



DE&S SAFETY AND ENVIRONMENTAL PROTECTION LEAFLET 06/2013

NOISE MEASUREMENT TO FACILITATE ASSESSMENT OF EXPOSURE AND SELECTION OF HEARING PROTECTION

Sponsor: DES TECH-QSEP Hd	Version: Issue 2.0 Issue 2.0 supersedes all previous issues of SEP Leaflet 06/2013.	Date of Issue: 28 May 2015
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1. INTRODUCTION

1.1 Issue 1 of this leaflet delivered protocols that were to be implemented throughout DE&S for the measurement of impulse noise to facilitate assessment of noise exposure in compliance with the Control of Noise at Work Regulations (CNAWR), Control of Noise at Work (Northern Ireland) Regulations (CNAW (NI)R) and the Merchant Shipping and Fishing Vessels (Control of Noise at Work) Regulations (MSFV(CNAR)R)).

1.2 The protocols in Defence Standard 00-27 Issue 3 follow HSE guidance where possible and included measurements needed to assess the level of attenuation required to support the selection of hearing protection.

1.3 The measurement methodology and protocols have now been incorporated into Issue 3, Measurement of Impulse Noise from Military Weapons, Explosives and Pyrotechnics and Selection of Hearing Protection.

1.4 The primary purpose of this leaflet is to mandate the use of Issue 3 by the MOD and its Contractors, in the execution of MOD contracts for measurement of impulse noise and supporting selection of hearing protection.

1.5 This leaflet also provides background and guidance on the use of Issue 3 and also details of a Framework Agreement that can be used to engage with acoustic specialists.

2. BACKGROUND

2.1 MOD policy on compliance with CNAWR, CNAW(NI)R and MSFV(CNAR)R is delivered through JSP 375, Volume 1 Chapter 25, and requires Defence Procurement/Acquisition Teams to identify and provide information on risks to hearing from exposure to noise from the equipment that they procure and supply. Where such exposure requires the end user to wear PPE hearing protection, it is the procurement/acquisition team's responsibility to recommend the type of hearing protection or provide sufficient information to enable the selection of appropriate measures or hearing protection to reduce the noise exposure to the end user.

2.2 In order to fulfil these responsibilities, DE&S Project Teams task agencies both from within and external to the MOD to make appropriate measurements of the noise to facilitate assessment of risk and where necessary, determine the selection of suitable hearing protection.

2.3 Def Stan 00-27 Issue 2 was published prior to the introduction of the CNAWR 2005, but took into account changes affecting exposure limit values and exposure action values¹. Issue 2 was considered best practice at the time of publication. In Jan 2013, a revised methodology for impulse noise measurement, including measurements needed to assess the level of attenuation required to reduce the level at the ear to at least below the upper exposure action value was considered. Issue 1 of this leaflet was published to deliver that methodology as a temporary solution, with intent to test and validate the methodology during development of Issue 3.

3. COMPLIANCE

3.1 Issue 3 has now been published and shall be used for measurement of impulse noise and support for the selection of hearing protection.

3.2 Issue 3 provides guidance on the methodology for measurement of the noise from Military Weapons, Explosives and Pyrotechnics (MWEPE) to support the procurement process for such devices. This is particularly intended for the testing and development stage of the MWEPEs to facilitate appropriate measurement of impulse noise that enables a suitable and sufficient risk assessment and the selection of appropriate control measures to reduce the risk to ALARP. The methodology recommended by Issue 3 represents current good practice.

3.3 Issue 3 supports compliance with the Control of Noise at Work Regulations 2005 (CNAWR 2005) and Control of Noise at Work (Northern Ireland) Regulations 2006 (CNAW(NI)R) apply European Union (EU) legislation in the United Kingdom (UK) and the protocols in the Standard follow current Health and Safety Executive (HSE) guidance on the Regulations as far as possible. However, as neither the HSE guidance on assessment of the sound attenuation of a hearing protector for impulsive sounds, nor the British Standard on which it is based, BS EN 458:2004, fully encompass the noise from military weapons, an adaptation of the method given in the British Standard is provided in Issue 3. The CNAWR/CNAW(NI)R applies in full throughout the MOD to all workplaces (including, ships, boats, vessels, aircraft and premises) with the exception of Royal Fleet Auxiliary operated vessels, which are covered by the Merchant Shipping and Fishing Vessels (Control of Noise at Work) Regulations (MSFV(CNAW)R) which has comparable requirements.

