Asset Reliability Practitioner

CERTIFICATION GUIDE

MIBoC Certification

ARP-A, ARP-E, ARP-L

MOBIUS INSTITUTE
BOARD of CERTIFICATION

JAS-ANZ

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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 to locate an authorized examination center near you.

In addition to receiving your certification 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 our secure online examination software.

Mobius Institute Board of Certification is accredited to ISO/IEC 17024 by an accredited IAF member organization, to ensure the certification program minimally meet the requirements of the relevant ISO standards. 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 reliability 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 and we will respond promptly with email.

Thank you

We hope that this Certification Guide provides you a good understanding of what reliability 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.

Table of Contents

Introduction

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

This guide also outlines a roadmap of MIBoC reliability 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 (ED161-1), the Classifications for Asset Reliability Practitioners Category ARP-A, ARP-E & ARP-L (ED161-2) and Classifications for Asset Reliability Practitioners Category ARP-Ex & ARP-Lx (ED161-3). Copies of these documents can be requested by contacting MIBoC's Certification Manager (certification.manager@mobiuscertification.com).

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 the certification scheme for Reliability was introduced.

MIBoC's aim is to provide access to condition monitoring certification around the world, and in as many languages as possible. We believe that if an analyst 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 committee is responsible for the development, review and approval of the organization's policies and procedures.

Members of the scheme committee represent stakeholders at a number of different levels, including condition monitoring functionality, industry and geographical region.

Technical Committee

MIBoC has established a separate Technical Committee for each of its certification schemes:

- Vibration Analysis,
- Infrared Thermography ,
- Ultrasound, and
- 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 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.

Overview of the Reliability Certification Scheme

The aim of the MIBoC reliability certification program is to:

- Provide recognition for people who have experience and demonstrated competence with reliability improvement initiatives within industrial facilities.
- Recognize a person's knowledge in the field of reliability improvement.
- Create a growth path for a person entering the workforce who has an interest in reliability improvement, through active involvement in improving reliability, to leading others in a reliability improvement initiative.
- Provide an incentive to become educated in the field of reliability improvement. This education is a key part of the reliability culture transformation.
- Create an international program so that everyone around the world can take advantage of these benefits.

These goals will be achieved through a holistic program that includes a proactive focus on defect elimination, a philosophy of continuous improvement, and the transformation of an organization's reliability culture, always with a focus on aligning these activities the goals of the organization.

