8 Radiation Detection and Monitoring Equipment

Scope

1. This Chapter describes the procurement, selection, testing, maintenance, repair and support of Radiation Detection and Monitoring Equipment (RDME). Additional guidance on non-ionising RDME is within Chapter 35.

2. Sufficient RDME shall be provided to meet the requirements of a Radiation Monitoring programme. The approved routes for the procurement / selection of appropriate RDME to meet the requirements are shown in the Selection, Use and Procurement sections (paragraphs 22 – 34) of this Chapter.

3. It is the responsibility of the Capability Sponsor to ensure that RDME selected is suitable for the intended use. Decisions about RDME selection should be made taking into account advice from the Radiation Protection Adviser (RPA), the Qualified Person (QP), and the equipment Support Authority (SA) (CBRN DT) within the DE&S organisation.

4. All equipment provided for the purpose of carrying out radiation detection and monitoring of ionising radiation for personal protection is required to be properly maintained, thoroughly examined and tested annually. Additionally, its performance must be established in tests before it is taken into use for the first time.

5. JSP 425 - Examination and Testing of Ionising Radiation Monitoring (Including Protection) Instruments – which previously detailed the minimum requirements for examination and testing of ionising RDME, has now been incorporated within this JSP.

6. Defence Standard 05-055 Part 1. Measurement and Calibration System Requirements for Ministry of Defence Test and Measurement Equipment – Ministry of Defence Calibration Laboratories Operation and Management - sets out the requirements that apply to all contracts, for the management and calibration of Test and Measurement Equipment (TME) items and requirements for Calibration Laboratories. It applies to TME sent to a contractor for calibration, repair, calibration after repair, and when the contractor is required to travel to the TME to conduct the work. It also applies to those contracts, which include a combination of TME, and other equipment such as parts of a main system. In such contracts it is important that the requirements for the TME are identified and listed in the contract.

7. Defence Standard 05-055 Part 3. Measurement and Calibration System Requirements for Ministry of Defence Test and Measurement Equipment – Requirements for Examination and Testing of Ionising Radiation Detection and Monitoring Equipment (RDME) - sets out requirements that apply to all Ministry of Defence (MOD) contracts, for the Examination and Testing of Ionising RDME items. It applies for RDME sent to a contractor for repair, calibration after repair, calibration and when the contractor is required to travel to the TME to conduct the work.

8. Defence Standard 05-055 Part 4. Measurement and Calibration System Requirements for Ministry of Defence Test and Measurement Equipment – Subcontract of calibration - sets out the requirements that apply to all Ministry of Defence (MOD) contracts, for the Examination and Testing of Ionising RDME items. It applies for RDME sent to a contractor

for repair, calibration after repair, calibration and when the contractor is required to travel to the TME to conduct the work.

9. Defence Standard 05-055 Part 4. The capability sponsor, i.e. Capability branch, Front Line Command or duty holder shall state their radiation monitoring requirements to the central equipment support Delivery Team (DT) within DE&S organisation, currently the Chemical, Biological, Radiological and Nuclear (CBRN) DT. Requirements shall be specified in accordance with MOD Policy JSP 392 Part 1, Annex A. To ensure that the requirements of IRR17 Regulation 20 are being met, further guidance and assurance can be provided by the MOD Radiation Protection Instruments Committee (MOD RPIC).

10. The MOD Radiation Calibration Qualified Persons (MRCQP) committee provides support and technical guidance to the MOD Radiation Protection Instrument Committee (RPIC) and equipment support Delivery Teams on all aspects of RDME examination and testing. The expert panel also recommends the minimum testing / calibration standards to be maintained by the radiation calibration facilities to ensure that the employers' responsibilities are achieved.

11. All radiological measurements shall be traceable to national standards. Traceability is defined in the International Vocabulary of Metrology as 'the ability to relate measurements to appropriate standards (generally International or National), through an unbroken chain of inter-comparisons'. In the United Kingdom, traceability is to primary radiation standards held or validated by the UK National Measurement Institution, National Physical Laboratory (NPL). It is emphasised that traceability must be underpinned by recognised approved and assessed measurement procedures. Traceability requirements are detailed in Defence Standard 05-055 Part 3.

