

# HANDBOOK OF DEFENCE LAND RANGES SAFETY

## VOLUME 4

### DEMOLITIONS, ORDNANCE DISPOSAL AND BATTLE SIMULATION

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BY COMMAND OF THE  
DEFENCE COUNCIL

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MINISTRY OF DEFENCE

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# HANDBOOK OF DEFENCE LAND RANGES SAFETY

## VOLUME 4

### DEMOLITIONS, ORDNANCE DISPOSAL AND BATTLE SIMULATION

## RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE
ONE	JUL 06

**Joint Service Publication 403** – Handbook of Defence Land Ranges Safety (Volumes 1 – 4)

- Volume 1:** Range management -  
**Part 1** - Regulations – Introduction, Glossary, Abbreviations.  
**Part 2** – Guidance.
- Volume 2:** Design, construction and maintenance of small arms, infantry and 40mm weapon systems ranges.
- Volume 3:** **Part 1** - Use of fixed wing aircraft and helicopter mounted weapon systems, and unmanned aerial vehicle systems, on land ranges.  
**Part 2** - Use of surface to air weapon systems on land ranges.
- Volume 4:** Demolitions, ordnance disposal and battle simulation.

## INTRODUCTION

Joint Services Publication (JSP) 403 is issued under the overall direction of the Defence Council. It contains the Ministry of Defence regulations for the safety of land ranges and is a Ministry of Defence Approved Code of Practice (ACOP). Where issues of health and safety are concerned it takes into account the provisions of the Health and Safety at Work Act and other legislation.

JSP 403 is designed to provide a comprehensive handbook covering safety on Ministry of Defence land ranges. It provides direction, guidance and instructions on which the Services and Ministry of Defence civilian organisations and agencies can base their safety regulations. There are currently four volumes and further volumes may be produced if required. JSP 403 as a whole is sponsored by the Chairman of the Defence Land Ranges Safety Committee.

JSP 403 contains both regulation and best practice measures for range safety. Throughout Volume 4 the use of the verbs must, will or is/are to identify mandatory requirements, whereas use of the verb 'should' indicates best practice. The application of best practice is to be considered mandatory unless other methods of keeping the risk of potential hazard as low as is reasonably practicable have been identified and can be successfully applied.

## SCOPE OF VOLUMES

**JSP 403 Volume 1** covers the range management aspects of the use of land ranges and deals specifically with policy, responsibilities, authorisation, use, maintenance and inspection of ranges. The current version Edition 2, (January 2003) replaced the original version dated 31 August 1997.

**JSP 403 Volume 2** covers the design and construction of land ranges and deals specifically with small arms, infantry and 30mm weapon systems ranges. Edition 3 (February 2003) of Volume 2 is the current version. Volume 2 replaced Infantry Training, Volume 4, Ranges, Pamphlet No. 22 Range Construction and Regulations (Army Code 71053).

**JSP 403 Volume 3** is in two parts. Part 1 covers the firing of weapon systems from fixed wing aircraft and helicopters on to land ranges. It has introduced commonality into control systems, procedures and management. It also explains the terminology used in air to surface engagements. Part 2 details the policy and principles for the safety of surface to air weapon systems firing against air or surface targets on land ranges.

**JSP 403 Volume 4** covers the design and construction of demolition ranges and explosive ordnance disposal training areas, the clearance of ordnance from ranges and training areas, the safe use of ranges and training areas for demolitions and ordnance disposal training, and the safe use of explosives and pyrotechnics for battle simulation on ranges and training areas.

## **SPONSOR**

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## ASSOCIATED PUBLICATIONS

Reference	Code	Title
A	JSP 362	Defence Lands Handbook.
B	JSP 364	Joint Service Explosive Ordnance Disposal Manual
C	JSP 375	MOD Health and Safety Handbook
D	JSP Vol 1	Handbook of Defence Land Ranges Safety Volume 1 Range Management policy, responsibilities, authorisation, use, maintenance and inspection of Land Ranges.
E	JSP Vol 2	Handbook of Defence Land Ranges Safety Volume 2 Design and Construction of Small Arms and Infantry Weapon Systems Ranges
F	JSP Vol 3	Handbook of Defence Land Ranges Safety Volume 3: Part 1 - Use of fixed wing aircraft and helicopter mounted weapon systems, and unmanned aerial vehicle systems, on land ranges.  Part 2 – Use of Surface to Air Weapon Systems on Land Ranges.
G	JSP 482	MOD Explosive Regulations
H	JDP 2/02	JS EOD, Explosive Ordnance Disposal
I	Design and Maintenance Guide No 12	Explosive Ordnance Clearance
J	Army Code No. 11968	Ammunition and Explosives Regulations (Land Service) (A&ERs)
K	Army Code No. 71080	Infantry Training, Volume 4, Ranges Pamphlet No.21, Regulations for the Safe Planning, Conduct and Supervision of Firing and Training Infantry Weapon Systems and Pyrotechnics.
L	Army Code No. 71670	Military Engineering Volume II, Field Engineering Pamphlet No. 4, Demolitions.
M	Army Code No. 71685	Military Engineering Vol II Pam 4A. All Arms Battle Noise Simulation
N	BR 5063 (Supp)	Clearance Divers Supervisors Aide-Memoire
O	JSP 412	Radio Frequency Radiation Hazards Associated with Electro-Explosive Devices.

## CHAPTER 1

### SCOPE AND PURPOSE OF JSP 403 VOLUME 4

#### INTRODUCTION

0101. Joint Services Publication (JSP) 403 is designed to provide a comprehensive handbook covering safety on Ministry of Defence land ranges. It gives guidance and instructions on which the Services and Ministry of Defence civilian organisations and agencies should base their safety regulations. JSP 403 is sponsored by the Chairman of the Defence Land Ranges Safety Committee (DLRSC).

#### AIM

0102. The aim of Volume 4 is to detail the policy and principles for the planning and conduct of demolitions, disposals, Explosive Ordnance Disposal (EOD) and battle simulation activities on Defence Land Ranges.

#### SCOPE

0103. JSP 403 Volume 4, covers the establishment of demolition ranges and explosive ordnance disposal training areas, the clearance of ordnance from ranges and training areas, the safe use of ranges and training areas for demolitions and ordnance disposal training, and the safe use of explosives and pyrotechnics for battle simulation on ranges and training areas. The Volume consists of the following chapters:

- |    |           |   |
|----|-----------|---|
| a. | Chapter 1 | Scope and purpose of JSP 403 Volume 4               |
| b. | Chapter 2 | Establishment of demolition and EOD training areas. |
| c. | Chapter 3 | Use of demolition and EOD training areas            |

#### RANGE AUTHORISATION

0104. Land Ranges may only be used for authorised activities. The procedures for authorisation, management and inspection of all land ranges are given in Reference D.

#### RANGE CLEARANCE

0105. From time to time, all ranges require some form of clearance of explosives. For husbandry purposes this will be a regular post-use activity and includes the disposal of blinds and collection of residue.

