26 Vibration

Contents

Introduction

1. This chapter sets out the procedures and guidance for the application of The Control of Vibration at Work Regulations (CVAWR), Control of Vibration at Work Regulations (Northern Ireland) (CVAWR (NI)) which apply to Defence vehicles, aircraft, workplaces and premised across the UK and the Merchant Shipping and Fishing Vessels (Control of Vibration at Work) Regulations (MSFV (CVW) R) which apply to ships, boats, small vessels. Where they do not apply due to geographical boundaries, it is MOD policy that Defence shall have outcomes at least as good as Statute.

2. Vibration is encountered virtually everywhere in daily life (driving, travelling by train, boat, riding in a lift etc). In the majority of cases exposure to vibration should not cause harm. The risk of vibration induced injury depends on the exposure (time), intensity (power) and frequency of exposure to that vibration (including intermittent exposure and repeated shocks).

3. The HSE and the medical profession recognise that there are two specific categories of exposure to occupational vibration, these are:

a. Hand Arm Vibration (HAV) – is defined as exposure to vibration from mainly hand-held, hand-guided and / or hand-fed tools;

(1) vibration is transmitted from use of these tools through the hand and / or fingers. The longer the exposure to the vibration the greater the risk or severity or damage to blood vessels and nerves in the fingers, hands and arms; and

(2) the conditions which can result are collectively known as Hand-Arm Vibration Syndrome (HAVS). Common conditions can include vibration white finger, and carpel tunnel syndrome (a nerve disorder resulting in pain, tingling and weakness in parts of the hand).

b. Whole Body Vibration (WBV) – is defined as vibration usually transmitted to the whole body from the supporting surface or a platform (vehicle, ship, boat, aircraft; and / or machinery) involving standing, seated or recumbent persons;

(1) there is no single identifiable medical condition that develops as a result of WBV (although the impact on musculoskeletal health associated with the driver, crew or piloting platforms over long periods and impact on passengers affected is known). The relationship between the exposure and severity of injury is an area of ongoing research;

(2) commonly reported symptoms from WBV exposure can include pain in back / neck, nausea, headaches, dizziness, blurred vision etc. Pregnant women may be at greater risk of health problems (particularly back pain) from WBV exposure than men or non-pregnant women and their exposure to WBV should be limited;

(3) shock is a sub-category of WBV and is defined as a sudden, unexpected impact that transmits energy to a device / person in a relatively short time (acute) interval (e.g. small fast boat impacting waves, 4x4 vehicle crossing rough terrain); and

(4) injury is dependent on the impact force of the shock together with the positioning of the person in relation to the shock / impact (e.g. standing, and the shock is transmitted through the feet to the spine). In addition to acute injuries at the time, long term exposure to even moderate levels of repeated shock may lead to chronic injuries to the spine.

4. Defence personnel who are exposed to regular and long-term vibration and / or impact shock may develop various medical syndromes or conditions, impacting mission effectiveness and may be forced to retire early on medical grounds; this has a detrimental effect on the welfare of the individual as well as the department (skill shortages, recruitment costs, retraining, compensation payments etc). It is essential that awareness is raised, and the risk of vibration related injury is managed to minimise its effects on personnel, resources and operational capability.

5. All activities conducted by Defence shall comply with the CVAWR and CVAWR (NI) and any host nation legislation or standards at all workplaces (including, Royal Navy ships, boats, vessels, aircraft and premises). Royal Fleet Auxiliary (RFA) operated vessels, and vessels which are not part of the Royal Navy (e.g. Service police boats, Army vessels) are covered by the MSFV (CVAW) R which has comparable requirements.

6. Where it is not possible to comply with the requirement in the regulations, but the continuance of the activity is in the interest of national security the legislation allows an application for exemption; see paragraphs 44 - 48 for more details.

Roles and Responsibilities

Top Level Budget / Trading Fund Agency (TLB / TFA)

7. TLBs and TFAs shall ensure they have strategies and procedures in place to minimise the effect and exposure or potential exposure of Defence personnel and others

who may also be affected (e.g. passengers carried in vehicles / boats / aircraft) by vibration in the course of their work. Sufficient resources should be made available to provide competent advice; conduct risk assessments and implement effective vibration control measures. These strategies and processes should be regularly reviewed to ensure that they are effective.