3.4 Issue 3 also supports compliance with current MOD Policy. As MWEPEs can generate high levels of impulsive noise, there is a requirement for the provision of suitable and effective hearing protection for exposed personnel. The minimum requirements for measurements² required by Issue 3 provide information to facilitate the estimation of the level of attenuation required from personal hearing protection.

3.5 As the measurements are to meet the requirements of the Regulations, the guidance given in Issue 3 follows that given in the HSE guidance to the Regulations as closely as possible.

4. SPECIALIST SUPPORT

4.1 A Framework Agreement (FA) is in place with the Health and Safety Laboratory with core tasking to provide the Defence Equipment and Support (DE&S), Safety and Environmental Protection Group with a competent acoustic specialist to deliver advice and guidance through a telephone Helpdesk facility and face-to-face appointments (Noise Clinics) to MOD staff. The FA also enables tasking on HSL for specific health and safety activities in support of the MOD. The current specialist contracted by HSL has significant knowledge and experience of MWEPE measurement and analysis in the MOD.

¹ MOD Policy for upper and lower exposure action levels were 5dB below the regulatory requirement prior to CNAWR 2005 and hence the impact of this change on the MOD was minimal.

² The measurements are not intended to measure the attenuation provided by hearing protection.

4.2 The FA, managed through DES TECH-QSEP, can be used by the MOD to engage with the HSL and information on the process for engagement and access to the Helpdesk and Noise Clinics are detailed in Annex A.

5. VALIDATION OF MOD ADAPTATION OF BS EN 458 METHOD

5.1 Validation was carried out under FAs between HSL and the MOD on Issue 1 of this leaflet and identified that the procedure has its basis in the best methodology both currently available and widely accepted. However, as neither the BS EN 458:2004 method nor the MOD refinement of this method has been validated against the types of challenging noise sources in use in the military environment, further validation work was recommended by HSL.

5.2 During the development of Issue 3, the validation work recommended by HSL was carried out through the HSL/MOD FA. The validation report made the following recommendations:

- a. The MOD should continue to use their modified BS EN 458:2004 method for the assessment of C-weighted peak attenuation of weaponry noise, since it provides a reasonable estimation of the peak attenuation across all noise types. This was enacted by the publication of Issue 3
- b. The MOD should consider adjusting this method when applied to A-weighted noise levels, due to the underestimation of the attenuation of the A-weighted route mean square (rms) level of weaponry type noise in the L-5 category. The method may be improved by extending the L category to cover C minus A values from >3 to 10 dB when applied to the attenuation of A-weighted noise levels. Additional work on continuous noise protocols and the above recommendation will be addressed and delivered, initially, through this leaflet.

6. MEASUREMENT AND SCENARIOS

6.1 The Standard had to be generic and tries to capture all operating scenarios (defined as combination of the variables influencing the noise from MWEPs including transducer position and orientation, weapon type, ammunition type, charge level, weapon height and orientation, conditioning of weapon and or ammunition, etc. Safety issues may dictate some of the arrangements for measurements, eg testing to be carried out on a specified firing range.

6.2 Remote firing is usually mandated for MWEPs in the testing and development stage. Issue 3 assumes this as the norm and that the testing arrangements will reflect normal operating situations, eg height above ground, elevation etc. This will allow measurements to be made in accordance with HSE guidance; measurements should be made at the position occupied by the person's head, preferably with the person not present".

6.3 Issue 3 does not specify the number of firings but recommends an ideal of a minimum of five firings (firing may be single shot or bursts of known number of rounds) per operating scenario. Other factors such as cost and availability may dictate the number of firings per operating scenario.

7. SELECTION OF HEARING PROTECTION

7.1 The guidance on the selection of personal hearing protection given in the HSE Guidance on the Regulations is based on British Standard BS EN 458:2004. BS EN 458:2004 annex B, gives an informative method for selecting hearing protection for peak sound pressures. The method groups noise sources into one of three "Types" depending on their frequency content. A list of sources in each Type is provided. Unfortunately the categorisation is too coarse to be applied to MWEPS. For example, the term "rifle" used in the BS does not apply to the wider range of weapons termed "rifle" by the MOD. For this reason, the MOD has adapted the more detailed method given in BS EN 458:1994 for use with MWEPs.

7.2 The use of MIRE techniques had been considered but not used in the Standard for a number of reasons, including:

- a. The Standard covers guidance on the measurement of noise from MWEPs not the measurement of attenuation.
- b. Regulations require the use of BS EN 24869-1 attenuation data.
- c. The BS 458 method and the MOD adaptation can be used for both over and in the ear hearing protection. The MIRE cannot be used for in-ear devices.