#### EXPLOSIVE ORDNANCE CLEARANCE (EOC)

0106. EOC is a separate and deliberate procedure. It is the reduction of Unexploded Ordnance (UXO) contamination of land areas, by means of a systematic search technique, to a level that is as low as reasonably practicable. It requires a separate tasking procedure. Further details can be found at Annex A, which is an example of a Land Quality Assessment - Risk Assessment.

## **BATTLE SIMULATION**

0107. Where Battle Simulations are required the safety distances to be applied are listed in Table 403/3/2 at Annex C to Chapter 3. Detailed procedures for producing Battle Simulations can be found in Reference M.

Annex:

A. Explosive Ordnance Clearance (EOC)



## ANNEX A TO CHAPTER 1

### EXPLOSIVE ORDNANCE CLEARANCE (EOC)

1. Responsibilities. The responsibilities for EOC for the three Services and tasking details can be found in Reference H.
2. Level of Clearance. Depending on the reasons for the clearance operation there are 3 types of clearance:
  - a. Visual search.
  - b. Shallow search.
  - c. Deep instrument search.
3. Factors. The recommendation as to the type of clearance to be carried out on any task will depend on the following factors
  - a. Future use of land:
    - (1) Continued military training and type of training to be conducted
    - (2) Disposal for arable use
    - (3) Disposal for development.
  - b. Type of soil.
  - c. Density of contamination.
  - d. Access and type of terrain.
4. Risk Assessment. Prior to any task commencing, a reconnaissance will be carried out to determine what, if any, ordnance contamination exists. A Reconnaissance Report will be produced which will include a Land Quality Risk Assessment. It will suggest what type and level of clearance, if any is required. In the case of Army ranges, it will also dictate which type of team will complete the clearance. An example of this Risk Assessment can be found at Appendix 1.
5. Disposal of UXO. Range Administering Units (RAUs) should be aware that there is a requirement for disposals of UXO that cannot be safely transported. This may involve the RAU providing support, manpower or resources to the EOC Unit.
6. Termination of task and Certification. After each task a Clearance Certificate and a Completion Report will be completed. It will include a final Land Quality Risk Assessment. These documents will form the basis for the authority for the future use of that land as agreed prior to the task commencing.
7. Alienation. The CO RAU must not sign an EOC Clearance Certificate (see Site Closure Guide at Paragraph 120 of Annex E to Reference I) without first seeking EOC advice.

#### Appendix:

1. Land Quality Assessment Risk Assessment.

**APPENDIX 1 TO ANNEX A**

**LAND QUALITY ASSESSMENT RISK ASSESSMENT**

<b>UNIT</b>	<b>ASSESSMENT No: EOC</b> Source used: JSP 364 SOP 11  Assessment Date:		
<b>ACTIVITY</b>  Activity: Place: Date of Activity: Officer in Charge:	<b>NUMBER OF PERSONS AT RISK</b>  2-5 6-9 10 plus		
<p align="center"><b>1. HAZARD INVOLVED WITH ACTIVITY/PROCESS</b></p> <p>A. Risk of injury from surface EO contamination.                  B. Risk of injury from sub-surface EO contamination.                  C. Risk of injury from deep buried EO.                  D. Risk of chemical contamination.</p>			
<p align="center"><b>2. EXISTING SAFETY MEASURES/CONTROLS</b></p>			
<b>Hazard</b>	<b>Safety Measure/Control</b>	<b>Initials</b>	<b>Comment</b>
A. Risk of injury from surface EO contamination.	History of site ascertained Area visually inspected		If contaminated, clearance task recommended
B. Risk of injury from sub-surface EO contamination.	Area subject to random electronic and intrusive Investigation		If contaminated, clearance task recommended
C. Risk of injury from deep buried EO.	History of site ascertained Archive records consulted		
D. Risk of chemical contamination.	History of site ascertained		
<p><b>OFFICER/NCO IN CHARGE OF ACTIVITY MUST INITIAL FOR EACH SAFETY MEASURE/CONTROL ABOVE, NOTING THAT WHEN SAFETY MEASURES/CONTROLS ARE NOT APPLIED/AVAILABLE OR ADDITIONAL HAZARDS ARE LIKELY, PARAGRAPH 3 BELOW IS TO BE COMPLETED</b></p>			

**3. ADDITIONAL MEASURES**

A. **Residual Risks**

B. **Additional Safety Measures/Controls**

C. **Additional Controls Agreed. Yes/No.** If yes, detail the action to be taken

**Target date for implementation.....**

Signed

D. **Assessment Rating**

The above Land Quality Assessment Risk Assessment gives a risk rating of

**X x X = Low Risk**

E. The presence of ordnance can never be completely discounted. Although considered unlikely, there still remains the possibility of stray or buried items within this area. All future users should be made aware of the history of this site and be advised to remain alert. Should anything of an explosive nature be unearthed, all work must be suspended and the area evacuated. The police must then be informed who will arrange for attendance of EOD personnel if required.

Signed .....OC EOC Group

**RISK RATING**

**RISK RATING ACTION BANDS**

**Likelihood x Severity of Injury/harm**

**Risk Rating Bands & Actions Required**

1. Most unlikely	1. Trivial injury/harm	1&2 Minimal Risk	- Maintain Control Measures
2. Unlikely	2. Slight injury/harm	3&4 Low Risk	- Review/monitor control measures
3. Likely	3. Serious injury/harm	6&8 Medium Risk	- Improve control measures
4. Most likely	4. Major injury/harm or death	9,12 & 16	- Improve control immediately & consider stopping work

To establish **Risk Rating** multiply 'Likelihood' by the 'Severity of injury/harm

## CHAPTER 2

# DESIGN AND CONSTRUCTION OF DEMOLITION, DISPOSAL AND EOD TRAINING RANGES

### GENERAL

0201. Scope. This chapter details the principles for the design and construction of demolition, disposal and Explosive Ordnance Disposal (EOD) training ranges. It should be used as a guide as each range will vary depending on geographical location and size of maximum Range Danger Area (RDA). Both land and tidal sand areas should be considered for the construction of ranges.

Advice in the first instance should be sought from the appropriate single service authority.

0202. Procedures. The procedures concerning the procurement, acceptance, authorisation and closure of a land range in the UK or overseas are detailed in Reference D.

0203. Access Restrictions. These are detailed in Reference D.

### RANGE DANGER AREA (RDA)

0204. Hazards. The main hazards from the use of explosives and methods of mitigation are as follows:

- a. Flash and heat. Personnel and non-essential equipment are to be placed outside the calculated safety distance or in a protected shelter.
- b. Blast and noise. Personnel and non-essential equipment are to be placed outside the calculated safety distance or in a protected shelter. Personnel inside a protected shelter should wear appropriate hearing protection.
- c. Ground shock. The level of ground shock produced is dependent upon local rock strata, demolition type and soil type on surface and sub surface. Ground shock can be limited by reducing the Net Explosive Quantity (NEQ) per serial.
- d. Fragmentation. The ordnance, target and debris in the ground will produce fragmentation. Personnel and non-essential equipment are to be placed outside the calculated safety distance or in a protected shelter.
- e. Toxic smoke and gases. Toxic smoke and gas are produced by the initiation of explosive material and are affected by meteorological conditions such as temperature, wind speed and direction. Protective equipment and procedures are to be used where appropriate.
- f. Residue and Hazardous Waste Disposal. Toxic substances are produced by the initiation of explosives and disposal of munitions. These must be disposed of in a safe manner taking into account environmental considerations.