8. Adequate resources for the provision of sufficient information, instruction, and training, for Defence personnel, visitors and contractors should also be made available.

Procurement or Acquisition Teams and Local Purchase

9. At the earliest opportunity, acquisition teams must evaluate predicted vibration exposure levels within the scope of the User Requirement. Any equipment / platform designed and / or purchased shall be technically engineered to eliminate or reduce vibration exposures to the user to a level that is As Low As Reasonably Practicable (ALARP). Where the equipment is to be used in conjunction with an existing platform, a vibration survey shall be undertaken to evaluate the amount of HAV and / or WBV produced by the combined effect of the equipment and the platform when operated in accordance with the user requirement before its introduction into service.

10. The results from vibration surveys and evaluation and suppler or manufacturer vibration emission data shall be supplied to the operating TLB to enable suitable user risk assessments to be carried out on the equipment prior to use.

11. If the equipment is procured locally[1] (new or refurbished) and no vibration (manufacturer or supplier) emission data is available, a suitable and sufficient risk assessment must be carried out on the equipment to determine any potential for harm to the user(s). If the risk assessment identifies that there is a potential of HAV or WBV to the user(s) a vibration survey shall be carried out before the equipment is issued. However, where there is an urgent operational need the equipment may be released to service after the risk assessment has been carried out and prior to the vibration survey, so long as it is carried out as soon as is practicable. The supplier / manufacture emission data shall be used as an initial source for the assessment of vibration risk to the user.

Commanding Officer (CO) / Head of Establishment (HoE)

12. The CO / HoE shall ensure that where powered hand-tools and / or vibrating platforms (vehicles, ships, boats and aircraft) are used and exposure to vibration is likely to occur, sufficient resources are made available to perform risk assessments, implement control measures, monitor and record outcome and review.

13. CO and HoE must ensure that sufficient information, instruction, and training regarding the hazards associated with activities on their site which may expose Defence personnel to vibration are provided. Resources shall also be made available for the provision of health surveillance / health monitoring programmes (JSP 375, Volume 1, Chapter 14) where there is a risk of harm to Defence personnel exposed to vibration in the workplace.

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[1] Equipment if purchased within the EU should be CE marked to confirm that it meets minimum Health and Safety standards. The LPO should assure themselves that any equipment purchased outside the EU is confirms to a similar health and safety standard.

Managers

14. The manager must ensure that where there is a risk of personnel being exposed to levels of vibration that may cause harm, all activities / processes (e.g. the use of vibrating tools, or riding on or in vibrating platforms (forklifts, small fast boats, helicopters, 4 x 4 vehicles) and the environmental conditions in which these activities are conducted are subject to a formal risk assessment. The risk assessment shall be carried out in conjunction with a competent person.

15. Where no Safety Case or technical file is supplied, managers should contact their local health and safety adviser in the first instance for advice on the availability of competent vibration risk assessors. If the local health and safety adviser is unable to assist, then managers should contact their TLB safety organisation for advice.

16. Managers shall, for the purpose of the risk assessment, take into consideration any vibration information provided by the manufacturer or suppliers of the tools, or information provided by procurement and acquisition teams which may indicate that a user of the platform or equipment may be at risk of developing vibration exposure related injuries unless suitable control measures are implemented.

17. The findings of the risk assessments for the process or activity and the control measures (including provision of suitable and sufficient information, instruction and training on the possible effects and consequences, and how to manage the exposure) should be implemented and communicated to all those at risk and, on request, all interested stakeholders (trade union appointed safety representatives or other employee safety representatives etc.).

18. Where the risk assessment has identified a risk of HAV and / or WBV (including shock), health surveillance and / or health monitoring programmes, they are to be implemented in accordance with JSP 375, Volume 1, Chapter 14. Managers shall ensure that all Defence personnel (new and existing) who are exposed to the risk of HAV and / or WBV complete the appropriate health surveillance self-assessment(s):

a. pre-exposure: MOD Forms 5053 (HAV) and 5055 (WBV); and

b. post exposure: annually, MOD Forms 5054 (HAV) and 5056 (WBV).

