evaluate test results in accordance with applicable codes, standards specifications and procedures and prepare reports on equipment condition fault diagnoses, recommend appropriate corrective actions and comment of effectiveness of repairs. Additionally, they are able to



provide technical direction to ultrasound monitoring personnel at Category I and be aware of the use of alternative or supplementary condition monitoring technologies.

## About MIBoC

Mobius Institute began certifying Vibration Analysts in 2005.

The Mobius Institute Board of Certification (MIBoC) was formed in 2011 to provide independent and impartial certification for personnel involved in condition monitoring and diagnostics of machines.

In 2017 MIBoC expanded its certification scheme to include Infrared Thermography and Ultrasound and in 2018 we released our certification scheme for Asset Reliability Practitioners.

MIBoC's aim is to provide access to condition monitoring and asset reliability practitioners certification around the world, and in as many languages as possible. We believe that if a practitioner wants to become certified, he or she should not be impeded by location, language or socio-economic situation.

In 2012 MIBoC was formally accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) to the international standard ISO/IEC 17024 to provide personnel certification in the condition monitoring field.

JAS-ANZ has formal arrangements with a number of international accreditation organizations including the International Accreditation Forum (IAF), the Pacific Accreditation Cooperation (PAC), the Asia Pacific Laboratory Accreditation Cooperation, and the European cooperation for Accreditation (EA).



Other IAF member organizations include ANSI in the United States, SAS in Switzerland and UK AS in the United Kingdom.

This means that certification through MIBoC is recognized internationally.

## Committees

The activities and strategic direction of the Mobius Institute Board of Certification are governed by a management team and a number of committees which collectively represent the scheme's stakeholders.

### Governing Body

The remit of the Governing Body is to ensure that the activities of the MIBoC Board, management team and committees meet the needs of the condition monitoring community, including employers, clients, vendors and training companies. Additionally, it is responsible for safeguarding the independence and impartiality of MIBoC at all levels, including its organizational structure, policies and procedures.

### Scheme Committee

MIBoC's scheme committees are responsible for the development, review and approval of the organization's policies and procedures.

Scheme committee members represent stakeholders at a number of different levels, including condition monitoring or asset reliability functionality, industry and geographical region.

### Technical Committee

MIBoC has established separate Technical Committees for each technology in its certification schemes: Vibration Analysis, Thermography, Ultrasound and Asset Reliability.

Members of MIBoC's Technical Committees provide expertise on the technical aspects of the certification scheme, including

- the development, review and approval of the examination questions,
- the review and approval of training courses and certifications from other organizations,
- providing an escalation point for technical decisions relating to certification, appeals and complaints.

## **MIBoC's Certification Scheme**

The ultrasound certification program of the Mobius Institute Board of Certification is based on the requirements of international standards ISO/IEC 17024, ISO 18426-1 and ISO 18436-8:

- ISO/IEC 17024 is the ISO standard which outlines how personnel certification programs should be conducted in general.
- ISO 18436-1 is the ISO standard which outlines how personnel certification should be conducted specifically for personnel engaged in Condition Monitoring and Diagnostics of Machines.
- ISO 18436-8 is the ISO standard which outlines the technical requirements that are specific to certification of Ultrasound personnel.

MIBoC's policies, processes and procedures are reviewed and approved by its committees to ensure that they are impartial and meet the needs of the various stakeholder groups. The certification program is reviewed regularly and updated when necessary to reflect changes in the ISO standards or requirements of industry.

### **Benefits of MIBoC Certification**

Certification is required by many employers, and a growing list of companies will not use consultants that have not been certified.

Certification by Mobius Institute Board of Certification is the most highly recognized certification available anywhere. MIBoC is recognized as certifying practical condition monitoring personnel, not just people with good memorization skills.

You do not need to be trained by Mobius Institute to obtain MIBoC certification. As long as you meet the training requirements outlined in this Guide (along with the other certification requirements), you will be eligible to apply for MIBoC certification.



We do not charge annual fees to maintain your certification. Once you have obtained your certification, you will not need to pay anything further until its expiry date when you may wish to renew it.

When you are certified by MIBoC you will receive a digital certificate and card as evidence of your qualification. You will also receive your own personalized certification logo, and (if you consent) your name will be displayed on our website's list of certified analysts.