0205. Range Danger Area (RDA). The safety distance for a particular explosive nature is to be calculated using the Safety Distance Tables in Annex C to Chapter 3. The maximum NEQ that can be detonated on the range must be contained within the RDA and stated in the Range SO.

0206. Air Danger Height (ADH). In the production of Range SO consideration is to be given to the ADH. The procedures to be followed are detailed in Chapter 6 of Reference D.

### FACTORS

0207. Physical Properties. The ideal physical properties of a demolition range are as follows:

- a. Isolated to minimise disruption and damage to other facilities and structures.
- b. Located where blast and noise can dissipate easily. Wooded areas and scrub will help dissipate noise but hinder control. Rocky and steep surfaces will divert and not dissipate noise but will contain blast more effectively. Balancing these factors will provide the optimum site.
- c. Danger radius must be wholly contained on MOD land unless legal agreement has been met with the appropriate landowner.

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0208. Areas and Installations. The following areas or installations should be avoided when siting a demolition range:

- a. Buildings, especially those which are inhabited.
- b. Overhead or underground cables and wires.
- c. Land drainage schemes and underground pipelines.
- d. Roads, railways, canals, and Rights of Way.
- e. Airfields.
- f. Radio/ radar transmitters.
- g. Agricultural land.
- h. Areas of dense vegetation.

0209. Environmental Issues. When selecting the site for a range, the visual and acoustic effects on the environment and the general public, as well as any measures to reduce those effects, are to be assessed. This is particularly important for sites in or near National Parks, areas used for public leisure and inhabited areas. DE, or the appropriate civil authority, is to be consulted at an early stage to ascertain whether the area chosen is a conservation-designated area or a heritage site, and whether there may be planning authority sensitivities which require consultation with statutory Bodies. Advice on noise can be obtained from the Area Health and Safety Environmental Groups for the Royal Navy/Royal Marines (RN/RM), the Division or Formation Environmental Health Officer (EHO), the Environmental Noise Officer (ENO) Royal Air Force (RAF) Health Monitoring Team (HMT) and MOD Directorate of Safety, Environment and Fire Policy (D SEF Pol) as applicable. On operations the Environmental Health Team (EHT) is to be consulted.

0210. Facilities. The following facilities may need to be provided:

- a. Firing Point (FP). The FP must be protected or be a safe distance from the demolition area. The ability to observe the initiation of the explosives is highly desirable. Examples of viewing devices are as follows:
  - (i) A periscope fitted with armoured glass.
  - (ii) Close Circuit Television (CCTV). The CCTV should be capable of zoom, tilt, and pan and be fitted with wiper blades.
- b. Ammunition Storage. Ammunition storage inside the RDA area must be fully protected from blast and fragmentation. Details of the design and construction of facilities are detailed in Chapter 6 of Reference G. Advice on the construction and the necessary regulations concerning ammunition storage should be sought from the relevant single service authority. Ammunition stored outside specifically designed and constructed facilities must be stored in accordance with Field Storage or Road Transport Regulations.
- c. Ammunition Holding Area (AHA). Where the AHA is located within the RDA it must be protected or be located outside the maximum calculated safety distance. There should be at least three separate areas to allow safe holding of detonators, munitions and explosives and a segregation area for Unexploded Explosive Ordnance (UXO)<sup>1</sup> and stray ammunition. Consideration must also be given to segregating ammunition of different compatibility groups.
- d. Administration Area. An administration area should be available. It may include the following:
  - (1) Safe area for personnel to relax. The area should be comfortable enough for all personnel on the range to remain for long periods of time.
  - (2) Toilet and washing facilities.
  - (3) Facility to heat food and drinks.
  - (4) First Aid Point with stretcher.
  - (5) Workshops or garage for storage of targets and tools.
  - (6) Protected POL store.
  - (7) Effective and appropriate communications.
  - (8) Designated smoking area.

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e. Design and construction of range structures. Advice on the specification for all facilities on the range should be sought from the Defence Training Estate (DTE) Technical Advisory Section Royal Engineers (TAS RE). Bunkers and protected firing points are already utilised on some ranges. Historical precedent may be suitable justification for continued use but specific requirements must be established for new facilities.

0211. Demolition Area. A demolition range may contain a number of demolition areas. The following should be considered for a demolition area:

- a. The area should be clear of trees and undergrowth. This will reduce possible fire hazards and increase the line of sight. It will also allow items thrown clear in an explosion to be located.
- b. The ground should consist of deep soil to absorb ground shock. The ground should also be free from stone, as it will reduce fragmentation. The soil should not be marshy or waterlogged. Ground containing peat is not to be used. Demolition pits are liable to collapse and should not be allowed to become too deep, especially in sandy soil.
- c. There should be adequate routes to and from the designated FP and range facilities to the demolition area. There will be a requirement for the movement of ammunition, plant and soil moving vehicles to restore the area. Access is required for emergency services.

RV points should be clearly signed.

d. The size of the demolition area or pit will depend on a number of factors. These will be considered as part of the risk assessment and the details recorded on the MOD Form

904. The following are to be considered:

- (1) When it is necessary to use more than one pit, the pits are to be so sited that a detonation in one pit does not affect the ammunition in other pits.
- (2) For confidence charge training students should be separated to aid command and control. This is to be a minimum of 2m between charges.
- (3) Student/Instructor ratio. Setting up of charges will require adequate supervision in accordance with single service direction. Application of detonators to charges will always require a 1/1 ratio.
- (4) Size and nature of the charge and the procedure to be undertaken. This will be covered in the User Demolition Instruction. Each demolition area is to be large enough to allow the safe conduct of all serials to be conducted.

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<sup>1</sup> UXO can only be moved to this area if safe to move.

## **RANGE SAFETY**

0212. Access Control. In order to ensure that the integrity of the RDA is maintained the following may be utilised:

- a. Sentries at designated access points on range perimeter.
- b. Fencing, Barriers, Warning Signs and Flags. The requirements in Reference D and E are to be applied.
- c. Radar.
- d. Protected Observation Posts within RDA.
- e. On remote or controlled access sites, lockable road barriers.

0213. Communications. Communications will be required between the following:

- a. Demolition Area.
- b. Sentries and unmanned barriers where access may be permitted.
- c. Range control (if present).
- d. Emergency services. e. Administration Areas. f. Firing Point(s).
- g. Other organisations (in accordance with Range Standing Orders).

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Safety Note: Where radios are used, all frequencies used must be allocated by RAU through Range Standing Orders. RF precautions are to be observed in relation to Electro-Explosive Devices (EEDs) see Reference O. The RF safety distance tables for BOWMAN radios can be found at Reference L, Section 10.3

### **OPERATIONAL THEATRE RANGES (OTR) AND TEMPORARY EXERCISE RANGES (TER)**

0214. The procedures for establishing OTR and TER are covered in Reference D. However, the factors listed above must be taken into consideration.

### **TARGETS**

0215. In designing the Range consideration should be given to the types of targets to be used for demolitions and EOD training, to include the hazards listed in Paragraph 0204.