7.3 Like the method given in BS 458:2004, the MOD adaptation cannot be applied to all types of hearing protection. British Standards cover level dependent devices such as sound restoration and active noise cancellation devices. However, with these types of device, it is assumed that only the passive attenuation applies in high level impulsive noise. There are no current Standards covering devices that provide increased resistance to the passage of noise through a valve at high sound pressures. Such devices are therefore outside the scope of Issue 3 and will be through future work.

8. APPROVAL FOR USE

8.1 The Standard and its methodology have:

- a. Utilised current good practice and followed British Standards, HSE Guidance and MOD policy where possible.
- b. Captured the variation of operational scenarios so far as is reasonably practicable.
- c. Provided guidance for using the measurements to assess the sound attenuation required, supporting the selection of appropriate hearing protection for impulse noise
- d. Published consultation drafts both internally and publically (through DStan) and addressed and sentenced all comments.

8.2 Issue 3 of the Standard has been reached following broad consensus amongst the authorities and SMEs concerned with its use and is intended to be used whenever relevant in all future designs, contracts, orders etc, and whenever practicable, by amendment to those already in existence.

8.3 Previous versions of the Standard were delivered in accordance with good practice at the time of their publication. Publishing of this Issue does not obligate re-measurement or re-evaluation work carried out using previous issues of the Standard, but it is recommended that guidance is sought from an appropriate subject matter expert and, where appropriate, a risk assessment is carried out to identify whether such action would be necessary.

8.4 There has been no significant change between the methodology delivered through Issue 1 of this Leaflet and Def Stan 00-27 Issue 3 and hence no obligation for re-measurement. There are textural changes between these documents that reflect Def Stan 00-00 requirements for the production of defence standards and the additional of normative references, terms, definitions and notes for added clarity.

8.5 Def Stan 00-27 Issue 3 shall be used by the MOD and its Contractors, in the execution of MOD contracts for the measurement of impulse noise and support for the selection of hearing protection.

Annexes:

A. Framework Agreement for Health and Safety Support from the Health and Safety Laboratory.

FRAMEWORK AGREEMENT FOR HEALTH AND SAFETY SUPPORT FROM THE HSL.

1. DES TECH-QSEP manages a Framework Agreement (FA) contract with the Health and Safety Laboratory (HSL). The FA provides access to HSL Health and Safety subject matter experts (SMEs) to deliver advice, guidance and support to DE&S projects through a tasking process.

2. This process is intended for use where the MOD Noise and Vibration Specialists (RAFCAM/INM/AMD) cannot provide resources to support the associated task. Although they have limited resources they may be able to provide some guidance or support in the setting of tasking or statement of work requirements.

3. Within the FA, there is a core task to provide a noise expert to give advice and guidance to DE&S staff on management of impulse and continuous noise related issues. The Noise Helpdesk and Clinics are intended as First Point of Contact for Noise advice but are limited. The core task is in two parts:

a. **Helpdesk.** A HSL SME is available via telephone and email to respond to DE&S Project/Delivery Team noise queries. If the query cannot be answered via telephone or email, face-to-face Noise Clinics may be offered through the Helpdesk. The Helpdesk can be:

HSL Helpdesk SME: **Gillian Williams**
Telephone: **01332 799875**
email: Gillian.Williams@hsl.qsi.gov.uk

b. **Noise Clinics.** Noise Clinics will be run on a two-monthly basis. These clinics will be primarily run at Abbey Wood, but can be run at other sites if there is sufficient take-up. The Noise Clinics are based on booked half-hour appointments and give face-to-face access to the HSL Noise expert. Please contact the Helpdesk to book an appointment and to ensure your query can be appropriately addressed and prioritised.

DE&S Framework Agreement with HSL

4. Although the FA is intended to support Noise issues it has the scope to support general occupational health and safety topics. Contact DES TECH-QSEP Support or the helpdesk for further information.