## Ultrasound Certification Requirements

As per the requirements of ISO 18436-8, in addition to passing the certification exam, candidates for certification need to have a combination of education, training, and experience to ensure they understand the principles and procedures which apply to ultrasound condition monitoring.

Additionally, candidates should be given hearing examinations to ensure natural or corrected hearing acuity exists in at least one ear. A record of the results should be retained and presented to MIBoC upon request. The individual should be capable of hearing a standard pure tone audiometry with results of an average of 25 dB hearing level or lower. This examination should be administered upon initial certification and upon recertification, be administered by a licensed professional and a record of the test made available to MIBoC upon request.

Candidates who do not provide a record of passing the hearing test will receive conditional certification under which it becomes the responsibility of their employer to assess the candidate's hearing acuity and their suitability to perform ultrasound data collection and/or analysis. This condition of certification will be noted on the candidate's certificate as well as MIBoC's website list of certified analysts.

## Education

Whist candidates do not need to provide evidence of any formal education; it is recommended that candidates for Category I and II have at least secondary school graduation diploma or its equivalent.

Category II candidates must be able to manipulate simple algebraic equations, use a basic scientific calculator (including trigonometric and logarithmic functions), and be familiar with the operation of personal computers.

## Training

To be eligible to apply for certification, candidates need to provide evidence of successful completion (such as a Certificate of Attendance) of formal training conforming to the requirements of ISO 18436-3 (*Condition monitoring and diagnostics of machines – Requirements for qualification assessment of personnel – Part 3: Requirements of training bodies and the training process*) and based on the Body of Knowledge specified in Annex A. The minimum training hours are specified in Table 1 below.

**Table 1 – Minimum training (hours)**

Category I	Category II
32	Category I+32

MIBoC recognizes a number of training courses as meeting the training requirements for certification. For a complete list of recognized courses, please refer to document ED146, which can be downloaded from our website.

If you have attended a course which covers the required topics outlined in the Body of Knowledge specified in Appendix A but is not listed as a recognized course in ED146, then you can still apply to have your training recognized by sending us details of the course and training provider, using form EDo41.

In addition to the training hours shown in Table 1, candidates should attend machinery and component training, or equivalent on-the-job training, of at least a similar duration to that specified in Table 1. If undertaken, the additional training should cover the design, manufacturing, installation, operation and maintenance principles of machines and components, the failure modes and mechanisms associated with each principle.

## Examination

To be eligible for certification, candidates must pass the MIBoC ultrasound certification examination. As per ISO 18436-8, the required pass mark is 70%.

For more details of the exam, please refer to the *Certification Examination* section below.

## Experience & previous certification

Candidates must provide evidence of their practical work experience in the field of ultrasound-based machinery condition monitoring and diagnostics. The breadth and depth of the experience is expected to be in line with the category being applied for (refer *Classification of Ultrasound Categories* section above).

Candidates will be asked to provide the contact details of a manager/supervisor who can verify the work experience details submitted by the candidate.

The minimum experience requirements are shown in Table 2 below.

**Table 2 – Minimum experience (months)**

Category I	Category II
6	12

Certification at Category II requires previous certification at the lower category.

Candidates applying for certification at Category II only, who have at least 60 months of verifiable ultrasound work experience, may apply as mature candidates, allowing them to bypass (at MIBoC's discretion) the requirement of have obtained previous certification at Category I.

### Recognition of Prior Learning

MIBoC will take into account prior learning in signal analysis and diagnostic methods on machines.

For candidates who have achieved certification as Vibration Analyst Category III or IV or Acoustic Emission Category II or III through a MIBoC approved certification body, the required cumulative experience shall be  $\frac{1}{3}$  of that stated in Table 2.

For candidates who have achieved certification as Vibration Analyst Category I or II or Acoustic Emission Category I through a MIBoC approved certification body, the required cumulative experience shall be  $\frac{1}{2}$  of that stated in Table 2.

### Code of Ethics

Candidates certified by MIBoC are expected to maintain the highest standards of personal integrity, professional competence and ethical principles, and will be required to agree to a Code of Ethics as part of their registration in our online Training Management System (TMS).

