Ministry of Defence

JSP 425
Examination and Testing of Ionising Radiation Detection and Monitoring Equipment (RDME)

Part 1: Directive

Foreword

The main principles of radiation protection for ionising radiation are developed by the International Commission on Radiation Protection (ICRP), who publishes recommendations and practical information. Other aspects of radiation protection derive from bodies such as the International Atomic Energy Agency (IAEA) and environmental forums. These recommendations and guidance form the basis of MOD policy.

Regulation (19) of the Ionising Radiation Regulations (1999) (IRR99) requires employers who work with ionising radiations to monitor levels of ionising radiation in controlled and supervised areas, and to arrange that certain tests and examinations of the equipment used to carry out this monitoring are undertaken.

The Commanding Officer (CO) / Head of Establishment (HoE) has a statutory responsibility to ‘provide suitable and sufficient monitoring equipment’ which is ‘properly maintained’ and ‘remains fit for purpose’. Such equipment must be ‘adequately tested at appropriate intervals’.

This JSP details the minimum requirements for the examination and testing of Ionising Radiation Detection and Monitoring Equipment (RDME) and the minimum standards to be maintained by Ministry of Defence (MOD) Approved Radiation Calibration Facilities to ensure that the employers' responsibilities under Regulation 19 of the Ionising Radiation Regulations 1999 are achieved. This JSP will be reviewed at least annually.

I commend it to you and your staff.

Air Vice-Marshal Mike Quigley MA MSc CEng FIExpE MIET RAF
Defence Authority for Technical & Quality Assurance
(Director Technical DE&S)

Preface

How to use this JSP

1. This policy document details the testing policy to be adopted within the MOD for RDME; it lists the categories of tests to be used and defines the levels of supervision required to carry out calibration / testing. It introduces the procedures for an internal MOD audit program to ensure that the requirements stipulated in this document are maintained; identifies the requirements for traceability; and specifies the radiological quantities against which equipment shall be tested.

2. For the purpose of this JSP a 'test' is defined as a procedure to evaluate equipment performance in order to establish its suitability, or continued fitness, for a particular type or types of measurement. A test will involve elements of both examination and calibration. 'Calibration' is defined as the measurement of the response of the equipment to known radiation fields. 'Examination' is defined as an inspection of the mechanical and electrical state of the equipment. It is therefore important to recognise that the terms examination and calibration are not synonymous. See Appendix 1 for definitions of terms.

3. It shall be noted that within the MOD the 'employer' is the Commanding Officer (CO) who has a duty to the Secretary of State and a personal responsibility to protect the environment and to secure the health, safety and welfare of their staff at work. They are also required to protect persons not in MOD employment against risk to their health or safety arising from the MOD work activities (e.g. the general public). This includes ionising radiation safety. Their authority (but not responsibility) for ionising radiation safety management arrangements may be delegated to appropriate personnel such as a Radiation Safety Officer (RSO).

4. The JSP is structured in one part (Directive), which provides the direction that must be followed in accordance with MOD policy, standards and regulations. It should be used in conjunction with DStan 05-055 Part 3.

Coherence with other Defence Authority Policy and Guidance

5. Where applicable, this document contains links to other relevant JSPs, some of which may be published by different Defence Authorities. Where particular dependencies exist, these other Defence Authorities have been consulted in the formulation of the policy and guidance detailed in this publication.

6. JSP 392 – Management of Radiation Protection in Defence – provides the overarching MOD policy on safe working with radiation. Part 1 of this JSP clarifies MOD's position.

Further Advice and Feedback – Contacts

7. This JSP is sponsored, edited and published by SEOC SCP-SptEng-TstMeas Team within Defence Equipment and Support (DE&S) and is responsible for developing and maintaining policy for Test and Measurement equipment including calibration for the Tri-service. SEOC SCP-SptEng-TstMeas is aided in the formulation of this JSP by the MOD Radiation Calibration Qualified Persons (MRCQP) Committee, which is enabled and

chaired by the CBRN Delivery Team. Any comments or suggested amendments to this JSP should be forwarded to the Secretary of the MRCQP. For further information on any aspect of this policy, or questions not answered within the subsequent sections contact:

Job Title/Email	Project Focus	Phone
MRCQP Chair DESCBRN-PM15@mod.uk	Keith Simmons	030 679 33596
MRCQP Secretary sthreadingham@dstl.gov.uk	Simon Threadingham	02392 768171
DESSEOCSCP-SptEng-TstMeas@mod.uk	Vimbai Fedrick	030 679 82690
DESSEOCSCP-SptEng-TstMeas1@mod.uk	Richard Barber	030 679 81373