## CHAPTER 3

# USE OF DEMOLITION, DISPOSAL AND EOD TRAINING RANGES

## INTRODUCTION

0301. The safe and effective use of Demolition, Disposal and EOD Training Ranges is largely dependent on the following factors, which will be expanded within this chapter:

- a. Correct qualification and authorisation of all personnel conducting demolitions/EOD tasks, training and trials.
- b. Application of the correct planning and preparation guidance for such operations, training or tasks.
- c. Production of a comprehensive and informative Range Standing Order (Range SO) and User Demolition Instruction (UDI).
- d. Execution of UDI in accordance with single service procedures to complete the range programme/firing order.

## QUALIFICATIONS AND AUTHORISATION

0302. General. The use and destruction of explosives by detonation and burning and Explosive Ordnance Disposal (EOD) are inherently dangerous operations. Both the Range Administering Unit (RAU) and the User Units have responsibilities for safe operation of the range. Personnel undertaking these operations must be properly qualified. A list of single service qualifications can be found at Annex A. Authorisation to participate in tasks listed in this table is subject to limitations and restrictions imposed by single service qualifications and regulations. Individuals are responsible for ensuring that they do not operate outside the limitations of their qualification and/or authorisation and that these are current. RCOs are responsible for ensuring limitations are observed. On no account may a Commanding Officer authorise non-qualified personnel to plan, conduct or supervise any practice or training involving the use of live explosives, simulators or accessories.

0303. Range Administering Units (RAU). The responsibilities of the RAU are listed in Reference D.

0304. User Responsibilities. The user unit/organisation is responsible for:

- a. The safe conduct of all range activities.
- b. Using the range in accordance with the Range SO and the rules laid down in authorised training and other relevant publications.
- c. Production of the UDI.

0305. User Range Appointments. The UDI will nominate specific personnel for the conduct of demolition and EOD tasks, trials and training, who meet the appropriate single service regulations for qualification, requalification and licensing. The following appointments are defined in Reference D. Additional responsibilities are expanded in subsequent paragraphs:

- a. Exercise Director. This will normally be the CO of the exercising unit.
- b. Planning Officer. This will normally be the Range Conducting Officer (RCO).
- c. Range Conducting Officer. For certain activities the RCO may fulfil the duties of the Safety Supervisor.
- d. Safety Supervisor (SS). The number of SS required will depend on the exercise being



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e. First Aid Personnel. f.

Sentries.

0306. Range Conducting Officer (RCO)<sup>1</sup>. At every practice, demonstration, trial or operational task, a suitably qualified and authorised RCO is to be nominated. The RCO has the following specific responsibilities:

a. Enforcement of appropriate regulations and Range SO. b.

Production of the UDI.

c. Organisation and control of the range. d.

Preparation of range before use.

e. Conduct on the range.

f. Control of all explosive/non-explosive stores.

g. Control of the possession of all authorised exploder/firing devices at all times.

h. Nomination of an individual to give the executive order to fire any explosive charge(s). i.

Notification of all relevant authorities and any other personnel who may be affected by the operation or task.

j. Determination of danger areas/safety distances and selection of the Firing Point (FP).

k. Control and briefing of all personnel, particularly sentries. The brief is to ensure that all personnel are conversant with the content of the User demolition instruction.

l. Control of the investigation and, where necessary, the destruction of blinds and misfires.

m. Inspection of sites after each explosive serial.

n. Checking/clearing the site on completion of the task. o.

Taking declarations from all relevant personnel.

0307. Safety Supervisor (SS). Where required a suitably qualified SS is to be nominated and authorised with specific responsibility for ensuring safe conduct of range practices.

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<sup>1</sup> Some single service publications refer to a Demolitions Conducting Officer (DCO). The responsibilities are those defined for the RCO.

0308. Medical Cover. Due to the potentially dangerous situations that can arise during the use of any explosives and the remoteness of ranges/training areas it is necessary to have medical cover. At every practice, demonstration, trial or operational task, individuals providing medical cover are to be nominated in the UDI. Individuals providing medical cover must not be allocated other tasks and must remain protected/under cover at all times. The level of medical cover required for each range will be dictated in Range SO's and UDI's..

0309. Sentries. The Demolitions/EOD party must include sufficient sentries to secure the danger area from unauthorised access. They must be briefed on the actions to be taken in the event of unauthorised access during the range practice. The RCO is to ensure that he has 2 way contact with all the sentries for the

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0310. Trainees and Spectators. Under the direction of the RCO, Trainees are to be supervised by qualified personnel at all times whilst on the range/training area. Spectators, other than trainees, require the same supervision. They are not permitted within the danger area and are restricted to the approved observation areas in accordance with the UDI.

## **PLANNING AND PREPARATION GUIDANCE**

0311. Range Standing Orders. Requirements for Range SO are detailed in Reference D. They are to be read and signed as having been understood by the RCO before using the range.

0312. Contents of UDI. In order to standardise the format and content of demolition, burning and EOD (training) orders, suggested contents are detailed at Annex B. This template can be modified to meet Demolitions or EOD tasks in an operational or training environment.

0313. Safety Distance Tables. The safety distance for a particular explosive store is to be calculated as detailed in Annex C to Chapter 3. The maximum NEQ that can be detonated on the range must be contained within the RDA and stated in the Range SO.

## **RECORDING OF RANGE ACTIVITY.**

0314. General. The UDI is to include a plan for the use of explosives and stores to be expended/destroyed, by individual serials. A Land Range Log (MOD F906) is to be controlled by the RAU and completed by the RCO before leaving the range. A unit maintained document, sometimes known as a Demolition Diary, may be kept to record the actual conduct of serials in order to assist in the completion of MOD F906.

0315. Land Range Log MOD F906. An accurate record of the usage of explosives and stores expended/destroyed must be maintained by the RAU. It is to be available to the RCO whenever the range is in use and must be completed before and after use by the RCO. The record is to be in the form of a Range Log (MOD F906) which, in addition to its value as a record of explosives and demolition/training stores destroyed, is a record of range management. It is very useful in establishing accuracy of claims in the event complaints of damage received from local inhabitants. The retention of MOD F 906 and associated range file is dictated by the document retention policy directed in Reference C.

Annex:

- A. Guide to Single Service Demolition and EOD Range Qualifications.
- B. User Demolition Instructions.
- C. Explosive Safety Distances.

### ANNEX A TO CHAPTER 3

#### GUIDE TO SINGLE SERVICE DEMOLITION AND EOD RANGE QUALIFICATIONS

Authorisation to participate in tasks listed in this table is subject to limitations and restrictions imposed by single service qualifications and regulations. Individuals are responsible for ensuring that they do not operate outside the limitations of their qualification and/or authorisation and that these are current. RCOs are responsible for ensuring limitations are observed. In the event of queries individuals should gain clarification from the relevant school. Defence Explosive Munitions Search School (DEMSS) for EOD and Royal School of Military Engineering, Battle Engineering Wing (RSME, BEW) for Demolition.