5. To utilise the FA, the requestor will be required to provide:

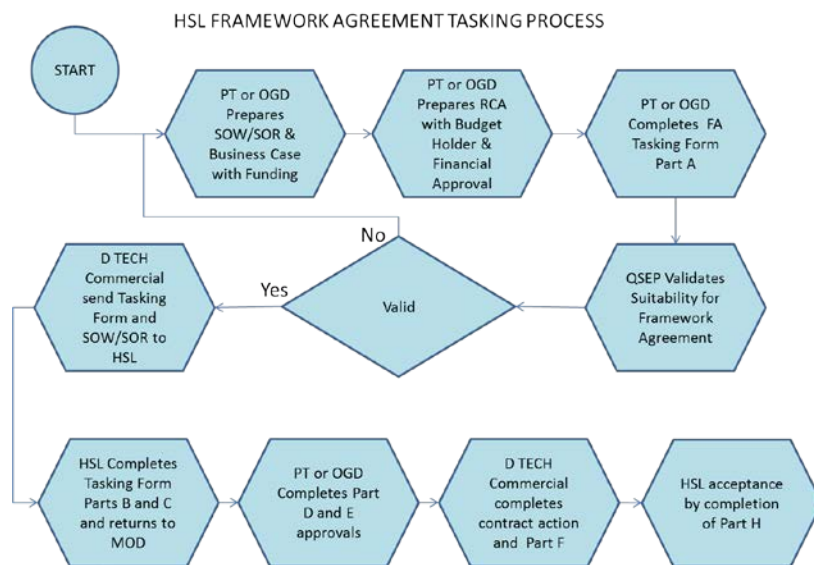
- A Business Case (BC) with Budget Holder and Financial Approval
- A Statement of Work/Requirements (SOW/SOR);
- RCA Reference;
- A Task Authorisation Form (Part A Completed).

6. The tasking process is:

- The approved documents, BC, SOW/SOR/Tasking Form³, are to be sent to DES TECH-QSEP Support who will validate the work and initiate the process.

³ It is expected that the requestor would communicate with QSEP and HSL prior to submission of the Tasking Form to ensure the work is within the FA and the SOW/SOR can be met.

- Where there is incomplete information or the task does not meet the requirements of the FA, the documents will be returned to the requestor for review.
- Where the request is valid, the tasking form will be sent to HSL, along with the SOW/SOR, for completion of the Tasking Form pricing and detailed proposal Parts B and C.
- The requestor Project and Financial Managers will then complete the acceptance of the quotation and financial approval Parts D and E.
- D Tech Commercial will then sign off the authority to proceed (Part F), complete any necessary contract action and return the tasking form to HSL.
- HSL will then acknowledge acceptance of the order (Part H).
- DES TECH-QSEP Support is to be notified on successful completion of the work to close-down the task.



7. It is recommended that PTs requiring noise advice or support contact the appropriate MOD SMEs in the first instance to ensure the work cannot be completed internally. The SMEs may be able to provide advice on the completion of the SOW/SOR.

MOD Noise and Vibration Specialists

Institute of Naval Medicine, Acoustics and Vibration Section
 Mil: 93806 8080
 Tel: 023 9276 8080

Army Medical Directorate, Environmental Monitoring Team
 Mil: 94261 2726
 Tel: 01276 412726

RAF Centre of Aviation Medicine, RAF Noise and Vibration Division
 Mil: 95381 6051
 Tel: 01462 851515 Ext 6051

Appendices:

1. HSL Framework Agreement Task Application form.

Note. An MS Word version of this form is available from destech-qsepsupport@mod.uk or through the Defence Intranet DES TECH QSEP Noise Webpage).

Part C - Detailed Proposals - *(Part B and C to be completed by the Contractor and returned to destech-qsepsupport@mod.uk)*

Detailed Proposals (attach as separate document where necessary with Reference.....)

A large empty rectangular box with a thin black border, intended for the contractor to attach detailed proposals. The text 'Detailed Proposals (attach as separate document where necessary with Reference.....)' is located at the top left corner of this box.

Part D, Acceptance of quotation - (to be completed by the MOD Project Manager and sent to Project Finance Manager)

Part D

The Contractor’s proposal at Part B and C is acceptable. The price quoted above is considered fair and reasonable and the rates used are in accordance with the Framework Agreement.

Date..... Name..... (MOD Project Manager)

Signature.....

For

Part E – Financial Approval, - (to be completed by MOD Project Finance Manager and returned to MOD D-TECH Commercial Manager)

Part E - MOD Financial Approval

Certified that the necessary finance is available.

UIN.....RAC.....

Date..... Name.....(MOD Finance Officer)

Signature.....

For

Part F, Authority to proceed. - (to be completed by the MOD D-TECH Commercial Manager)

Part F - Authority to Proceed

Approval is given for work detailed on this Task Authorisation Form to commence. The FIRM PRICE quotation of £.....is hereby agreed for all the work carried out under this Task.

Date..... Name.....(MOD Commercial Officer)

Signature.....

(Part G Not Used)

Part H, Acknowledgement - (to be completed by the contractor and returned to destech-qsepsupport@mod.uk)

Part H - Acknowledgement

We acknowledge receipt and confirm acceptance of this order and will commence work as detailed herein.

Date..... Name.....

Signature..... (Contractor)

For.....