## Certification Exam

MIBoC certification examinations consist of a number of multiple choice questions, selected from MIBoC's exam question database. The content is based on the Body of Knowledge specified in Annex A. The questions are of a practical nature, yet test the candidate on the concepts and principles required to conduct ultrasound condition monitoring, analysis and evaluations. Some questions will include the interpretation of data, and simple mathematical calculations using a basic scientific calculator may be required.

The duration and the number of questions in MIBoC's certification examinations are outlined in Table 3 below.

**Table 3 –Specifications of certification examinations by category**

	Number of Questions	Exam Duration (hours)
Category I	60	2
Category II	60	2

## Examination Development Process

MIBoC’s certification examinations are developed and reviewed using a rigorous psychometric analysis process to ensure the fairness and validity of each exam.

The examination specification is based on the requirements of ISO 18436-8. All questions are reviewed by members of the Ultrasound Technical Committee to ensure they are fair, accurate and appropriate to the category.

Additionally, detailed analysis is carried out on the way the exam questions are answered by candidates to identify any potential anomalies or outliers.

## How to apply for an exam

Candidates may sit a certification examination at one of MIBoC’s many Authorized Examination Centers (AECs) around the world. You will find a list of AECs and their contact details on our website.

If you are unable to get to an AEC location you may take the exam using our invigilation process, which allows you to take the exam at a date and location of your choice, supervised by an invigilator or proctor nominated by you. The invigilator must be someone who is independent and has no involvement or background in condition monitoring or reliability-based maintenance in any manner. Examples include a Human Resource Representative, Training Coordinator, University or Community College exam center.

Invigilated exams may be taken in either a paper-based format or an online internet-based format.

To apply for an invigilated exam, please contact [exams@mobiussinstitute.com](mailto:exams@mobiussinstitute.com).

## Reporting of Results

Examination results are e-mailed directly to the candidate around 10-14 days after the examination is received at MIBoC’s Australian office. Candidates will receive a score range indicating their performance in each of the sections on the exam, as well as an overall score range and a Pass/Fail result.

Due to Privacy Regulations, regardless of who paid for the certification application, results will be made available only to the candidate themselves. However, if the candidate consents, the exam score range will also be made available to the candidate’s AEC where the exam was taken.

## Special Consideration

Candidates may apply for accommodation of special needs, e.g. conditions which may require some form of consideration or compensation, such as language or disabilities. An example of compensation could be extended time for the candidate to complete the exam.

Accommodation for special needs is granted at MIBoC's discretion and candidates may apply using form [ED033](#) which can be downloaded from our website.

## Distribution of Certificates

Certificates and certification cards are issued digitally to successful candidates, who are notified by email. Issuing of digital certificates usually occurs around 2-4 weeks after the examination results are sent to the candidate.

Candidates may opt to additionally receive a printed hardcopy of the certificate and card; applications should be made through the Mobius Institute [webstore](#).

## Appeals & Complaints

Candidates or other parties may lodge a complaint or appeal.

A complaint is typically a criticism of MIBoC's policies/procedures or how these were carried out by MIBoC or an AEC.

An appeal can be lodged against a failure by MIBoC to certify, renew or re-certify a candidate, or against a decision by MIBoC to withdraw or cancel a candidate's certification.

Details of the Appeals/Complaints process can be found on form [ED007](#) which can be downloaded from our website.

## Exam Resits

In the event that a candidate is unsuccessful in passing the certification examination, he/she can apply to re-sit the exam twice, provided that the re-sit takes place no sooner than 30 days after the previous exam date.

A candidate who fails three consecutive attempts will be excluded from further examinations for a period of 12 months.

## Renewal & Re-certification

The period of certification is 5 years. Within 6 months of the certification expiry date the candidate is able to apply to renew the certification for a further 5 years provided he/she can provide evidence of continued work experience in the field of ultrasound condition monitoring for the previous five years without significant interruption.

Significant Interruption is defined as an absence from (or change of) work activity which prevents the holder of MIBoC certification from practicing the duties corresponding to the scope of the certification for a continuous period in excess of 365 days, or a number of periods exceeding two years.

*NOTE: Legal holidays, or periods of sickness or courses of less than thirty days are not taken into account when calculating the interruption.*

Certified personnel will be invited by e-mail (using the e-mail address specified by the candidate in the student database) to renew their certification.