Ser	Course	Course No	RCO <sup>1</sup>	SS	EOD team	Dems	Batsims	Remarks
<b>COURSES HELD AT DEODS</b>								
1.	DEODS Course.	No 0801	9	9	9	9		
2.	DEODS RN Course.	0813			9			RN equivalent of Cse 0804
3.	DEODS RE/RAF Course	0804			9	9		
4.	DEODS RN Elementary EOD Course	0807			9			RN equivalent of Cse 0805
5.	DEODS Course RE/RAF Elementary EOD.	0805			9	9		
<b>COURSES HELD AT RSME</b>								
6.	RE Troop Commanders Course.	5102	9	9		9	9	
7.	RE Troop Commanders Course (V)	1214	9					
8.	RE Field Sergeants Course.	1306	9	9		9	9	
9.	All Arms Demolitions Safety Officer Course (RSME).	1802	9	9		9	9	
10.	All Arms Battle Noise Simulation Safety Supervisor Course (BSS)	1803	9				9	Total weight of charges on a single firing cable not to exceed 2.5 kg. Not qualified to attach explosive to targets.
11.	Combat Engineer Class 1	2303				9	9	
12.	Combat Engineer Class 2	nil				9	9	In- unit upgrading
13.	Combat Engineer Class 3	2301				9	9	
Ser	Course	Course No	RCO <sup>1</sup>	SS	EOD team	Dems	Batsims	Remarks
14.	All Arms Assault Pioneer Platoon Commander	1506	9	9		9	9	
15.	All Arms Assault Pioneer Platoon Sergeant	Tbc				9	9	

16.	All Arms Assault Pioneer Section Commander	1507				9	9	
17.	Infantry Assault Pioneer Basic	2508				9	9	
18.	RAC Support Trooper Basic	2509				9	9	
19.	Infantry Assault Pioneer Advanced (V)	Tbc				9	9	
20.	Infantry Assault Pioneer Basic (V)	2219				9	9	
<b>COURSE HELD AT DEMOLITIONS CELL 22 SAS</b>								
21.	SAS Patrol Demolitions Course		9			9	9	
22.	SAS (V) Patrol Demolitions Course		9			9	9	
<b>COURSES HELD AT ASA</b>								
23.	Ammunition Technical Officers (ATO) Class 1.		9	9	9	9	9*	*TAB AER/3039 Empowers ATO / AT Class 1 and AS(V) Class 1, SSgt and above to carry out Batsims
24.	Ammunition Technical Officers (ATO) Class 2.		9	9	9	9	9*	
25.	Ammunition Technicians (AT) T1 SNCO		9	9	9	9	9*	
26.	Ammunition Technicians (AT) T1				9	9	9*	
27.	Ammunition Technicians (AT) T2				9	9		*AT Class 2 are not trained or empowered under TAB AER/3039 to carry out UXO / CMD other than logistic disposal tasks.
28.	Ammunition Specialist RLC TA Class 1				9	9	9*	
<b>COURSES HELD AT CTC RM</b>								
29.	RM Platoon Weapons Instructor Class I					9		Non-electrical initiated charges only. Limited to expl digging and blinds only
Ser	Course	Course No	RCO <sup>1</sup>	SS	EOD team	Dems	Batsims	Remarks
30.	RM Heavy Weapons Class 1 Course					9		Non-electrical initiated charges only. Limited to expl digging and blinds only
31.	RM SBS Swimmer Canoeist Class I (SC1) Course		9	9	9	9	9	Non-electrical initiated charges only (unless passed cse at serial 34)
32.	RM Assault Engineer Class I Course		9	9	9	9	9	

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33.	RM Assault Engineer Class 2 Course.					9	9	
34.	Inoculation/Noise Simulation (Electrical Initiation) Safety Supervisors Course					9	9	

<sup>1</sup> Some single service publications refer to a Demolitions Conducting Officer (DCO). The responsibilities are those defined for the RCO.

NOTES:

1. RCO = Range Conducting Officer
2. SS = Safety Supervisor
3. EOD Team = Participant in activities on an EOD Range, in accordance with Single Service regulations, under supervision where necessary
4. Dems = Participant in activities on an Dems Range, in accordance with Single Service regulations, under supervision where necessary
5. Batsims = Participant in activities during Batsims, in accordance with Single Service regulations, under supervision where necessary

CONTACT DETAILS:

SCHOOL	POC	TEL	FAX	REMARKS
DEFENCE EXPLOSIVE ORDNANCE SCHOOL	TRAINING OFFICER			
RSME - HQ COMBAT ENGINEERING WING	G3 TRG CELL			
ARMY SCHOOL OF AMMUNITION	DLSTG ASA -HQ CO			
COMMANDO TRAINING CENTRE ROYAL MARINES	ASSAULT ENGINEER WING			
MARITIME WARFARE SCHOOL- DEFENCE DIVING SCHOOL	DIVING TRAINING OFFICER			

## **ANNEX B TO CHAPTER 3**

### **USER DEMOLITION INSTRUCTIONS**

1. The User demolition instructions are to be produced by the user unit and signed by the RCO. It gives a detailed forecast of events and may highlight detail covered in Range SO. It may include information on the following subject areas:
  - References giving authority for the conduct of range activity. (e.g. JSP 403, 364, single service publications)
  - General Situation. Unit/sub-units involved, visitors (military and civilian), dates and timings.
  - Aim.
  - Conduct. Additional restrictions to regulations.
  - Ground. Grid/Map Ref, name of site, range layout, location of demolitions areas and pits, firing points, sentries and sentry posts, Splinter Proof Shelter (SPS).
  - Personnel. Nominal roll showing appointments (ensure appropriate qualifications), range party/groupings, visitors.
  - Limitations. NEQ (by detonation + burning), man limits, pits to be used, timings
  - Explosives. List of serviceable explosive stores, items for disposal, Ammunition Holding Area, Ammunition preparation point, Safeguarding/Security arrangements, Control of explosive stores
  - Targets and non-explosive stores. Non explosive stores and equipment lists, targets/items for demolition
  - Maintenance of the range. Special environmental considerations/actions, fire precautions, handover procedure, inspections
  - Emergency procedures. First Aid/medical arrangements, emergency orders, assembly areas, appointments/qualifications, location of fire fighting equipment, safety vehicle/route, and emergency telephone numbers.
  - Meteorological conditions. Outlook/forecast, action in adverse weather, restrictions depending on prevailing conditions, tidal state
  - Briefing. For all personnel, to cover details in User demolition instruction/Range SO, timings
  - MT discipline.
  - Orders for sentry/boundary patrol.
  - Radiation Hazards. Precautions for Electro Explosive Devices (EEDs), personnel safety distances, use of radios/mobile phones see Reference O. The RF safety distance tables for BOWMAN radios can be found at Reference L, Section 10.3. No mobile phone or other personal electrical equipment is to be switched on within 5m of an EED.
  - Prohibited Articles. Prohibited/Hazardous items, smoking restrictions.
  - Dress. No man made fibres, (including items incorporating Gortex and other in-service waterproof clothing), PPE.
  - Items requiring special safety precautions (such as White Phosphorus (WP)).