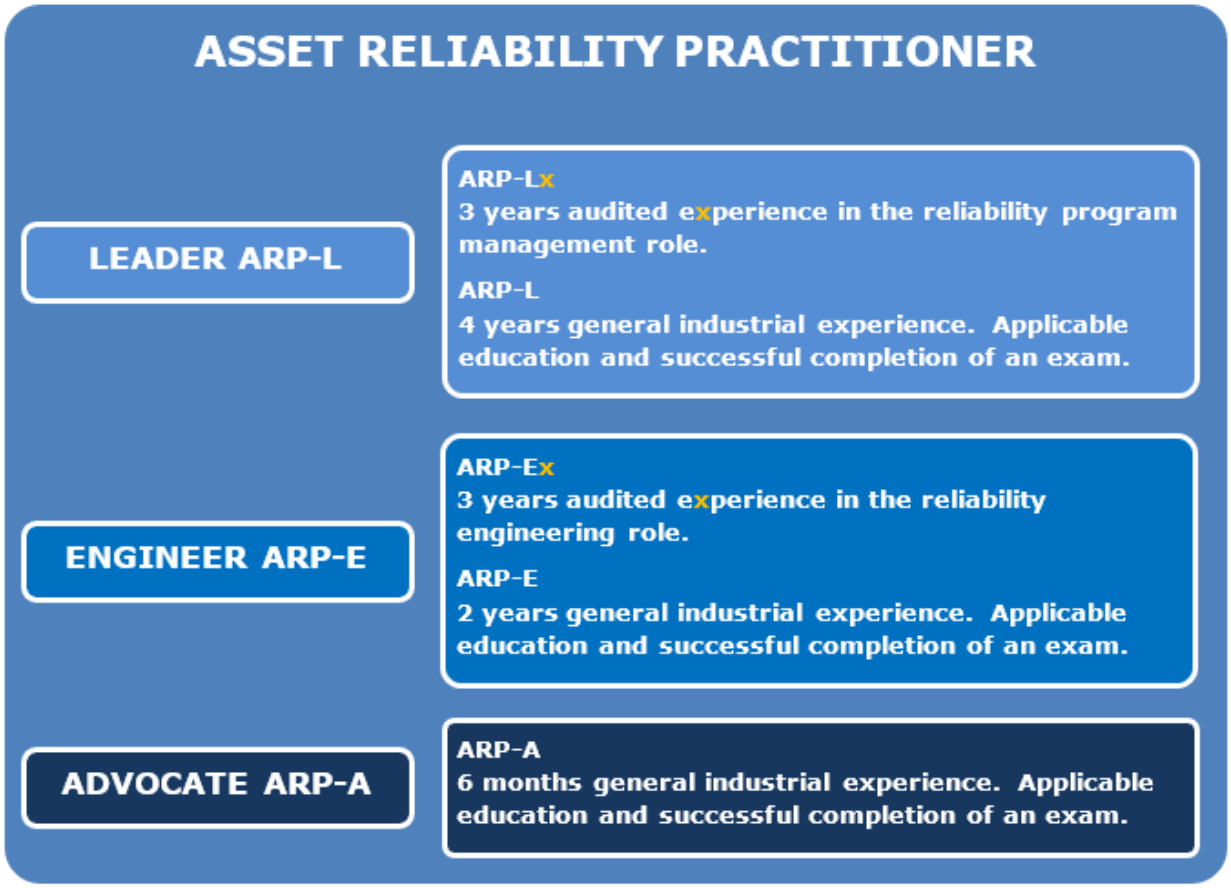
MIBoC's Reliability Certification Roadmap

Candidates certified under MIBoC's scheme are classified as Asset Reliability Practitioners, or ARP's.

There are three categories of certification to recognize a transition from a person who contributes to reliability improvement (but that is not their main role), to a person whose main role is in reliability improvement, and finally to the person who is the manager/leader of the reliability improvement initiative.

General certification at each of the three categories requires the individual to have general experience in an industrial facility.

At Category ARP-E and ARP-L, an optional level of certification has been defined that will recognize the candidate's experience and competence performing the activities defined in this scheme. These candidates will be certified Category ARP-Ex and ARP-Lx.



Category ARP-A: Reliability Advocate

Category ARP-A is designed to create awareness and buy-in for all people working in an asset intensive organization. The goal is to create awareness and thus to transform the reliability culture – to make these people strong advocates/supporters for reliability and the reliability improvement initiative.

Candidates may be in a variety of roles including operations, electrical and mechanical maintenance, planning, scheduling, condition monitoring, spares management, procurement, engineering, and all levels of management. Their day-to-day actions influence reliability in many ways.

Reliability "advocates" must be totally convinced and knowledgeable regarding how reliability and reliability improvement benefits the organization and themselves personally.

Advocates must have a sufficiently broad and detailed understanding of the technical aspects of reliability and reliability improvement to promote the concepts to others, ensuring that methodology and philosophy becomes embedded in the culture of the organization just as safety is a core belief on the organization. Detailed knowledge in any of the specific topic areas is not required.

Advocates must also have a full understanding of how they personally must contribute to reliability and the success of the reliability improvement processes.

More details of the job tasks associated with the Reliability Advocate can be found in document *ED161-2: Reliability certification scheme classification for Category ARP-A, ARP-E, ARP-L* which can be found on our website.

Category ARP-E and ARP-Ex: Reliability Engineer

The second level of certification is designed to ensure that a person, often referred to as a reliability engineer, is adequately educated to be able to identify the causes of unreliability, perform the tasks necessary to improve reliability, and also to recognize their experience via APR-Ex in this role. A candidate may currently be employed as a reliability engineer, or they may be involved in an associated area (e.g. condition monitoring) and wish to learn more about reliability engineering and be recognized for that knowledge.

