



# Medical examination and assessment of working divers (MA1)

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# Introduction

1 This guidance explains how Approved Medical Examiners of Divers (AMEDs) should conduct fitness to dive assessments on working divers for the purposes of the Diving at Work Regulations 1997.<sup>1</sup> It replaces the previous version published in 2015, following a review by the Health and Safety Executive (HSE). AMEDs should also be familiar with HSE's diving web pages, including the Approved Codes of Practice covering different sectors of the diving industry.<sup>2</sup>

2 The guidance is designed to help and support AMEDs in making informed decisions on fitness to dive, and sets out their responsibilities. It reflects the need to protect the health, safety and welfare of divers at work. In setting out medical and physical fitness standards for working divers, it takes account of the physiological, psychological and physical demands of working in a hyperbaric environment and responding to underwater emergencies.

## Background

3 Diving is a high hazard, safety critical activity and there are specific regulations on diving at work to control the risks. They are the Diving at Work Regulations 1997 (DWR), which cover all dives when one or more divers are at work in the diving industry, whether employed or self-employed. They apply to everyone from the client for whom the work is being done to the diver carrying out the work. All persons involved have a responsibility to take measures to safeguard the health and safety of those taking part in a diving project, as well as their own. Further information is available on HSE's diving web pages.

4 There are five Approved Codes of Practice tailored to the needs of different sectors within the diving industry:

- Commercial diving projects offshore<sup>3</sup>
- Commercial diving projects inland/onshore<sup>4</sup>
- Recreational diving projects<sup>5</sup>
- Media diving projects<sup>6</sup>
- Scientific and archaeological diving projects<sup>7</sup>

5 Under DWR, all divers at work must have a valid certificate of medical fitness to dive, issued by an AMED. The certificate is valid for up to 12 months. It needs renewing before it expires if the diver wishes to continue diving at work. Under regulation 13(1) of DWR, an individual must not dive in a diving project if they know of anything, including any illness or medical condition, which makes them unfit to dive.

6 To perform medical examinations and fitness assessments under DWR, a doctor must have a valid Certificate of Approval from HSE. HSE's diving web pages contain further information on the approval process.

7 A career in diving can be associated with acute and chronic health effects, including barotrauma, decompression illness (DCI) and dysbaric osteonecrosis. However, adopting safe diving practices reduces the risk of developing these conditions.

# Role of the AMED

8 To become an HSE approved AMED, you must be registered with the General Medical Council and hold a licence to practise, have a recognised qualification in occupational medicine and undertake specialised training in diving medicine covering:

- different types of diving at work;
- diving work environments;
- diving physiology and pathophysiology; and
- fitness to dive.

9 Through appropriate CPD, you should keep up to date with relevant developments and have a good understanding of the different types of diving and their hazards and risks. This will enable you to make justifiable and informed decisions on fitness to dive. Once approved, you must refresh the training at least once every five years to maintain approval. Refresher training should have an emphasis on diving physiology, pathophysiology and fitness to dive. Further information on suitable training is available on HSE's diving web pages.

10 As an AMED, you must be competent to perform clinical examinations and assess fitness to dive. You retain responsibility for carrying out these elements of the medical. You can delegate certain aspects of the process to other staff provided they are suitably trained and competent. For example, a nurse or occupational health technician could perform spirometry. You should have access to suitable facilities and equipment for conducting medicals, and make sure equipment is calibrated, serviced and maintained in accordance with manufacturers' instructions. Any physiological tests should be carried out using validated techniques.

11 Your role as an AMED is to:

- conduct medical examinations and fitness to dive assessments and make justifiable decisions on fitness to dive;
- identify medical conditions or abnormal test results that may present a risk to the diver or others involved in a diving project, and determine whether the diver has the functional capacity to carry out their work effectively and safely;
- obtain additional advice as appropriate (paragraphs 27-29) and perform an individual risk assessment, where there is doubt about fitness to dive;
- issue a certificate of medical fitness to dive for each medical performed, which clearly states whether the diver is fit to dive, fit to dive with restrictions or unfit to dive (paragraphs 30-34);

- inform the diver of their right to appeal if you find them unfit to dive or fit to dive with restrictions (paragraph 35);
- remind the diver of their legal obligation not to dive in a diving project if they know of anything that would make them unfit to dive; and
- provide divers with information on the potential health effects of diving.