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- Communications arrangements. Safety flags, signs, symbols, radios, frequencies, landline, emergency numbers, and use of mobile phones/pagers.
- Demolition/Disposal Orders. By serial, timings. Actions on Misfire, UXO
- End of task drills. Free From Explosives (FFE) procedure, UXO, range declaration.
- Administration. Overnight arrangements where applicable, security/storage.
- Records and Reports. Range documentation, Completion of MOD F906, Unit demolition diary.
- Exercise Director/RCO Signature Block

2. Completion of the User demolition instruction may require the use of annexes/enclosures. The following subjects may best be included as Annexes/Enclosures:

- Allocation of Duties and Nominal Roll.
- Vehicle Nominal List and Route Cards.
- Programme of events.
- Firing Order and list of serials.
- Serviceable Explosive Stores List.
- Non-Explosive Stores and Equipment List.
- Ammunition for disposal.
- Orders for All EOD personnel.
- Orders for Sentries.
- Orders for Visitors.
- Accident Procedures.
- First Aid Precautions.
- Safety Precautions
- Range Map.
- Training Order.

**ANNEX C TO CHAPTER 3**

**TABLE 403/3/1 – EXPLOSIVE SAFETY DISTANCES FOR AMMUNITION FIRED DURING TATTOOS, DISPLAYS AND DEMONSTRATIONS**

Item	Designation	Quantity	Safety distances (metres)	Width from line of fire <sup>1</sup>	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
1	Chge GP No 8	1	10m	10m	1. Must be in a combustible bag with a small hole cut to allow insertion of ISFE. 2. Must be on a metal tray. 3. Must be wetted.
2	Cartridge Blank 13 pr Mk 3, L1A1, L2A1 and L3A1	1	60m	25m	
3	Cartridge Blank 25 pr Mks 1, 2 and L1A1	1	60m	25m	
4	Charge Blank 155 mm How 3 lb Mk 1	1	200m	50m	No unprotected personnel are to be positioned in the arc 15°/267 mils either side of the line of fire.
5	Cartridge Blank 105 mm Fd L38A1	1	200m	50m	
6	Cartridge Blank 105 mm Fd L40A1	1	60m	25m	
7	Cartridge Blank 105 mm How L33A1	1	200m	50m	
8	Cartridge Blank 105 mm How L39A1	1	60m	25m	Angle of projection is not to exceed 350 mils.
9	Cartridge Blank 105mm How L33A1 or L39A1 with primer only (Charge removed)	1	15m	5m	1. Fired without milboard cup. 2. Not to be fired in an enclosed building in which there may be volatile fumes or near inflammable material.
10	Reserved				
11	Charge Blank 120 mm Tk L7A1	1	60m	25m	The distance in column (d) is to be measured from gun trunnions.
12	Blank Small Arms Ammunition for Rifle and Machine Gun	1	30m	-	Does not include bulleted blank ammunition.
13	Mine A/Tk Practice L2A1 fitted with Smoke Unit A/Tk Mine Practice L1A2	1	-	50m	Troops on foot are to keep 5 metres clear of vehicles likely to encounter practice mines.
14	Safety Fuze	600mm	5m	-	
15	Fuze Instantaneous	5m	25m	-	Must be suspended at least 600mm above ground between but not directly in contact with two wooden stakes.
16	Theatrical Maroon	1	30m		Must be suspended at least 600mm above ground between but not directly in contact with two wooden stakes.



Item	Designation	Quantity	Safety distances (metres)	Width from line of fire <sup>1</sup>	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
17	Detonator Electric L2A1	1	20m	-	1. Ground on which laid is to be free from surface stones or any other form of potential missiles. 2. Not to be covered or tamped in any way. 3. See Note 8. 4. Rarely will non-electric detonators be used for demonstrations (but see Item 19)
18	Detonator Electric L2A1 with Cord Det loop (not exceeding 200mm length)	1 + Max 200mm	20m	-	
19	Detonator Electric L2A1 (When contained in a metal box) or Detonator Non Electric L1A1 (When contained in a metal box)	1	100m	-	1. The detonator is to be taped to the side of the box that is facing away from the audience. 2. Distance may be reduced to 25m if the metal box is surrounded by a sandbag wall in all directions to a height of 300mm above the top of the box. 3. See Note 8
20	PE 4 (cartridge or slab) uncased charge surface laid NOTE. Battle inoculation charges should not exceed 1kg of PE4 (4 sticks) during normal training. Members Letter (ML) 44/98, Ref D/OB/2206/5 dated Jul 98 applies.	Up to 1kg	235m		When charges on ground, areas to be free of loose stones and debris. Can be reduced to 25m where charge is placed on sand-filled sandbag. 25m based on blast hazard. ML 44/98 applies. Can be reduced where charge is suspended, see serial 22 and 23.
21	PE 4 (suspended)	170g	135m	-	1. Must be suspended at least 100mm above ground between but not directly in contact with two wooden stakes. 2. May be reduced to 25m where stand-off (distance above ground) is in excess of 400mm 3. The use of non-fibrous materials for the stake for the stake (eg cardboard) should be considered.
22	SX 2 (suspended)	113g	135m	-	
23	PE 4 and Petrol	57g + 2 litres	100m	-	Must be suspended at least 600mm above ground between but not directly in contact with two wooden stakes.
24	Battle Noise Simulator L29A1	1	100m	-	Only to be used in accordance with A&ER Vol 2 Annex S. L28A1 no longer in service
25	Simulators Gun and Mortar Fire L11, L13 and L18	1	400m	-	

Item	Designation	Quantity	Safety distances (metres)	Width from line of fire <sup>1</sup>	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
26	Simulator LMG/GPMG	Max 200mm Det cord	25m	-	1. Simulators constructed in accordance with Reference M ( <i>Military Engineering Volume II – Field Engineering Pamphlet No 4A (Army Code No 71685) Chapter 3 para 0325-6.</i> )
27	Simulator LMG Short Burst	Max 200mm Det cord	25m	-	2. Ground on which laid is to be free from surface stones or any other form of potential missiles. 3. Not to be covered or tamped in any way.
28	Simulator Rifle Fire infantry section	Max 200mm Det cord	25m	-	1. Simulators constructed in accordance with Reference M ( <i>Military Engineering Volume II – Field Engineering Pamphlet No 4A (Army Code No 71685) Chapter 3 para 0324.</i> ) 2. Ground on which laid is to be free from surface stones or any other potential missiles. 3. Not to be covered or tamped in any way.
29	Puffs Powder No 8 or No 9	1	60m	-	If the ground is free from stones and other potential missiles then the distance may be reduced to 50 metres.
30	Sound Unit EOD Elec L1A1	1	5m	-	1. The safety distance is 5 metres without ear defenders. Personnel who are required, for any reason, to be closer than 5 metres must wear eye protection and ear defenders. 2. Ground on which laid is to be free from surface stones or any other potential missiles.
31	Sound Unit EOD Elec L2A1	1	10m	-	1. The safety distance is 10 metres without ear defenders. Personnel who are required, for any reason, to be closer than 10 metres must wear eye protection and ear defenders. 2. Must not be used when the simulator and personnel together are in any enclosed area such as a passage or alleyway. 3. Must not be used indoors. 4. Ground on which laid is to be free from surface stones or any other potential missiles.
32	Smoke Unit EOD Elec L3A1	1	2m	-	Ground on which laid is to be free from surface stones or any other potential missiles.
33	Grenade Hand Practice L56A1 Fuzed L134A1 or L159A1	1	5m	-	Safety radius for personnel taking part in grenade training.
34	Grenade Hand Practice L56A1 Fuzed	1	15m	-	Safety radius for all other personnel and members of the