19. MOD Forms 5053 and 5056 are “Official-Sensitive-Personal” when completed and it is a serious disciplinary offence for managers to try to access them.

20. Managers shall refer any member Defence personnel reporting a positive result on either pre-exposure or annual HAV and / or WBV self-assessments or between assessments to either Defence Business Services - Civilian Human Resources, (DBS-CHR) for civilian personnel or local Services Medical Centre for Service personnel. The referral should be accompanied with a copy of the relevant MOD self-assessment form (sealed in an envelope marked Official-Sensitive-Personal) together with a copy of the risk assessment.

21. A review of the risk assessment shall be triggered if personnel report positive results on completion of the self-assessment form.

22. Managers should keep a register of the assessment forms (existing and new) and identify whether a negative or positive response was recorded. The register should also detail what action has been taken if a positive response was recorded.

23. The manager shall ensure that suitable and sufficient training is provided to Defence personnel who have been identified as working with vibrating tools, or on / in vibrating platforms. The training should be updated if there are significant changes to work practises or the introduction of new equipment. It should include (not exhaustive):

a. the safe operation of the equipment;

b. the findings of the risk assessment and explanation of the risks;

c. reporting of injuries and developed conditions; and

d. safe working practises to minimise exposure to vibration.

Competent Risk Assessors

24. Competent risk assessors shall be able to demonstrate adequate knowledge, training and expertise in the assessment, evaluation and control of risks arising from exposure to vibration (HAV or WBV) together with knowledge of the process and / or equipment; how and in what environment the vibration may be caused or produced. The assessor shall bring to the attention of the manager the findings of the assessment and, if appropriate, explain the risks and the required control measures to manage those risks to reduce the effect of vibration exposure.

25. Details on sourcing internal competent advice can be found at Annex B. Information on internal training providers for HAV management can also found at Annex B.

All Personnel

26. Defence personnel shall follow all working arrangements that are put in place for their protection; take reasonable care when using vibration producing equipment, and / or use anti-vibration control devices in accordance with instruction and / or training, and attend appropriate training as required.

27. Smoking may put an individual at greater risk of injury from vibration due to combined adverse effects reducing blood flow; personnel who regularly work with vibrating equipment are therefore recommended to cut down or stop smoking.

28. A pre-exposure or annual health surveillance self-assessment form should be completed as appropriate (MOD Forms 5053 to 5056) if instructed by the manager, or if personnel experience any symptoms that may be related to exposure from vibration and are concerned about their HAV and / or WBV exposure and the potential to affect their health. Defence personnel shall inform their manager either of a negative or positive response but need give no further detail.

29. Negative self-assessments should either be posted or e-mailed to Defence Business Services-Civilian Human Resources, (DBS-CHR) (for civilian personnel) or handed in an envelope to the local Services Medical Centre (for Service Personnel) for filing with their personnel file.

30. Positive self-assessments should be notified to the manager and local health and safety adviser immediately. The manager must arrange referral to the relevant occupational health provider for assessment. Civilian Defence personnel should hand the form (in a sealed envelope marked “Health Surveillance Form” along with their name and staff number) to their manager for onward transfer to DBS CHR. Service personnel should deliver the completed questionnaire to their local Services Medical Centre.

31. These forms are “Official-Sensitive-Personal” once complete and it is at the discretion of the individual if their manager is to see them.

32. Personnel who experience any symptoms that may be related to exposure to vibration, either HAV or WBV, should inform their manager immediately who will refer them for assessment to the appropriate occupational health provider DBS-CHR for civilian personnel or local Services Medical Centre for Service personnel.

33. If personnel have had operations which have included insertion of metalwork into the body (e.g. hip replacement, repair of a fracture with rods, pins or metal plate) and they are exposed in their normal duties to HAV and / or WBV they may wish to advise their manager so that this can be considered in the risk assessment. Personnel with inserted metalwork may need more frequent health monitoring for HAV and WBV, especially if exposure to HAV or WBV causes pain in the region of the inserted metalwork.