12. The Atomic Weapons Establishment (AWE), Aldermaston has been tasked by CBRN DT, to undertake calibration of MOD owned transfer standards. MOD Approved Radiation Calibration Facilities (MARCF) purchasing transfer standards should liaise with AWE to ensure the standards are suitable for recalibration by AWE.

Statutory Requirements

13. In addition to the general requirements of the Health and Safety at Work etc. Act 1974, the following specific legislation applies directly:

a. Ionising Radiations Regulations 2017 (IRR17); and

b. Ionising Radiation (Medical Exposure) Regulations 2017 (IRMER2017).

Responsibilities

14. MOD Policy dictates that best practice shall be implemented in measurement. Further guidance can be found in the National Physical Laboratory Good Practice Guides (GPG).

15. The SA (CBRN DT) is responsible for ensuring that suitable facilities for the testing and repair of RDME are available.

16. MOD departments and HM forces should make provision for traceability of RDME calibration either through support agreements with the Support Authority (CBRN DT) or via direct contract with a MARCF.

Duties

17. Duties as detailed in Chapter 39 apply. In addition, the following duties also apply.

Radiation Safety Officer (RSO)

18. The Radiation Safety Officer (RSO) is to ensure that all areas holding RDME (including instrument check sources) comply with the requirements of JSP392. In particular, that appropriate risk assessments and contingency plans are in place (see Chapters 2 and 40). The RSO may be required to liaise with the Radiation Protection Supervisor (RPS) / Workplace Supervisor (WPS), Delivery / Project Team (DT / PT), RPA and other stakeholders in obtaining suitable and sufficient risk assessment coverage.

Qualified Person (QP)

19. Defence Standard 05-055 Part 3 Para A requires that a QP is to be appointed in writing by a suitably senior, knowledgeable and accountable manager within the establishment in order to ensure that testing of RDME is carried out in accordance with the IRR17.

20. The QP is defined as a person appointed by the employer having the necessary expertise, training and experience in instrumentation theory and practice to undertake or supervise the examination and testing of RDME to meet the requirements of the IRR17. The qualification and training requirements for Qualified Persons are given in Defence Standard 05-055 Part 3.

21. Each MARCF shall have an appointed QP who will ensure that the agreed criteria / test procedures for MOD RDME testing detailed in the MOD Radiation Calibration Statement of Requirement (MRCSOR) Chapter 2 are followed. The appointment of a QP is to be notified to the Chair of the MOD Radiation Calibration Qualified Persons (MRCQP) Committee.

Selection

22. Radiation Detection and Monitoring Equipment (RDME) is split into three categories:

a. RDME used for Health and Safety (H&S) which includes the Nuclear Emergency Response Organisation (NERO) is identified in this Chapter as RDME(H&S);

b. RDME used in support of medical, dental and veterinary equipment testing is identified in this Chapter as RDME (MED and DENT) and should be managed in accordance with JSP473 Joint Service Regulations for The Engineering Support of Medical, Dental and Veterinary Equipment. JSP473 outlines the policies and procedures to be adopted in the inspection and maintenance of medical equipment used by the UK Armed Forces and its Agencies; and

c. RDME used to meet operational war fighting requirements is identified in this Chapter as RDME (OP).

RDME (H&S)

23. The MOD Radiation Protection Instrumentation Committee (RPIC) is the centralised body that co-ordinates the standardisation of RDME (H&S) across the Ministry of Defence. Procurement of RDME (H&S) is undertaken by CBRN DT on behalf of the RPIC.

24. The selection of suitable RDME (H&S) must be made on the advice of the RPA.

25. General and specific advice on RDME may be obtained from either the RPA or the equipment sponsor.

26. The approved list of RDME (H&S) is limited to a range of instrumentation adequate for (MOD) defined radiation and detection monitoring purposes. Utilisation of RDME (H&S) from the approved list provides users with the assurance of through life support for the equipment.

27. Suitable RDME (H&S) is defined by the appropriate RPA and endorsed by the relevant Chief Environment and Safety Officer (CESO) or other suitable person. The approved scales and allowances for RDME (H&S) are detailed in the RDME Approved Listof Test Equipment (RDME (H&S)-ALTE) which is maintained on behalf of the MOD Radiation Protection Instruments Committee (RPIC) by the CBRN Delivery Team.