## Medical assessment process

12 Professional diving is often a very demanding career and divers should be medically and physically fit to perform their work. The medical assessment should enable you to identify medical conditions that might be a contraindication to diving, either permanently or temporarily, or that need further specialist assessment. You should adequately assess the functional capacity of the diver to carry out their work effectively and safely. In determining fitness to dive, it is important to consider both the safety of the diver and others involved in the diving project.

13 If there is doubt about an individual's fitness to dive, you should adopt a risk-based approach in each case. The risk assessment should consider relevant history, examination findings, test results and any specialist advice obtained, in relation to the type of diving and working conditions. In performing an individual risk assessment, supported by the guidance in this document, you can use discretion in making a justifiable, informed decision on fitness to dive.

14 If a diver has a medical condition that is not covered in this guidance, you should obtain additional advice as appropriate (paragraphs 27-29).

15 Where a diver has had a medical examination through a recreational diving organisation, you can use discretion to decide whether some investigations already carried out need repeating. It should take account of the diver's medical history, and their health and the time elapsed since the last recreational medical examination. If there is any doubt, the investigations should be repeated.

### Initial medical examination

16 Under DWR, anyone wishing to become a working diver must have a medical examination by an AMED before they start their diver training and/or assessment course. Initially, you should direct prospective divers to the medical questionnaire<sup>8</sup> on HSE's diving web pages (reproduced in Appendix 1). They should complete and sign it, and ask their GP to countersign it to confirm their medical history. If the individual is not based in Great Britain (GB) (eg if they have come to GB for diver training), the medical questionnaire should be countersigned by their GP equivalent. In only exceptional circumstances, where there is no GP equivalent for an individual who is not based in GB, should you go through the questionnaire with them and ask them to complete and sign it as a self-declaration.

17 You should consider the completed questionnaire. The presence of a medical condition identified at this stage, which might be a contraindication to diving, could avoid the expense of a full, initial medical examination and prevent unnecessary testing.

18 The initial medical is comprehensive. Appendix 2 summarises the routine investigations to perform. You should make prospective divers aware of any medical problems that may affect their long-term health or future employment prospects.

19 You must record the findings of the medical examination on an MA2 form, which is provided by HSE and contains the medical certificate of fitness to dive (paragraphs 30-34). As subsequent medicals may be performed by another AMED, you should provide sufficient detail on the MA2 form to allow identification of any relevant changes over time. You can also record your findings on the Diver's Medical Record<sup>9</sup> form available on HSE's diving web pages (reproduced in Appendix 3). This is convenient for comparing examination findings and test results over time where a diver returns to the same AMED for their medicals.

20 You should not issue a certificate of medical fitness to dive before seeing the prospective diver's medical questionnaire completed in accordance with paragraph 16.

## **Annual medical examination**

21 All divers who wish to continue diving at work must have a medical at least every 12 months. Appendix 2 summarises the routine investigations to perform.

22 The diver should provide the last MA2 form (paragraphs 30-34) from their most recent examination for comparison unless you carried out the previous medical and can look at the record. Without the previous MA2 form, you should treat the medical as an initial examination.

23 You should ask the diver if they have had any health issues since their previous medical. To help confirm the medical history, you can use the medical questionnaire for the diver to complete and sign as a self-declaration (reproduced in Appendix 1). This might be especially relevant where it is the first time you have seen a diver for their annual medical. If the medical questionnaire raises any issues of concern, you may need to consult the diver's GP for further information.

## **Return to work medical assessment**

24 Any medical condition or injury occurring during a diver's career may impact on their fitness to dive. In certain circumstances, the diver must be re-examined by an AMED to assess their fitness to return to work. For example, if they develop a respiratory, cardiac, neurological or otological disorder, including decompression illness (DCI), or any other condition or injury requiring them to be off work for more than 14 days.

25 You should assess the possible effects of the illness or injury and any medication required on diving safety and the functional capacity to undertake diving work. The return to work assessment does not replace the requirement for an annual medical examination.

26 Return to work following DCI needs careful consideration. Consultation with a diving medical specialist (paragraphs 27-29) and, if necessary, the treating hyperbaric physician, will assist in making decisions about fitness to dive and the timing of return to diving.