Contents

Foreword ..... **i**

Preface ..... **ii**

How to use this JSP ii

Coherence with other Defence Authority Policy and Guidance ii

Further Advice and Feedback – Contacts ii

Contents ..... **iv**

Chapter 1 - Policy **1**

Governance 1
General Policy 1
MOD-Approved Radiation Calibration Facility Audit Scheme 2
The Qualified Person 2
Staff Qualifications and Training 2
Facility Quality Management 3
Instrumentation Test Categories 3
Documented Calibration/Test Procedures 3
Standards, Traceability and Quantities 3
Equipment Test Periodicity 3
Calibration Certificates 4
Calibration Records 4
Calibration Labels 4
Integrity Seals 4
Out-of-Tolerance Reporting 5
Sub-Contracting of MOD Calibration Work 5

Annex A - Feedback Form **6**

Appendix 1 - Abbreviations & Definitions **7**
Appendix 2 - Normative References **9**

1 Policy

Governance

1. 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 IRR99 Regulation 19 are being met, further guidance and assurance can be provided by the MOD Radiation Protection Instruments Committee (MOD RPIC).

2. The MOD Radiation Calibration Qualified Persons (MRCQP) committee has been formed to provide support and technical guidance to the MOD 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.

3. 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 by National Physical Laboratory (NPL). It is emphasised that traceability must be underpinned by recognised approved and assessed measurement procedures. Traceability requirements are detailed in DStan 05-055 Part 3.

4. The following policy stipulates the requirements covering all aspects of statutory RDME testing including: test categories, Qualified Persons, calibration facilities, radiological standards traceability and specification, diametric indices, neutron monitor test arrangements, equipment test protocols and the MOD Approved Radiation Calibration Facilities' audit scheme.

General Policy

5. 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 Advisor (RPA), the Qualified Person (QP), and the equipment Support Authority (SA) (CBRN DT) within the DE&S organisation.

6. 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)

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

8. All radiological measurements made within the MOD, including Her Majesty's (HM) forces, must be undertaken using RDME calibrated at a MOD Approved Radiation Calibration facility which has traceability to National Metrology Institutions (NMI) or Euro met governed National Standards Laboratories, via tertiary and secondary standards.

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

10. MOD departments and HM forces should make provision for traceability of RDME calibration either through support agreements with the Support Authority or via direct contract with a MOD Approved Radiation Calibration Facility.

11. RDME shall be tested using radiological System International (SI) units and as a minimum, be tested with the nuclides and reference rates specified in the relevant equipment protocol. Non SI units RDME shall require approval for continued use by the relevant RPA.

MOD-Approved Radiation Calibration Facility Audit Scheme

12. In order to ensure that calibration facilities meet the appropriate standard, the facilities shall be audited triennially by the internal audit scheme managed by the MRCQP committee on behalf of the MOD RPIC committee.

13. All calibration facilities approved for the testing of MOD RDME shall be able to demonstrate a comprehensive understanding of: the characteristics of the facility, traceable calibrated radiation fields, and the derivation of response. Guidance is provided in DStan 05-055 Part 3. Approval will be granted and maintained subject to successful participation in the audit programme.

14. The list of MOD Approved Radiation Calibration Facilities which have achieved a satisfactory audit report in accordance with this JSP is held by the chair of the MRCQP committee.

15. 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.

The Qualified Person

16. 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 IRR99.

17. Each MOD Approved Facility shall have an appointed QP who will ensure that the agreed criteria / test procedures for MOD RDME testing detailed in the MRCQP Protocol Manual Chapter 2 are followed.

Staff Qualifications and Training

18. Training and qualifications shall be commensurate to the position held and shall be defined in Terms of Reference (TOR). Definitive TOR for all staff are required as well as training records and planned training programmes. Suitable supporting evidence reflecting the individual's competency shall be provided. These shall be made available for audit.

Facility Quality Management

19. All MOD Approved Facilities shall maintain an appropriate quality management system to ensure standards within the facility are maintained and equipment are correctly tested / calibrated with test procedures subsequently controlled in an effective manner.

20. The management system established shall be periodically and systematically reviewed by a suitable internal audit process to provide objective evidence of its continued effectiveness. Further guidance on this can be found in DStan 05-055 Part 3.

Instrumentation Test Categories

21. MOD RDME shall be tested in accordance with the following categories that relate to specific test requirements:

a. Type test.
b. Category One: Test Before First Use.
c. Category Two: Periodic or Annual Test.
d. Category Three: Check before Operational Use.

22. When type test data is not available or considered insufficient then sufficient testing to establish a baseline for the equipment must be completed, guidance on tests to be undertaken within each category of test is provided in DStan 05-055 Part 3.