Renewal applications should be made in writing using form [ED036](#) and accompanied by [ED034](#), both of which can be downloaded from our website.

## References

The following ISO standards can be obtained from the International Standards Organization Store at <http://www.iso.org/iso/home/store.htm>.

- ISO/IEC 17024 - Conformity assessment — General requirements for bodies operating certification of persons
- ISO 18436-1 - Condition monitoring and diagnostics of machines — Requirements for training and certification of personnel - Part 1: Requirements for certifying bodies and the certification process
- ISO 18436-3 - Condition monitoring and diagnostics of machines — Requirements for training and certification of personnel - Part 3: Requirements for training bodies
- ISO 18436-8 - Condition monitoring and diagnostics of machines — Requirements for training and certification of personnel - Part 8: Ultrasound

## Appendix A – Body of Knowledge

Subject		Topics	CAT I	CAT II
<b>1. Principles of ultrasound</b>			<b>3</b>	<b>2</b>
	Basics of sound		*	
	Sound wave motion		*	
	Acoustic Impedance and its influence on propagation and attenuation		*	*
	Inverse distance law		*	
	How friction, turbulence and impacting produce ultrasound and where they apply		*	*
	Understanding the properties of the decibel		*	*
<b>2. General equipment knowledge</b>			<b>1.5</b>	<b>1</b>
	Instrument operation and function		*	*
	Airborne sensors		*	*
	Structure-borne sensors		*	*
	Heterodyne principle and application		*	*
	Sensitivity validation		*	*
<b>3. Data acquisition in ultrasound</b>			<b>2.5</b>	<b>1</b>
	Principles of data acquisition		*	*
	Sensor positioning		*	*
	Competing ultrasound and shielding techniques		*	*
	Measurement of ultrasound		*	*
	Capturing time domain and spectrum signals for analysis		*	*
<b>4. Data storage and management</b>			<b>1</b>	<b>2</b>
	Developing and using a database		*	*
	Managing stored data		*	*
	Disposition of anomalies			*
<b>5. Condition monitoring principles</b>			<b>1.5</b>	<b>1</b>
	What is condition monitoring		*	
	Why is it useful?		*	
	What other technologies are there?		*	*
	Why and when would ultrasound be useful?		*	
	Acceptance testing		*	*
	Benchmarking			*
<b>6. Applications to machine systems</b>			<b>17</b>	<b>17</b>

Subject	Topics	CAT I	CAT II
	Leak detection i. Turbulence and flow ii. Directionality iii. Measurement precautions iv. Pressurized gases and compressed air v. Vacuum vi. Tightness testing using the ultrasonic tone method		
	Valve inspection to identify: i. Blocked ii. Passing iii. Cavitating		
	Steam traps i. Using ultrasound ii. Combination with temperature iii. Reporting techniques		
	Electrical inspection i. Corona, tracking and arcing ii. Internal partial discharge iii. Safety concerns	* (all)	* (all)
	Hydraulic systems inspection i. Cylinders, valves and pumps		
	On-condition bearing lubrication i. Trending values ii. Ultrasonic lubrication process considerations iii. Under and over-lubricated bearings		
	Bearing defect detection		
	Slow speed bearing inspection		
	Gearing inspection		
	Pump inspection-cavitation		
	Motor inspection and the effect of variable speed drives		
<b>7. Severity Determination</b>		<b>2</b>	<b>4</b>
	Setting up decibel alarms		*
	Trending decibels	*	*
	Statistical alarm creation		*
	Time signal analysis	*	*
	Spectrum analysis	*	*
	Case studies	*	*
	Diagnosis and Prognosis		*
<b>8. Programme implementation</b>		<b>0.5</b>	<b>0.5</b>
	Routine inspection considerations	*	*



Subject	Topics	CAT I	CAT II
	Routine management	*	*
	Report structuring		*
	Corrective action for alarm incidences		*
<b>9. Reporting and corrective action</b>		<b>0.5</b>	<b>1</b>
	Key information needed	*	*
	Recommending corrective action		*
	Tracking corrective action outcome	*	*
<b>10. Personal safety</b>		<b>0.5</b>	<b>0.5</b>
<b>11. Training examination</b>		<b>2</b>	<b>2</b>
<b>TOTAL HOURS</b>		<b>32</b>	<b>32</b>