34. Personnel with cardiac pacemakers or Implantable Cardioverter Defibrillator (ICD) should seek advice from their cardiologist before being exposed to any significant WBV or shock (i.e. riding in a fast boat at sea / or riding in a vehicle travelling at speed over rough terrain).

Assessing the Risk

35. The hazard survey for all activities / equipment / platforms shall identify the potential for HAV, WBV and shock. Safety Cases and technical files shall be consulted where available. Typical activities that are a common cause of HAV include the operation of:

a. hammer action tools (e.g. hammer drill, rivet gun) for more than an average of 15 minutes (continuous) per day; or

b. rotary and other action tools (e.g. angle grinder, chain saw, floor polisher) for more than 1 hour (continuous) per day.

36. WBV and shock can occur when operating or riding in / on the following equipment / platforms:

a. any equipment or platform which vibrates (e.g. helicopters, motorcycles); or

b. the operation generates shocks or impacts (e.g. fast boats, vehicles on unmade roads, railway vehicles).

37. A formal risk assessment shall be carried out in accordance with JSP 375, Volume 1, Chapter 8 by a competent person (see Annex B) working in consultation with the manager and the operators of the activity and / or equipment or platform. Vibration from equipment

can potentially cause damage to other workplace equipment or structures; this may create additional safety risks (e.g. materials falling from overhead platforms or joints moving apart). Vibration may also affect the ability of personnel to read instruments or indicators, or to handle equipment controls. Although mainly associated with the driver, crew or pilot, the exposure of passengers to WBV will need to be considered in the assessment.

38. The risk assessment should as a minimum examine whether the activity, equipment or platform exposes personnel to risks from HAV, WBV or shock, and special consideration should be given to:

a. young persons (under age of 18);

b. expectant mothers and those who have recently given birth;

c. personnel who already suffer from an existing injury (neck, back or circulatory problems), or a vibration related injury;

d. personnel with prosthetic devices;

e. personnel who have recently undergone surgery (e.g. cardiac pacemaker, hip replacement, or repair of a fracture with rods, pins or metal plates); and

f. personnel who have an existing medical condition affecting blood circulation (e.g. diabetes) will be at higher risk of susceptibility to vibration related injury.

39. The risk assessment should also consider:

a. magnitude, type and duration of exposure including intermittent or repeated shocks;

b. effects of vibration on the workplace and equipment e.g. reading of controls, handling, stability;

c. availability of alternative equipment designed to reduce vibration;

d. environmental conditions e.g. exposure to low temperatures, wet conditions (can increase vulnerability to vibration induced injury); and

e. information from health surveillance programmes or published guidance.

40. The risk assessment should detail the control measures to be taken to control exposure, and where appropriate, health surveillance / health monitoring requirements. The risk assessments should be reviewed annually or immediately following any significant changes to processes, equipment or personnel which may mean that the existing assessment is no longer valid or if personnel report or exhibit any of the following symptoms:

a. hand arm vibration;

(1) blanching of fingers on exposure to cold and wet, becoming red and painful on recovery (known as vibration white finger);

(2) attacks of numbness or tingling in fingers after using powered hand tools; and

(3) difficulty in picking up small objects.

b. whole body vibration and shock;

(1) pain from any part of the neck, back, knees, hips, wrists or ankles; and

(2) nausea, headaches, dizziness, blurred vision.

Mitigation and Control Measures

41. The control measures identified in the risk assessment must be put in place to eliminate exposure risks from HAV and WBV or reduce the risk to ALARP and mitigate the effects. The best solution is to eliminate the risk completely through introduction of automation, remote working technology or alternative vibration free processes; however, this may not always be possible. Where the risk cannot be eliminated, the regulations require suitable control measures to be applied and exposure to vibration managed.

42. When developing control measures to reduce HAV the following approaches should be considered (list not exhaustive):

a. reduce vibration exposures by modifying the existing process;

b. replace the powered tools with ergonomic reduced vibration equivalents;

c. ensure maintenance of tools and equipment in accordance with manufacturers' instructions;

d. select appropriate consumables (e.g. better balanced and fitting grinding wheels) and replace items as and when required;

e. provide Defence personnel with training, information and instruction on safe use of tools and equipment;

f. if working in a hot environment, systems should be put in place to minimise the effect of perspiration on the grip of tools or equipment;

g. if working in a cold or wet environment, controls should be put in place to protect Defence personnel from the cold, from getting wet or to stop working with vibrating tools in extremely low temperatures;

h. ensure adequate supervision and health surveillance;

i. minimise the forces needed to operate and control the tools (e.g. tensioners, balancers, jigs, fixtures);

j. reduce the exposure time and fatigue (e.g. through job rotation); and

k. monitor the effectiveness of control measures.