28. Where a platform, unit or establishment requires a change to the type or number of RDME allocated amendment to the RDME (H&S) ALTE must be made. The specific service amendment routes are shown below:

a. for RN units S130 procedures are to be followed for change in RDME scaling;

b. for RAF units a RDME (H&S) ALTE amendment form is to be completed and passed through the station TMEC; and

c. for Army units a RDME (H&S) ALTE amendment form is to be completed and passed through the unit QM (Tech).

29. The amendment request must provide reasons for the change in allocation and must be endorsed by the relevant RPA on behalf of CESO. Following endorsement, the requirement should be submitted to CBRN Delivery Team such that RDME-ALTE amendment action may be initiated.

RDME (OP)

30. RDME (OP), formerly identified as RADIAC equipment, is scaled in centi Gray (cGy) and should not be used for radiation protection purposes, unless advised by the RPA.

31. The capability for operational use is defined by HOC SP and CBRN. The tables of scales and allowances to support operations detailed in JSP 886 and specifically for the Royal Navy Surface Fleet in BR 2170(3) and Royal Navy Submarine Fleet in BR2170(4).

Use

32. RDME shall only be operated by personnel who have been specifically trained in their operation and are aware of the capabilities and limitations of the equipment.

Procurement

General Requirements

33. During the procurement phase, the following requirements shall be incorporated into the contract of purchase by the sponsoring Project Team. It is the Project Team’s responsibility to ensure all of the requirements are met:

a. Type Test data* is available and reviewed;

b. before First Use certificate is completed in accordance with Defence Standard 05-055 Part 3;

c. details of the equipment's performance, limitations and accuracy relevant to its proposed use, are provided;

d. a calibration protocol is included in the MRCSOR; and

e. a Users Operation Information Chapter is included in the Portable RDME Operating Information AESP-6665-L-118-201 or Installed RDME Operating Information AESP 6665-L-119-201 as appropriate.

*Exceptionally in the absence of Type Test data suitable and sufficient testing must be undertaken by an appropriate MARCF or an independent facility to confirm that the type of instrument is suitable for its intended purpose and to enable the baseline performance of the instrument to be compiled.

34. It is the responsibility of the sponsoring Project Team or equipment manager to provide newly procured RDME with the following:

a. spares to support repair;

b. jigs and sources (if special items are required) for testing and operational checks;

c. test procedures (usually obtained from instrument suppliers);

d. suitable instrument check sources. If an instrument check source is to be supplied a radiation risk assessment is also to be provided (see Chapter 2) and relevant details published in JSP 515 - Hazardous Stores Information System; and

e. Initial Training Package for training the trainers and / or a reusable training package as necessary dependant on the complexity of the RDME.

RDME (H&S) Equipment Requirements

35. With the exception of site-specific special monitoring equipment, RDME (H&S) is managed by the DE&S CBRN Delivery Team with approval of the RPIC and in consultation with the relevant CESO and RPA.

36. Where there is a specific requirement for equipment not on the approved list, a request for new equipment is to be submitted to the relevant RPA for consideration and approval. The request is then forwarded to the relevant CESO for endorsement. CESO willarrange procurement with the equipment sponsor via the RPIC and CBRN Delivery Team.

37. If a site-specific requirement cannot be met through the RPIC / CBRN DT, a MOD unit or establishment with an RPA may, in exceptional circumstances, purchase special / specific to type RDME. In such instances the procuring unit will become the equipment sponsor and must ensure provision for subsequent support activities is maintained in line with guidance detailed in this Chapter.

RDME (OP) Equipment Requirements

38. New RDME (OP) requirements are managed by DE&S (CBRN Delivery Team), as directed by HOC SP and CBRN capability branch.

Examination and Testing

39. RDME testing shall be carried out in accordance with Defence Standard 05-055 Part 3 Examination and Testing of Ionising Radiation Detection and Monitoring Equipment.

40. Examination and testing shall be undertaken by a MARCF. All radiological measurements made within the MOD, including His Majesty's (HM) forces, must be undertaken using RDME calibrated at a MARCF which has traceability to the UK National Metrology Institution (NMI) via tertiary and secondary standards.