More details of the job tasks associated with the Reliability Engineer can be found in document *ED161-2: Reliability certification scheme classification for Category ARP-A, ARP-E, ARP-L* which can be found on our website.

Category ARP-L and Lx: Reliability Manager

The third level of certification is reserved for the reliability initiative program manager/leader - the person who will manage one or more ARP-E reliability engineers, possibly across multiple sites. This person must have a technical knowledge of reliability, maintenance, and the best practices in these areas. Knowledge will not need to be as detailed as the ARP-E reliability engineer's knowledge. However, they will require knowledge and skill in project management, people management, budgeting, continuous improvement, training and work culture change. They will need exceptional communication skills and must be able to communicate the financial and operating benefits to senior executives in management terms.

More details of the job tasks associated with the Reliability Engineer can be found in document *ED161-2: Reliability certification scheme classification for Category ARP-A, ARP-E, ARP-L* which can be found on our website.

To be eligible for general certification, candidates need to have a combination of training and general industrial work experience, and pass a knowledge-based examination, to ensure they understand the principles and procedures which apply to reliability improvement.

The "x-level" ARP-Ex and ARP-Lx certification is over and above general ARP-E and ARP-L certification and recognises an individual who has acquired both knowledge and practical experience and has proven competence in reliability improvement.

Certification at the lower category is not a prerequisite for certification for ARP-E or ARP-L, provided all the other certification requirements are met.

Training

To be eligible to apply for certification, candidates need to provide evidence of successful completion (such as a Certificate of Attendance) of one or more approved training course/s which collectively cover the topics listed in the Body of Knowledge specified in Annex A. The minimum training hours are specified in Table 1 below.

Table 1 – Minimum training (hours)

ARP-A	ARP-E	ARP-L
16	32	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 ED169, 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, then you can apply to have your training recognized by sending us details of the course and training provider, using form ED041, which can be found on our website.

Knowledge-based examination

To be eligible for certification, candidates must pass the MIBoC reliability certification examination, the required pass mark is 70%.

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

Experience required for general certification

Candidates must provide evidence of general industrial work experience in line with the classification of each category:

ARP-A candidates must have general industrial experience for a sufficient period that they should have experienced the consequences of failure in the areas of production targets missed, and/or performance targets, and/or quality goals missed, and/or risk of safety or environmental incidences, and/or excessive costs associated equipment failure.

ARP-E candidates must also have experienced the impact of poor reliability as per the ARP-A requirements, but they should have been directly involved with the reliability improvement process in at least two (2) of the following areas: performed maintenance tasks, operated equipment, performed condition monitoring tasks, participated in an RCA project, performed reliability analysis, performed RCM/FMEA analysis, or been actively involved in the role of reliability engineer as described in the Reliability Roadmap above.

ARP-L candidates should also have experienced the impact of poor reliability as per the ARP-A requirements, but they should also have been involved in the reliability improvement process, either as a reliability engineer or a program manager/leader (as described in the Reliability Roadmap above).

Candidates shall be required to provide details of their experience and the contact details of someone who can verify the experience.

The minimum experience requirements are shown in Table 2 below.

Table 2 – Minimum experience (months) required for general certification

ARP-A	ARP-E	ARP-L
6	24	48

Experience required for x-level certification

The process to become certified as ARP-Ex or ARP-Lx involves four mandatory steps/requirements, and one optional step:

1. The candidate shall be certified at ARP-E to be eligible for ARP-Ex and ARP-L to be eligible for ARP-Lx
2. The candidate must meet the minimum duration (defined in Table 1) of verified experience performing tasks listed in section 5.2 and 5.3 for ARP-Ex and ARP-Lx in document ED161 respectively.
3. The candidate may *optionally* complete an Experience and Competency Pre-assessment, without charge, to assess the likelihood of passing the Experience and Competency Assessment.