## **Additional advice**

27 If there is doubt about an individual's fitness to dive, you should consult with other AMEDs and/or medical specialists as appropriate.

28 For chronic conditions that may change over time, eg asthma or diabetes, you should obtain relevant information from the clinician overseeing the individual's care.

29 HSE has a list of diving medical specialists for advice and referrals which is available on request by emailing: [amed@hse.gov.uk](mailto:amed@hse.gov.uk). These diving medical specialists are registered with the General Medical Council (GMC), hold a licence to practise, are on GMC's Specialist Register for an appropriate medical specialty and have relevant knowledge/experience of diving medicine.

## **Certificate of medical fitness to dive**

30 Following each medical examination, you must issue the diver with a completed MA2 form, which includes the certificate of medical fitness to dive. You should record the findings of your medical examination in detail on the MA2 form, and clearly indicate on the certificate whether the diver is fit to dive, fit to dive with restrictions or unfit to dive.

31 If the diver is fit to dive, you must state the period during which the certificate remains valid, which must not exceed 12 months. If fit with restrictions, you must clearly state those restrictions on the certificate. Options for restrictions include duration of certification, type and remoteness of diving, and depth, time and frequency of diving. Restrictions should be appropriate to any underlying issue identified and the type of diving activity.

32 For practical purposes, the diver can present for the medical up to one month before the expiry date on their certificate. The date of the new certificate may then begin from the expiry date of the current version. The time from expiry date of the current certificate to expiry date of the new certificate must not exceed 12 months. You must not extend the certificate beyond that period.

33 You should retain a copy (paper or electronic) of the diver's MA2 form along with any additional clinical information, ensuring storage is secure and the information is readily accessible if required. Within four weeks of conducting the medical, you should provide basic details of the diver and their fitness to dive assessment to HSE. This is used for

regulatory purposes to assist the investigation of diving incidents. HSE will provide you with specific details of what information is required and how to submit it.

34 You can request MA2 forms from HSE by emailing: [amed@hse.gov.uk](mailto:amed@hse.gov.uk). You should indicate how many forms you need and confirm the address they should be sent to.

## Appeals

35 If you find a diver unfit to dive or fit to dive with restrictions, or you revoke their certificate of medical fitness to dive, you should inform them of their right to appeal to HSE within 28 days for a review of the decision. HSE's diving web pages contain details of the medical appeals procedure.<sup>10</sup>

# General medical considerations

## Age

36 DWR does not specify lower or upper age limits for professional diving. However, the minimum age for working offshore is 18 years.

## Pregnancy

37 Due to possible harmful effects that exposure to increased pressure may have on a foetus, a working diver who is pregnant or suspects they might be pregnant should not dive.

## Medication

38 Assessment of fitness to dive in an individual on medication should consider:

- the underlying health condition for which the individual is taking medication, symptom control and any functional impairment;
- the effects of medication, taking account of the physiological effects of diving;
- length of time on medication, including adaptation to any side effects;
- any unexpected effects resulting from interaction with the diving environment;
- the consequences of stopping treatment if it is unavailable, eg in the event of its loss; and
- the type of diving.

## Smoking

39 As with all smokers, divers should be encouraged to stop smoking. Smokers are likely to have an increased incidence of health conditions that may have an adverse impact on fitness to dive.

## Disability

40 For disabled divers, you should conduct an individual functional risk assessment and you need to consider the safety of the diver and others involved in the diving project. Other relevant issues include:

- functional loss and adaptations;

- whether the condition is progressive or associated with remissions and relapses;
- effects of any medication;
- size of the diving project;
- use of safety divers; and
- nature of the diving environment.

41 A decision on fitness to dive should take account of the requirements of the Equality Act 2010.<sup>11</sup> Any restriction to diving must be justified.

## Infection and impaired immunity

42 A diver with a communicable disease may start diving once the underlying condition has resolved. In cases of doubt, such as the presence of complications, you should consult the doctor responsible for the individual's clinical care.

43 For divers who have had symptoms of COVID-19 or tested positive for SARS-CoV-2 but were asymptomatic, you should refer to specific guidance issued by HSE on returning to diving after COVID-19.