Item	Designation	Quantity	Safety distances (metres)	Width from line of fire <sup>1</sup>	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
	L134A1 or L159A1				public.
35	Simulator SA Fire L19	1	2m	-	<ol style="list-style-type: none"> <li>1. The safety distance is 2 metres without ear defenders. Personnel who are required, for any reason, to be closer than 2 metres must wear eye protection and ear defenders.</li> <li>2. Ground on which laid is to be free from surface stones or any other potential missiles. Only to be used in accordance with master range instructions.</li> </ol>
36	Simulator Explosion L20	1	1m	-	<ol style="list-style-type: none"> <li>1. The safety distance is 1 metre without ear defenders. Personnel who are required, for any reason, to be closer than 1 metre must wear eye protection and ear defenders.</li> <li>2. Ground on which laid is to be free from surface stones or any other potential missiles. Only to be used in accordance with master range instructions.</li> </ol>
37	Simulator SA Strike L21	1	2m	-	<ol style="list-style-type: none"> <li>1. The safety distance is 2 metres without ear defenders. Personnel who are required, for any reason, to be closer than 2 metres must wear eye protection and ear defenders.</li> <li>2. Ground on which laid is to be free from surface stones or any other potential missiles. Only to be used in accordance with master range instructions.</li> </ol>
38	Simulator SA Ricochet L22	1	2m		<ol style="list-style-type: none"> <li>1. The safety distance is 2 metres without ear defenders. Personnel who are required, for any reason, to be closer than 2 metres must wear eye protection and ear defenders.</li> <li>2. Ground on which laid is to be free from surface stones or any other potential missiles. Only to be used in accordance with master range instructions.</li> </ol>
39	Simulators not listed in this Table	1	200m		

## NOTES

1. The distances given column (d) are for directional weapons and are **linear safety distances** measured from the muzzle. Spectators are to be protected at the rear of the gun by a minimum safety distance of 15 metres other than in those cases where a greater distance is specified in the table.
2. When weapons are not involved the distances quoted in column (d) are **radial safety distance for the explosives**.
3. There is the possibility that, in a built up area, slight superficial damage to buildings eg. minor window damage or flaking of plaster, might occur under certain circumstances (affected by local ground contours, wind direction etc) at considerably greater distances than those given in this table.
4. Within the context of the table the term, unprotected personnel is to indicate those not wearing ear defenders.
5. The safety distances given in this table are subject to any limitations that may be imposed by local regulations.
6. The safety distances prescribed in this table are the minimum distances to be observed. These minimum distances are the smallest practicable distances to be used. Whenever possible greater distances are to be implemented.
7. In all instances care is to be taken to ensure that missiles such as stones or empty canisters are not produced as a result of the functioning of any explosive store.
8. The RF safety distance for BOWMAN radios is contained in Reference L, Section 10.3

**TABLE 403/3/2 EXPLOSIVE SAFETY DISTANCES FOR EXPLOSIVE BATTLE NOISE SIMULATION**

Ser	Type of Charge	Size of Charge	Danger Area Radius	Air Danger Height <sup>2</sup> ■	Remarks
(a)	(b)	(c)		(d)	(e)
1	All detonators and detonating cord in open		20m	60ft	a. For service personnel under supervision. b. Detonating cord clips not to be used in battle noise simulation charges. c. If radio frequency hazard suspected, see Reference L , Section 10.3
2	Multiple detonator circuits (small arms fire) with up to 200mm detonating cord in open		25m	80ft	As Ser 1
3	Confidence training or battle noise simulation charges in open for participating serving personnel	a. Charge on ground, Max 1kg	165m	500 ft	When charge placed on ground, areas to be free of loose stones and debris.
		b. Charge on sand-filled sandbag, Max 1kg	25m	160ft	
4	Practice charges in open used in battle noise simulation for military personnel wearing CBA, helmet and aural protection	c. Charge on ground, Max 1kg	165m	330ft	Charge on ground, areas to be free of loose stones and debris.
		Charge on sand-filled sandbag, Max 1kg	25m	80ft	
5	Practice charges in open used in battle noise simulation for military personnel wearing CBA, helmet and aural protection	d. Charge on ground, Max 2.5kg	500m	1600ft	Charge on ground, areas to be free of loose stones and debris.
6	Blast incendiary	0.115kg	150m	490ft	20m radius clearance of flammable material
7	Large nuclear simulator	a. Bangalore Torpedo.	1000m	2000ft	100m radius clearance of flammable material for both simulators.
		b. 2.75kg PE4 taped to timber	500m	1600ft	
8	Small nuclear simulator	0.46kg	300m	980ft	20m clearance of flammable material

**NOTES**

1. Where civilians are present Battle Noise Simulations are to be considered as Demonstrations and Table 403/3/1 applies. Personnel such as ACF and CCF to be classed as civilians when planning safety distances.
2. Air Danger Height (ADH) determined in feet above ground level (AGL). ADH is not a direct conversion of Danger Area Radius.
3. Charges made up from PE4 (cartridge or slab removed from its plastic case) as detailed in Reference M. Metal detonating cord clips should not be used with Battle Inoculation charges.

**TABLE 403/3/3 EXPLOSIVE SAFETY DISTANCES FOR EXPLOSIVE CHARGES IN TRAINING**

Ser (a)	Type of Charge (b)	Target (c)	Size of Charge (d)	Danger Area – Radius (e)	Air Danger Height (f)	Remarks (g)
1	Cutting	a. Timber. b. Concrete. c. Metal (eg girders, guns and vehs)	See local Range Standing Orders	a. 300m b. 500m c. 1000m	a. 980ft. b. 1600ft c. 2000ft	Metal fragments may fly up to 1000m from small charges. For AFV's see Note 2 and for troops dug-in see Note 3.
2	Concussion	Buildings and AFVs	See local Range Standing Orders	1000m	2000 ft	Considerable blast effect to be taken into account when selecting buildings as shelters
3	Cratering	Road, etc Explosive digging	a. Up to 2kg. b. 2 to 30kg. c. Over 30kg.	a. 100m b. 300m c. 500m.	a. 330ft b. 980ft c. 1600ft	
4	Mined	Piers, abutments and retaining walls	See local Range Standing Orders	500m.	1600ft	
5	Borehole	Rock, concrete, masonry, brick	See local Range Standing Orders	300m	980ft.	
6	Breaching, footing, pressure	RC beams and slabs, mass concrete walls and obstacles	See local Range Standing Orders	1000m.	2000ft	
7	Shaped charges	Concrete and steel	a. CD No 14. b. CD No 11. c. RCK Shaped Charge	1000m.	2000ft	
8	Rapid Bridge Demolition Charges (RBDs)	Masonry or concrete bridges	RBDs – L7A1. L11A1 & L12A1	1000m.	2000ft	
9	Bangalore Torpedo	Wire obstacles	-	a. At right angles to axis of Torpedo 1000m b. In line of axis: (1) Personnel standing 200m. (2) Personnel lying 100m.	2000ft	When firing in line of axis full body armour protection and helmet to be worn.