4. The candidate must complete the Experience and Competency Application, and have it verified, to determine if the final step should be undertaken. MIBoC will score the application and verify all of the information provided in the application, and if satisfactory, will invite the candidate to formerly apply for certification.
5. The candidate must then complete a more detailed Experience and Competency Assessment based on the requirements of the scheme and the response given in the Experience and Competency Application.

The number of months of experience required at the ARP-Ex and ARP-Lx levels in the role that meets the description of a certified Asset Reliability Practitioner ARP-E and ARP-L are listed in Table 3 below.

Table 3 – Minimum experience (months) required for x-level certification

ARP-A	ARP-E	ARP-L
N/A	**36**	**36**

Note: The months shown represent the number of months of experience required in a role corresponding to that category; they are not cumulative

Details of how the x-level experience is assessed can be found in document *ED161-3: Reliability certification scheme classification for CAT ARP-Ex & ARP-Lx.*

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).

Knowledge-based certification exam

MIBoC knowledge-based reliability 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 of reliability improvement.

The duration and the number of questions in MIBoC's reliability certification examinations are outlined in Table 4 below.

Table 4 –Specifications of reliability certification examinations by category

	Number of Questions	Exam Duration (hours)
ARP-A	60	2
ARP-E	100	3
ARP-L	100	3

To be eligible for certification, candidates must pass the MIBoC reliability certification examination, the required pass mark is 70%.

Examination Development Process

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

All questions are reviewed by members of the Reliability 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 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 MIBoC's Customer Service Administrator (exams@mobiusinstitute.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 results 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 website.

Appeals & Complaints

Candidates or other parties may lodge a complaint or appeal.

A complaint may be 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. MIBoC may use its discretion in allowing an earlier re-sit examination in the event that evidence of further training acceptable to MIBoC is undertaken.

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

A candidate whose examination results have not been accepted for reason of fraud or unethical behaviour shall wait at least 3 years before re-applying for examination.

Re-assessment of experience/competence assessment

In the event that a candidate is unsuccessful in passing the x-level experience assessment, he/she can apply to be re-assessed, provided that the re-sit takes place no sooner than 6 months after the previous assessment date. A candidate who fails three consecutive attempts will be excluded from further assessments for a period of 3 years.

A candidate whose assessment results have not been accepted for reason of fraud or unethical behaviour shall excluded from further assessments for a period of at least 3 years.

Validity of certification

The period of validity of a MIBoC certificate/wallet card is three years from the date of initial certification or renewal.

Certification shall be invalid:

- three years after certification unless the certificate holder applies for renewal;
- if the certificate holder becomes physically and/or mentally incapable of performing the duties;
- if a significant interruption takes place in the application of the competence for which the individual is certified;
- at the discretion of MIBoC, after reviewing evidence of unethical behaviour.

Certification of an individual can be checked and verified online at MIBoC's website, or by contacting the MIBoC Certification Manager at certification.manager@mobiuscertification.org.

Certification renewal

Within four months of the certification expiry date the candidate is able to apply to renew the certification for a further three years provided he/she can provide evidence of ongoing personal and professional development in the area of reliability improvement during the current three-year certification period. Applications for renewal after a certificate has expired for more than four months may be considered at MIBoC's discretion, however a certificate which expired more than nine months ago shall not be eligible for renewal.

The required ongoing personal and professional development can be achieved through a variety of methods. Please refer to section 10 of document ED161-2 for a detailed list of eligible development options.

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 ED170 and accompanied by for ED034, both of which can be downloaded from our website.

STRATEGY AND IMPLEMENTATION

Reliability improvement strategy topic	ARP-A	ARP-E	ARP-L
General overview	■	■■	■■■
Business process review	□	■	■■■
Business case	□	■	■■■
Asset management	□	■	■■■
Reliability improvement implementation	□	■■	■■■■
Operational excellence	□	■	■■
Project management		■	■■
Maintenance strategies	■	■■■	■■
Reactive maintenance	■	■	■
Condition Based Maintenance	■■	■■	■■
Preventive (interval based) maintenance	■	■■	■■
Run-to-failure maintenance	■	■	■
Preventive Maintenance Optimization	■	■■	■
Operator Driven Reliability	■	■■	■