44 HIV positive status is not a contraindication to diving. Development of a relevant, new medical condition in an individual who is HIV positive would necessitate reassessment of their fitness to dive. If signs and symptoms of AIDS develop, the diver is unlikely to be fit to dive. You should assess cases on an individual basis and consult the doctor responsible for the individual's clinical care.

45 A diver with impaired immunity for other reasons requires careful consideration. It may necessitate a restriction on the type of diving. The risk of infection, even with prophylactic antibiotic use and access to medical care, needs assessing in relation to foreign travel, diving in contaminated conditions and working in saturation conditions.

## Malignancy

46 You should assess malignancy and treatment side effects on an individual basis and obtain information from the doctor responsible for the diver's clinical care. Anyone found fit to dive is likely to need regular review.

## Obesity

47 The deposition of too much fat, especially around the abdomen, is associated with increased risk of heart disease, type 2 diabetes, stroke and certain cancers. Development of such conditions could have an adverse impact on fitness to dive. Obesity may be associated with a lack of physical fitness and can have practical implications for diver

safety, eg fit of equipment, accessing and working in confined spaces and conducting a rescue.

48 At each medical examination, you should record the diver's height, weight, body mass index (BMI) and waist circumference. To measure waist circumference, you should follow the protocol recommended by the World Health Organisation and the NHS.<sup>12, 13</sup>

49 A high BMI generally indicates excessive body fat. However, you should interpret BMI with caution in individuals who are highly muscular as it is a less accurate measure of adiposity in this group. Ethnicity can influence the BMI at which comorbidity risk factors are of concern.<sup>14</sup> Waist circumference more readily identifies changes in visceral fat deposition.

50 For divers with a BMI  $\geq 30$  kg/m<sup>2</sup> and/or waist circumference  $\geq 94$  cm in males or  $\geq 80$  cm in females, provide weight management advice as appropriate. If there is doubt about fitness to dive, you should conduct an individual risk assessment and consider the overall findings of the medical in relation to the type of diving activity. Depending on the outcome, issuing a short duration certificate then reassessing the diver may be appropriate.

51 For those with a BMI  $\geq 35$  kg/m<sup>2</sup> and/or waist circumference  $> 102$  cm in males or  $> 88$  cm in females, consider referring them to their GP. Issuing an unfit certificate will usually be appropriate.

## Exercise testing

52 Professional diving can be physically and mentally demanding, and divers should have a good level of physical fitness. This is particularly important in underwater emergencies where they may have to carry out a self-rescue or rescue another diver. At each medical examination, you should conduct a Chester Step Test (CST) to estimate maximal oxygen uptake (VO<sub>2</sub> max) as a measure of a diver's aerobic capacity and cardiorespiratory fitness.

53 Initially, you should assess the risk and suitability of carrying out a CST. This should take account of the diver's medical history, examination findings, test results, general fitness and presence of any cardiac risk factors. Appendix 4 contains a cardiac screening tool. Those conducting exercise testing must have up-to-date training in basic life support and resuscitation skills, following the standards of the Resuscitation Council UK.<sup>15</sup> They should also have appropriate resuscitation equipment, eg an automated external defibrillator, depending on the outcome of the risk assessment. There should be a clear procedure to follow in the event of a collapse.

54 The CST is a submaximal, multistage aerobic capacity test.<sup>16</sup> Wearing an accurate chest strap heart monitor, the subject steps on and off a step at a rate set by the audio beat. The stepping rate is increased every two minutes, while heart rate is recorded. The

test continues until the subject reaches 80% of their maximum heart rate and/or reports a moderately vigorous level of exertion. It lasts for a maximum of 10 minutes.

55 You should routinely use a 30 cm step height, unless a 25 cm step height is appropriate due to factors such as functional capacity, stature and risk. You should use the latest CST software for calculating VO<sub>2</sub> max.

56 You should measure PEF or FEV<sub>1</sub> before and 5, 10 and 15 minutes after the CST, as a screen for exercise-induced bronchoconstriction (see paragraph 62).

57 If there is doubt about the reliability of the CST result in an individual case, you should consider whether an alternative test for estimating VO<sub>2</sub> max would be appropriate. For example, a treadmill test or multi-stage shuttle run test.