43. When developing control measures to reduce WBV or shock the following approaches should be considered (list not exhaustive):

a. select the right equipment, vehicle or vessel suitable for the job;

b. ensure that all vehicles and vessels fitted with suspension seating prevent the seat suspension 'bottoming out' when travelling over rough ground or seas;

c. the driving seat position is adjusted correctly and that all foot and hand controls are within easy reach with no twisting of the body required;

d. ensure maintenance of vehicles or vessels is in accordance with manufacturer's instructions;

e. provide Defence personnel with training, information and instruction on safe use of vehicles and vessels e.g. adjust vehicle or vessel speed or direction to suit the conditions; avoiding activities which will result in excessive bumping, slamming and jolting to persons riding in the vehicle or vessel;

f. inform Defence personnel of the risk factors such as manual handling and poor posture that can contribute to injury;

g. plan routes wherever possible to avoid shocks and jolts, and where possible to take account of WBV risks as well as safety factors;

h. reduce the exposure time and fatigue (e.g. through job rotation);

i. monitor control measures to consider whether further protective measures are needed, and introduce if appropriate; and

j. wear adequate clothing to provide thermal protection to reduce possibility of muscular injury through exposure to cold and wet environments.

Exemptions

44. The provision in the CVAWR / CVAWR (NI) / MSFV (CVW) R allows the Secretary of State for Defence (SofS) to exempt a person or class of persons from specified parts of the specific regulations.

45. An exemption from the CVAWR / CVAWR (NI) / MSFV (CVW) R will only be granted where the SofS is satisfied that the person or class of persons involved in activities detailed in an exemption case submission (ECS) are carried out in the interests of national security. Any exemption granted will be time limited (five years) and be subject to conditions. Where the provisions of the CVAWR / CVAWR (NI) / MSFV (CVW) R cannot be complied with and an exemption is granted, control measures should be put in place to mitigate the activity to a level that is as low as reasonably practicable and minimises the risk to the health and safety of the person or class of persons concerned.

46. The ECS must contain a reasoned argument to demonstrate that in order to protect national security (operational capability) that Defence is reliant on the exemption being granted, and the conditions stipulated in the regulations have been satisfied. The ECS must include the following information:

a. the type of person, or class of person being exempted;

b. the name and purpose of the particular equipment, system or activity giving rise to the problem;

c. an outline of the problem and its magnitude – i.e. without exemption how particular activities (e.g. training) will be adversely affected, numbers of people placed at potential risk, the impact on front line operational capability (e.g. military tasks that will become impossible to undertake, or otherwise severely hampered) etc;

d. actions undertaken and / or considered to comply with the regulations – where compliance is being ruled out on cost grounds, cost data is to be provided;

e. an action plan for compliance with the regulations in the short, medium and long term – i.e. proposed mitigation measures to reduce the risk to a level as low as reasonably practicable, likely costs and timescales, etc.;

f. the time period for which the exemption is required (limited to a maximum of five years) and the rationale for it;

g. the plan for assessment of Defence personnel undertaking the activity and provision of suitable and appropriate health surveillance and / or health monitoring; and

h. where renewal of an existing exemption is being sought, details on the success or otherwise of the previous action plan, including the results of health surveillance / monitoring.

47. The preparation of the ECS will require input from operating authorities, acquisition teams and medical personnel etc. as appropriate. The draft ECS must be passed for scrutiny to the relevant subject matter experts for a decision on approval. After passing scrutiny, the sponsor forwards the completed ECS and draft exemption certificate to the SofS for signature granting the exemption.

48. If the case is successful, a certificate will be issued by SofS. A copy of the certificate shall be provided to the Defence Safety Authority by the sponsor. If not successful, the activity must be discontinued until such time as it can comply with the regulations.