Documented Calibration/Test Procedures

23. MOD Approved Calibration Facilities shall have documented operational procedures available for reference and these shall be used for the testing of MOD sponsored RDME. The minimum test requirements are defined in the MRCQP protocol manual Chapter 2.

Standards, Traceability and Quantities

24. The test facility shall possess a suitable inventory of and maintain records for jigs and support equipment to perform the tests detailed in the protocols for the equipment calibrated by the facility.

25. The Ionising Radiation Regulations 1999 and their associated Approved Codes of Practice specifies the requirement for traceability of all measurements made for the purpose of radiological protection. Refer to DStan 05-055 Part 3 for detail of traceable units.

Equipment Test Periodicity

26. Before MOD purchases an instrument, the body of information regarding the characteristics and expected performance of the specific type of instrument known as the Type Test Data, must be reviewed to enable the baseline performance of the instrument to be complied. If Type Test Data is not readily available, suitable and sufficient testing must be undertaken by an appropriate MOD approved facility or an independent facility to confirm that the type of instrument is suitable for its intended purpose.

27. Prior to entry into service, all RDME shall pass a Category 1 – Before First Use Testing (BFUT). The BFUT shall provide sufficient evidence that the instrument conforms to the Type Test Data. Details of test and examination categories to be completed for a BFUT are detailed in DStan 05-055 Part 3.

28. Following any repair that may have affected the radiological properties of an instrument, the instrument shall pass a Category 1 BFUT prior to return to service. Details of the repairs which may affect the radiological properties of the RDME are defined in DStan 05-055 Part 3 Section 14.

29. 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.

Calibration Certificates

30. 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 DStan 05-055 Part 3.

Calibration Records

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

Calibration Labels

32. All radiological standards / equipment calibrated by the facility 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.

33. As a minimum, the calibration label shall contain the information described in DStan 05-055 Part 3.

34. The standardised series of MOD calibration labels are defined in DStan 05-055 Part 3, and illustrated in MOD Form 1775. It is mandated that these standardised labels should be used where possible; however this does not limit the use of other labels that are not listed in Mod Form 1775.

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

Integrity Seals

36. 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 MRCQP Protocol Manual in the different protocols.

Out-of-Tolerance Reporting

37. The facility 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 test facility shall inform the customer when equipment have been tested and found to be outside designated performance limits. Records shall be maintained to demonstrate compliance.

Sub-Contracting of MOD Calibration Work

38. 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 obtain agreement from the chair of MRCQP committee, to ensure that this satisfies the capability requirement. Records shall be available to demonstrate compliance.

ANNEX A

JSP 425 FEEDBACK FORM

Sender's Reference:

To: DESSEOCSCP-SptEng-TstMeas@mod.uk

From: Name: Role:

Address, incl email address and tel no:

Comment(s):

Part/chapter/paragraph:

Date:

……..

Author Response

Thank you for commenting on JSP 425:

Your reference: Dated:

Action being taken (tick):

- issue a revised/amended JSP
- under investigation
- incorporate comment(s) in future amendments
- no action required

APPENDIX 1

ABBREVIATIONS & DEFINITIONS

Abbreviations

AWE	Atomic Weapons Establishment
BFUT	Before First Use Test
BIPM	Bureau International des Poids et Mesures
CBRN DT	Chemical Biological Radiological and Nuclear Delivery Team
CO (Commanding Officer)	The most senior officer of a ship, unit or establishment. Commanding Officer includes the Commandant, Officer Commanding, Captain, Master, Head of Establishment, D/PT Leader and Medical Officer-in-Charge.
DE&S	Defence Equipment and Support
DESSEOC	Defence Equipment and Support, Support Enablers Operating Centre
Dstl	Defence Science and Technology Laboratory.
DT	Delivery Team
GPG	Good Practice Guide A publication produced via the National Physical Laboratory detailing the industry recommended processes and procedures for a specific topic area.
HMNB	Her Majesty's Naval Base
IAEA	International Atomic Energy Agency.
ICRP	International Commission on Radiation Protection.
IRR99	Ionising Radiations Regulations 1999
ISO	International Standards Organisation
JSP	Joint Service Publication.
MOD	Ministry of Defence
MRCQP	MOD Radiation Calibration Qualified Persons Committee
NMI	National Metrology Institution (The NMI of the UK is NPL).
NPL	National Physical Laboratory
QP	Qualified Person a person appointed by the employer having the necessary expertise, training and experience in instrumentation theory and practice to undertake or to supervise the examination and testing of RDME to meet the requirements of the Ionising Radiations Regulations 1999.
RDME	Radiation Detection and Monitoring Equipment (RDME) is split into three categories: RDME used for Health and Safety (H&S) and Nuclear Emergency Response Organisation (NERO) is identified in this document as RDME (H&S). This group includes equipment identified as Radiation Protection Instrument (RPI), Radiation Monitoring Instrument (RMI). RDME (MED & DENT) used in support of medical, dental and veterinary equipment testing should be managed in accordance with JSP473 Joint Service Regulations for The Engineering Support of Medical, Dental and Veterinary Equipment. The JSP 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. RDME used to meet operational war fighting requirements is identified in this document as RDME (OP).
RMI	Radiation Monitoring Instrument