41. Specific arrangements for RAF and Army units are in place via central RDME support tasking sponsored by CBRN DT:

a. annual testing is carried out through the DRPS Calibration Facility where a pool of RDME and appropriate spares is held. The work is carried out under the CBRN Delivery Team RDME Support contract;

b. the Tri-Service RDME Support contract utilises MOD Form 1773 for the notification of equipment due for calibration. The calibration facility will raise MOD Form 1773 against the list of RDME held by the unit or establishment in accordancewith their database; and will then issue the MOD Form 1773 to the unit or establishment four weeks prior to the month of calibration;

c. the unit or establishment will receive the completed Form which includes an Urgency of Need (UON) and Direct Exchange Return code. These will have been predetermined by the calibration facility dependent upon current availability and status of equipment held within the pool and will normally be UON or ROUTINE with a maximum turnaround time of 14 days. Units or establishments wishing to amend the UON or Direct Exchange Return codes are to notify the Support Authority statingthe reasons for change, authorised by the unit's Authorised Person;

d. other than the exception stated above then the standard MOD Form 1773 procedure applies. Both Direct Exchange and Loan Cal equipment is to be returned to the Calibration Facility as detailed on the MOD Form 1773. Units or establishments should not return their instruments until a replacement has been received; and

e. the maintenance policy for RAF units and establishments RDME (H&S) is contained in AP100B-01 Order 2.1.13.

42. Platforms, units and establishments not covered by the CBRN DT sponsored RDME support tasking are responsible for the management of their own RDME and must ensure compliance with the requirements of this Chapter.

43. RDME sent to calibration facilities must include all accessories, individual instrument check sources and leads. They must be:

a. accompanied by the appropriate instrument log form: RN – S / D 1956; RAF / Army RAF Form 4021 R / 1;

b. certified as not being contaminated above levels that would require radiation protection controls to be implemented as agreed with the RPA and calibration facility; and transported in accordance with Chapter 10 and meet the surface contamination requirements, where an instrument check source is included as part of the equipment (Nat-U check source type 1623A are not generally included as part of equipment and should not be returned unless otherwise instructed).

44. Technical queries about RDME should be directed in the first instance to theEquipment Sponsor or the RPA.

45. Testing difficulties arising from the design of RDME are to be referred initially to the Equipment Sponsor.

Examination and Test Categories

46. The examination and testing of RDME is broken down into three categories. These categories are fully detailed in Defence Standard 05-055 Part 3.

47. MARCFs shall have documented operational procedures available for reference and these shall be used for the testing of MOD sponsored RDME.

48. The agreed minimum examination and testing required for each category and each type of RDME is detailed in the MRCSOR. The MRCSOR is circulated to all RPIC members for ratification.

49. RDME shall be tested at least annually to confirm that the performance of the equipment has not deteriorated, or after repairs that may have altered their radiological response. Test responses shall fall within the tolerance band stipulated in the relevant equipment calibration protocol. Details of the repairs which may affect the radiological properties of the RDME are defined in Defence Standard 05-055 Part 3 Section 14.

50. Operating instructions for users which include ‘before each use’ testing requirements are detailed in the Portable RDME Operators Information AESP-6665-L-118 or Installed RDME Operators Information AESP 6665-L-119 as relevant.

MOD Approved Radiation Calibration Facility

51. For the purposes of this Chapter a MOD Approved Radiation Calibration Facility (MARCF) will be referred to as an approved calibration facility.

52. The minimum facilities, equipment and standards to be achieved by an approved calibration facility are fully defined in Defence Standard 05-055 Part 3.

53. The Prime contractor shall ensure that any test work sub-contracted shall be performed in a calibration facility, which operates a system meeting the minimum requirements of this JSP. Prior to sub-contract the Prime Contractor shall provide evidence to and obtain written agreement from the chair of MRCQP committee, that the use of any sub-contracted facility is appropriate and suitable to maintain compliance with the requirements of this JSP. The Prime Contractor is to ensure that the sub-contracted facility undertakes testing in accordance with the requirements of Defence Standard 05-055 Part 3 and the MOD Radiation Calibration Statement of Requirement relevant to the RDME to be sub-contracted. Records shall be available to demonstrate compliance. RPA and CBRN Delivery Team are to be informed prior to work being undertaken at non-approved calibration facilities.