Retention of Records

49. All Vibration and Risk Assessments, Health Monitoring, Training, and Maintenance Records etc should be kept for a period of no less than 60 years and in accordance with JSP 375, Volume 1, Chapter 39 - Retention of Records.

Related Documents

50. The following documents should be consulted in conjunction with this chapter:

a. JSP 375, Volume 1;

(1) Chapter 02 - Office & General Workplace Safety;

(2) Chapter 08 - Risk Assessment;

(3) Chapter 14 - Health Surveillance and Monitoring;

(4) Chapter 16 - Accident / Incident Reporting and Investigation;

(5) Chapter 15 - PPE and RPE;

(6) Chapter 22 - Work Equipment; and

(7) Chapter 39 - Retention of Records.

b. Other MOD Publications;

(1) DSA01.1 – Defence Policy for Health, Safety and Environmental Protection;

(2) DSA01.2 Chapter 2 – Requirement for Safety and Environmental Management Systems in Defence;

(3) JSP 950 – Medical Policy;

(4) DSA02-DLSR- Defence Movements and Transport Regulations and JSP 800; and

(5) DIN 2010DIN06-034: Health Monitoring and Accident; Reporting Programme for Whole Body Vibration – Small Boats, Planning Watercraft and Landing Craft.

c. Legislation and Guidance;

(1) HSE L140 – Hand-Arm Vibration: The Control of Vibration at Work Regulations;

(2) HSE INDG175 – Control of the Risks from hand-arm vibration - Advice for employers on the Control of Vibration at Work Regulations;

(3) HSE INDG296 – Hand-Arm Vibration – Advice for Employees;

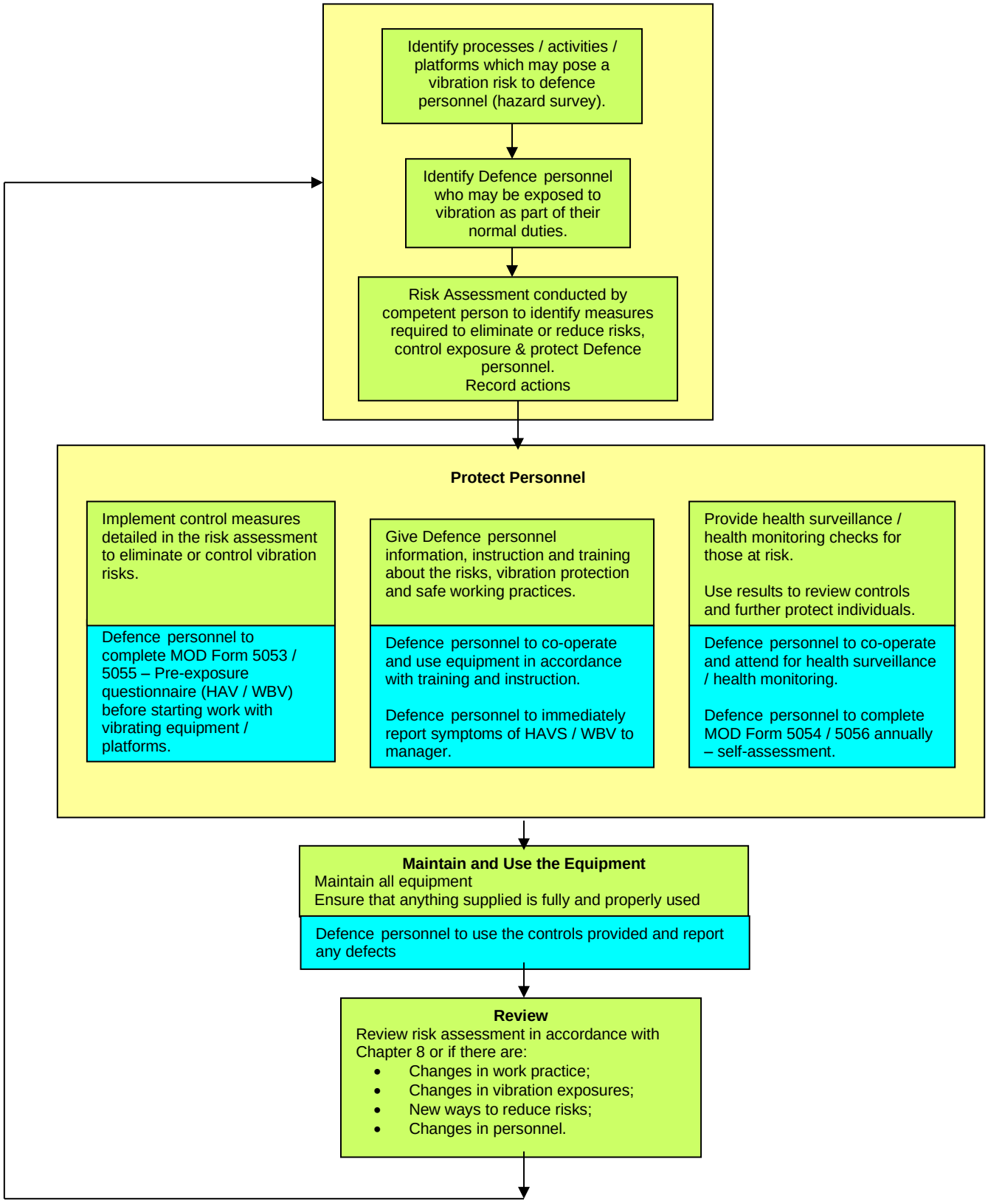
(4) HSE HSG170 - Vibration Solutions - Practical Ways to Reduce The Risk of Hand-Arm Vibration Injury;