RPA	Radiation Protection Adviser a person or corporate body appointed by the employer to advise him on the observance of the Ionising Radiations Regulations 1999 and on other health and safety matters in connection with ionising radiations.
RPI	Radiation Protection Instrument
RPIC	Radiation Protection Instrument Committee
RSO	Radiation Safety Officer
SI	Système International

Definitions

Calibration Facility	A facility used for the calibration or testing of RDME.
Calibration	A measurement of the response of the equipment to known radiation fields.
Capability Sponsor	The responsible organisation who identify; using the Defence Strategic Direction, the capability required to meet the UK's defence objectives.
Contamination	The unintended presence of radioactive material on surfaces, areas, personnel or objects or in gases or liquids.
Dose rate	The rate at which a person or part of a person would receive a given dose of ionising radiation.
Dosimetry	The measurement of radiation doses. It applies to both the devices used and to the technique.
Equipment	For the purposes of this publication equipment is defined as an individual item i.e. a dose rate meter or a kit comprising an instrument with associated probe and accessories i.e. Mini Monitor 900 with 42B probe.
Establishments	Includes all Naval, Army, Air Force, and MOD civilian (including Defence Agency) establishments and attachments. It also includes businesses contracted to carry out work on behalf of the MOD
Front Line Commands	Organisations responsible for maintenance of capability in-service.
Ionising radiation	Gamma (γ) rays, X-rays (either from radionuclides, X-ray equipment or produced as a by-product of some other apparatus), alpha (α) particles, beta (β) particles and neutrons.
MOD Approved Radiation Calibration Facility	A calibration facility that has achieved a satisfactory assessment against the requirements of JSP 425.
Periodic/Annual Test	A test to confirm that the equipment performance has not deteriorated.
Type Test	An assessment of an equipment to ensure that the equipment is fit for purpose as defined within the User Requirement Document.

APPENDIX 2

NORMATIVE REFERENCES

The following referenced documents are applicable to this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ACOP (Approved Code of Practice and Guidance)	Work with Ionising Radiation Approved Code of Practice and Guidance. An enabling act covering environmental protection.
Environmental Permitting Regulations 2010	The Environmental Permitting (England and Wales) Regulations 2010
Environmental Protection Act 1990 (as amended)	Environmental Protection Act 1990 (as amended)
Health and Safety at Work etc. Act 1974 (as amended).	Health and safety of persons at work enabling act.
International vocabulary of metrology	Basic and general concepts and associated terms (VIM) 2008 3rd Edition.
IRR99	Ionising Radiations Regulations 1999
JSP 375	Management of Health and Safety in Defence.
JSP 392	Management of Radiation Protection in Defence
DStan 05-055 Part 3	Measurement and Calibration System Requirements for Ministry of Defence Test & Measurement Equipment
MHSWR 1999	Management of Health and Safety at Work Regulations 1999
MRCQP	The MRCQP is the technical committee that is a sub-committee from the RPIC. .
NICOP	Clearance and Exemption Principles, Processes and Practices for use by the Nuclear Industry: A Nuclear Industry Code of Practice.
Radioactive Substances Act 1993	Use, keeping and disposal of radioactive material. Reference Sources for the Calibration of Surface Contamination Monitors - Part 2: Electrons of energy less than 0.15 MeV and photons of energy less than 1.5 MeV.
RPIC	The RPIC is the Capability Sponsor/Governance forum, that CBRN DT have to answer to and provide them with the assurance that what they buy and support is fit for purpose
Support Authority (SA)	The organisation responsible for the delivery and maintenance of equipment required to meet the capability.
The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 ("CDG 2009").	This regulation deals with the carriage of dangerous goods, the purpose of which is to protect everyone either directly involved (such as consignors or carriers), or who might become involved (such as members of the emergency services and public).
The International System of Units (SI) 2006 8th Edition	The International System of Units (SI) 2006 8th Edition
The Ionising (Medical Exposure) Regulations 2000	The Ionising (Medical Exposure) Regulations 2000

The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR)	REPPIR establishes a framework of emergency preparedness measures to ensure that members of the public are properly informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring.
The Radioactive Material (Road Transport) (Great Britain) Regulations 2002	This document is intended to provide UK guidance to users of transport regulations on where and how a Radiation Protection Programme can be established and implemented.