MOD Approved Radiation Calibration Facility Audit Scheme

54. To ensure that approved radiation calibration facilities meet the appropriate standard, the facilities shall be audited triennially by the MARCF audit scheme managed by the MRCQP committee on behalf of the MOD RPIC committee.

55. A formal assessment of the radiological and general safety of the facility shall have been completed by the local radiation safety organisation. Evidence of compliance to safety standards shall be provided to the lead auditor prior to commencement of the audit.

56. All MARCFs approved for the testing of MOD RDME shall be able to demonstrate a comprehensive understanding of:

a. the characteristics of the facility

b. traceable calibrated radiation fields, and

c. the derivation of response.

57. Approval will be granted and maintained subject to successful participation in the audit programme. Failure to resolve Non-Compliance / observations will be communicated to the MOD RPIC committee where agreement will be reached on actions to be taken to resolve the issues or consensus reached to suspend or withdraw MARCF status.

58. An up-to-date list of MARCF's is maintained by the Chair of the MRCQP committee.

Documentation

Certificate of Calibration

59. Certificates of calibration shall be issued by the calibration facility for and with all equipment tested. Guidance on the minimum information required on the certificate is provided in Defence Standard 05-055 Part 3.

60. A copy of the current certificate of calibration shall be available to the user.

Calibration Labels

61. All radiological standards / equipment calibrated by the MARCF must be labelled to indicate their calibration/test status. Any limitations of testing must be identified to the user by a suitable label attached to the equipment with limitations detailed on the calibration certificate.

62. As a minimum, the calibration label shall contain the information described in Defence Standard 05-055 Part 3.

63. The standardised series of MOD calibration labels are defined in Defence Standard 05-055 Part 1 and illustrated in MOD Form 1775. It is mandated that these standardised labels are to be used where possible; however, this does not limit the use of other labels that are not listed in MOD Form 1775.

64. Labels shall be situated such that they are visible whilst the RDME is in use and must not affect performance.

Integrity Seals

65. Access to adjustable devices on standards and measuring equipment (which are fixed at the time of test and are not to be adjusted by the user), shall be sealed to prevent tampering by unauthorised personnel. Seals shall be designed and fitted such that tampering will destroy them. Further guidance on the use and placement of integrity / security seals is provided in the MRCSOR in the relevant protocols.

Out-of-Tolerance Reporting

66. The MARCF shall make provision for the immediate identification, labelling, removal from use and quarantine or repair of any items undergoing examination / testing found to be outside of protocol pass / fail criteria. The MARCF shall inform the customer when equipment has been tested and found to be outside designated performance limits. Records shall be maintained to demonstrate compliance.

Instrument Log

67. A log containing the particulars of every test and repair for each instrument is to be kept by a Qualified Person:

a. Form S / D 1956 is to be used by Navy and Army units and establishments.RAF Form 4201 R / I is to be used by Air Force units and establishments; and

b. the instrument log for equipment managed under the CBRN Delivery Team Tri-Service RDME Support Contract, e.g. RAF and Army units and establishments, will be maintained and retained by DRPS Calibration Facility.

Operating Instruction Guides

68. The user operating instructions for all RDME managed by CBRN DT can be found in the two following documents;

a. Portable RDME Operating Information AESP 6665-L-118-201; and

b. Installed RDME Operating Information AESP 6665-L-119-201.

Records

69. The MARCF shall maintain records of all equipment tested. As a minimum, the records shall include the fields defined in Defence Standard 05-055 Part 3. These records are to be maintained until at least 2 years after last use or disposal or the RDME, whichever is later.

70. The instrument logs are to be held for a period of at least 2 years from date of last entry by the unit or establishment.

71. The document retention periods mentioned are a requirement of IRR17. At the end of the above periods, an assessment on the relevance of retaining the document should be made in conjunction with the requirements of JSP392 Volume 1 Chapter 3 and JSP441 Information, Knowledge, Digital and Data in Defence.

Contact Details

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