(5) HSE INDG 242 - Control Back-Pain Risks Whole Body Vibration – Advice for Employers on the Control of Vibration at Work Regulations;

(6) HSE L141 – Whole Body Vibration: The Control of Vibration at Work Regulations; and

(7) HSE – The Supply of Machinery (Safety) Regulations.

Managing Vibration Risks Flow Chart



Competence

Obtaining Advice

1. The local health and safety adviser should be the initial point of contact for advice on the availability of competent assessors to undertake a vibration assessment. If the local health and safety adviser is unable to assist, then managers should contact their MOD Occupational Hygienists or their TLB safety organisation for advice.

2. If competent advice is not available locally or from the TLB safety organisation, specialist in-house advice and expertise is available from the departments listed in Table 1; these resources are limited, and priority will be given to the Defence personnel from the appropriate owning TLB.

Royal Air Force Head of Noise and Vibration Division	**Army** Army Medical Directorate	**Royal Navy** Head of Acoustics and Vibration
RAF Centre of Aviation Medicine RAF Henlow Bedfordshire SG16 6DN Email: AIR38Gp-CAM-OEM-NVD-GpMbx@mod.gov.uk	Headquarters Field Army Environmental Monitoring Team (EMT) Second Floor, Zone 6, IDL 423 Ramilies Building Marlborough Lines Monxton Road ANDOVER SP11 8HJ Email: FdArmy-Sp-EMT@mod.gov.uk	Institute of Naval Medicine Alverstoke Gosport Hampshire PO12 2DL Email: NAVYINM-AVS@mod.gov.uk

Table 1: Source of MOD Internal Competent Vibration Advice

3. If the above in-house expertise is unable to provide the service required, the manager should contact their TLB safety organisation for guidance in sourcing external competent advice / support.

Training

4. Defence personnel who require training to become a competent assessor for vibration risk should undertake a suitable accredited training course. The MOD has a limited in-house capability for the provision of accredited training run by the Institute of Naval Medicine (INM) at Gosport:

5. The Management of Occupational Exposure to Hand Arm Vibration" is a 5-day course designed for those responsible for the hand / arm vibration management in the workplace. Successful candidates will be awarded a certificate by the accreditation body, the Institute of Acoustics. Advice and application forms can be obtained from Head of Acoustics and Vibration, INM on 023 9276 8080 or Military 9380 68080.

6. There are currently no internal training courses for Whole Body Vibration risk assessment.

7. Defence personnel who have completed appropriate training and have appropriate experience to qualify as competent vibration assessors should notify their local health and safety adviser.