**NOTES**

1. Air Danger Height (ADH) determined in feet above ground level (AGL). ADH not direct conversion of Danger Area Radius.
2. AFV's. Safety distance for troops fully closed down, under armour and wearing crewman's helmet or ear protection:
  - a. Challenger, Cheftain and Warrior: 170m b. FV432, Saxon, AS90 and CVR(T): 250m Optic covers should be closed.
3. TRENCHES. Safety distances for troops fully dug-in, under cover and wearing combat helmet: 450m.  
Trenches are to be of approved design with a minimum depth of 1.5m, maximum width 0.6m and minimum overhead protection of 0.46m.

**TABLE 403/3/4 EXPLOSIVE SAFETY DISTANCES FOR DEMOLITION/DISPOSAL OF AMMUNITION**

Item	Type of Ammunition	Danger area- Radius in Metres				Remarks
		Surface unprotected	Buried unprotected	Surface protected <sup>1</sup>	Buried protected <sup>2</sup>	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
<b>SINGLE ITEMS</b>						
1	Shell HE below 3in (81mm) Calibre	500		95	95	
2	Shell HE between 3in (81mm) and 5in (120mm) Calibre	900		230	230	
3	Shell HE above 5in (120mm) Calibre	1300		460	370	
4	Bombs 2in (51mm) and 3in (81mm) Mortar HE	550		95	95	
5	Bombs 4.2in Mortar HE Bombs Spigot Mortar HE	600		275	185	
6	Rockets 3.5in HEAT Bombs PIAT HE	400		230	185	
7	Grenades Hand HE	250		95	95	
8	Mines Anti-Personnel HE			70	70	
9	Mines Anti-Tank HE			275	275	
10	HE in bulk up to 2.5kg			50	50	
11	HE in bulk from 2.5kg to 5kg			70	70	
12	Pyrotechnic natures			40	40	
<b>MULTIPLE ITEMS (BASED ON WEIGHT)</b>						
13	Cased EO with weight up to 10 Kg	800	100	50	20	
14	Cased EO with weight up to 50 Kg	1800	140	70	40	
15	Cased EO with weight up to 250 Kg	2200	370	185	120	
16	Cased EO with weight up to 500 Kg	2500	400	200	140	
17	Cased EO with weight up to 1000 Kg	2700	550	275	185	
18	Cased EO with weight up to 3000 Kg	3500	900	450	300	
19	Cased EO with weight up to 5000 Kg	3700	1050	575	400	

**NOTES:**

1. If RAF munitions not identified in this table require disposal HQ STC ES & EOD must be consulted for specific disposal instructions.

<sup>1</sup> Adequate sandbagging is 40 Sandbags per 1kg of explosive or where protective works have been constructed in accordance with Reference B.

<sup>2</sup> Adequate sandbagging is 20 Sandbags per 1kg of explosive or where protective works have been constructed in accordance with Reference B.

**TABLE 403/3/5 SAFETY DEPTHS AND DISTANCES FOR UNDER WATER EXPLOSIVE CHARGES**

1. The following Table is a guide to safety distances when using explosives underwater. Before anyone engages in this type of activity they must be fully conversant with the criteria in BR 5063 Annex B to Chapter 4 which is a Naval publication.

2. The tables listed below are a guide to EOD Operators and have been developed from several EOD publications and many years of RN EOD operational experience. When using these tables the EOD operator must assess each situation individually, taking into account operational priorities, secondary hazards and environmental/geographical conditions.

3. Application of Underwater Distance Safety Tables:

All UXO with an NEQ of 3kg TNT or less must be at a depth of 5 metres or deeper.

All UXO with an NEQ greater than 3kg TNT must be at a depth of 10 metres or deeper.

Item	Subject	CHARGE WEIGHT (Kg of TNT)	MINIMUM SAFE DISTANCES (Metres)	UXO MINIMUM DEPTH (Metres)	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)
	<b>TOWING DISTANCES</b>				BR 5063 Annex B to Chapter 4, Table- 4 refers
1		1 - 3	25	5	
2		3 - 10	50	10	
3		10 - 50	75	10	
4		50 - 100	100	10	
5		100 - 1000	200	10	
6		1000 - 2000	250	10	
	<b>DEMOLITION OPERATIONS from a RIB or INFLATABLE CRAFT (Only)</b>				BR 5063 Annex B to Chapter 4, Table- 5 refers
7		1 - 3	100	5	
8		3 - 10	150	10	
9		10 - 50	200	10	
10		50 - 100	250	10	
11		100 - 500	300	10	
12		500 - 1000	350	10	
13		1000 - 2000	400	10	



Item	Subject	CHARGE WEIGHT (Kg of TNT)	MINIMUM SAFE DISTANCES (Metres)	UXO MINIMUM DEPTH (Metres)	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)
14	<b>MINIMUM SAFE DISTANCES FOR DIVERS &amp; SWIMMERS</b>	1	400		BR 5063 Annex B to Chapter 4, Table- 3 refers
15		3	500		
16		10	700		
17		10 - 50	1000		
18		50 - 100	1200		
19		100 - 500	1500		
20		500 - 1000	2000		
21		1000 - 2000	2500		
22	<b>MINIMUM SAFE DISTANCES FOR COMMERCIAL SURFACE VESSELS</b>	1	50		BR 5063 Annex B to Chapter 4, Table- 2 refers
23		3	90		
24		10	150		
25		20	220		
26		30	300		
27		50	350		
28		100	500		
29		200	700		
30		300	900		
31		400	1000		
32		500	1100		
33		600	1200		
34		700	1300		
35		800	1400		
36		900	1500		
37		1000	1600		

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38		1500	2000		
39		2000	2200		

## **NOTES**

### **1. Safe Distance for Divers and Underwater Swimmers:**

If an explosive charge is to be detonated underwater, all diving and surface-swimming operations should be suspended. If suspension of diving operations is not possible, the distances in table No 3 should be considered as a minimum safe distance.

### **2. Diving Craft Safety Distances:**

Table 4 applies to RIBs and Inflatable Craft only. For diving tenders, parent or support vessels Table 2 is to be used

### **3. Demolitions Operations:**

Table 5 is to be used when conducting underwater demolitions and countermining procedures from a RIB or Inflatable Craft Only. If operating from a diving tender, support vessel refer to Table 2 for minimum safe distances.

The distances in table 5 are considered the absolute minimum.

Consideration must be given to potential fallout from an underwater explosion i.e. fragmentation, noxious gases, seabed debris and water vapour. The Diving Craft (MIB or RIB) should be positioned to avoid down wind fallout and wind or Tidal drift into the danger area in the event of engine failure

### **4. FURTHER INFORMATION:**

Further guidance can be found in **BR 5063 Annex B to Chapter 4**, which contains information on a variety of subjects including; UXO Explosive Content / Factor of Effect, Pipelines, Cables, Tunnels and Mining.