PEOPLE MANAGEMENT

People management topic	ARP-A	ARP-E	ARP-L
General overview	■	■	■■■
Leadership	■	■	■■■
Culture change	■	■■	■■■■
Project management	□	■	■■
Human error	■	■■	■■
Human relations		■	■■■
Knowledge and skills assessment			■■■■

Training and education	■	■■	■■■■
Certification	■	■	■■

DEFECT ELIMINATION

Defect elimination topic	ARP-A	ARP-E	ARP-L
General overview	■	■■	■■■
Design	■	■■	■■■
Purchasing	■	■	■■■
Transportation	■	■■	■■
Spares management	■	■■■	■■■
Storage	■	■■■	■■
Planning and Scheduling	■	■■	■■
Installation and commissioning	■	■■■	■■
Project management	■	■■	■■■
Operation	■	■■	■■■
Acceptance Testing	□	■■	■■
Root cause analysis	■	■■■	■

ASSET STRATEGY DEVELOPMENT

Asset strategy development topic	ARP-A	ARP-E	ARP-L
General overview	■	■■	■■
Master asset list	□	■■	■
Bill of materials	□	■■	■
Asset Criticality Ranking	■	■■■	■■
Failure Modes Effects Analysis	□	■■■■	■■
Reliability Centered Maintenance	■	■■■■	■■
Preventive Maintenance Optimization [PMO]	■	■■■■	■

RELIABILITY ENGINEERING

Reliability engineering topic	ARP-A	ARP-E	ARP-L
General overview		■■	■
Reliability block diagrams		■■	
Reliability analysis		■■■	
Lifecycle costing		■	■

WORK AND SPARES MANAGEMENT

Work and spares management topic	ARP-A	ARP-E	ARP-L
General overview	■	■■	■■■
Maintenance Repair and Overhaul (MRO) spares management	■	■■■	■■■
Maintenance planning	■	■■■	■■
Maintenance scheduling	■	■■■	■■
Managing break-in work	■	■■■	■
Shutdowns, turnarounds and outages	■	■■■	■■■
Computerized Maintenance Management Systems	■	■■■	■■■

PRECISION SKILLS (PRECISION AND PROACTIVE MAINTENANCE)

Precision skills topic	ARP-A	ARP-E	ARP-L
General overview	■■	■■■	■■
Shaft alignment	■	■■■	■
Balancing	■	■■■	■
Fastening	■	■■	■
Soft foot	□	■	■
Looseness correction		■■	■
Resonance correction	□	■■	■
Rolling element bearing installation	■	■■■	■
Journal bearing installation		■	■

Mechanical seal installation	□	■■	■
Electrical installations	■	■■■	■
Verifying electrical systems	■	■■■	■
Power quality	□	■■	■
Commissioning of electrical equipment	□	■■	■
General principles of installing mechanical components	■	■■■	■■
General principles of installing electrical components	■	■■■	■■
Grease lubrication	■■	■■■	■
Oil lubrication	■	■■■	■

CONDITION MONITORING

Condition monitoring topic	ARP-A	ARP-E	ARP-L
General overview	■■	■■■■	■■■
Vibration analysis	■■	■■■	■■
Ultrasound	■	■■■	■
Infrared analysis (thermography)	■	■■■	■
Oil analysis	■	■■■	■
Wear particle analysis	■	■■	■
Motor current/voltage/circuit analysis	■	■■	■
Non Destructive Testing (NDT)	□	■■	■
Process/performance monitoring	■	■■	■
Visual inspection	■	■	■
Electrical insulation testing		■	

CONTINUOUS IMPROVEMENT

Continuous improvement topic	ARP-A	ARP-E	ARP-L
General overview	■	■■	■■■
Business justification	■	■	■■■
PDCA/Kaizen/Lean	■	■ ■	■ ■■
Benchmarking	■	■	■■■
Key Performance Indicators	■	■■■	■■■
Communication	□	■■	■■■
Root Cause (Failure) Analysis	■■	■■■■	■■
Visual workplace & error proofing	■	■	■