58 Table 1 provides a general guide to help interpret results. Where VO<sub>2</sub> max is 40-44 ml/kg/min or just below 40 ml/kg/min, you should conduct an individual risk assessment and consider the overall findings of the medical in relation to the type of diving activity. You should provide fitness advice as appropriate.

**Table 1** General guide to help interpret VO<sub>2</sub> max values

VO <sub>2</sub> max (ml/kg/min)	Fitness to dive
<b>&gt;44</b>	Issue a 12-month certificate if other aspects of the medical are satisfactory.
<b>40-44</b>	Issue a short duration certificate then reassess VO <sub>2</sub> max or issue a 12-month certificate restricted to a specific diving activity. A 12-month certificate may be appropriate where a diver works in recreational, media or scientific diving projects (including swimming pool or aquarium diving) using recreational diving techniques and is exposed to a relatively less demanding work environment (based on maximum working depth, dive times and working conditions).
<b>&lt;40</b>	Issue an unfit certificate. If VO <sub>2</sub> max is just below 40 ml/kg/min, and where a diver works in recreational, media or scientific diving projects (including swimming pool or aquarium diving) using recreational diving techniques and is exposed to a relatively less demanding work environment (based on maximum working depth, dive times and working conditions), it may be appropriate to issue a certificate restricted to a specific diving activity.



# Respiratory system

59 The respiratory system should be clinically and functionally compatible with diving. A comprehensive respiratory history is essential and you should consider using a standardised questionnaire.

60 At each medical, you should carry out a comprehensive examination of the respiratory system, perform spirometry at rest and record FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC ratio and PEF.

61 You should consult a diving medical specialist for any candidate with an FEV<sub>1</sub>, FVC or PEF lower than 80% of the predicted value (corrected for age, sex, height and ethnicity), FEV<sub>1</sub>/FVC ratio less than 70% or with any other significant abnormality of pulmonary function. However, if any one of the spirometry measurements is borderline, referral may not be necessary if the lower limit of normal (based on a z-score of -1.64) indicates the result is acceptable.<sup>17</sup>

62 You should also record the respiratory response to the exercise test (see paragraphs 52-58) for any evidence of exercise-induced bronchoconstriction. Document PEF or FEV<sub>1</sub> before and 5, 10 and 15 minutes after exercise and consider using the Borg scale or similar to assess breathlessness in a structured manner. If PEF or FEV<sub>1</sub> falls by ≥15% at 5, 10 and/or 15 minutes post-exercise, or if there are any other features suggestive of exercise-induced bronchoconstriction from the diver's history, you should consult a diving medical specialist.

63 Chest radiography should only be performed if justified on individual clinical grounds. You should consider the individual's history, findings from the physical examination and whether the potential information derived from radiography will assist in deciding on fitness to dive. If additional assistance in interpretation is needed or imaging other than a plain chest X-ray is required, you should consult a diving medical specialist.

## Respiratory conditions

64 If there is any doubt about respiratory fitness, you should seek advice from a diving medical specialist. Table 2 sets out specific circumstances in which advice should be sought and when a respiratory condition would be a contraindication to diving without the need for further assessment.

**Table 2** Respiratory conditions that are an absolute contraindication to diving or require further assessment

Condition	Candidate unfit to dive without need for further assessment	Candidate needs further assessment by a diving medical specialist
Acute respiratory disease such as pulmonary infection (for COVID-19 see paragraph 43)	All cases, until resolved with no sequelae	N/A
Asthma (see paragraphs 65-67)	<p>On more than low dose inhaled corticosteroids and a long-acting <math>\beta_2</math> agonist (requiring additional controller therapies or specialist therapies in BTS/SIGN guideline)<sup>18</sup></p> <p>Admitted to hospital with exacerbation in last 3 months; unstable asthma; bronchoconstriction with wheeze precipitated by exercise, cold or emotion</p>	Where there is doubt about respiratory fitness (eg a borderline exercise challenge test - see paragraph 66)
Chronic obstructive pulmonary disease	N/A	All cases
Cystic fibrosis	Pulmonary involvement	All other cases
Presence of large bullae or cysts	All cases due to increased risk of barotrauma	N/A

Condition	Candidate unfit to dive without need for further assessment	Candidate needs further assessment by a diving medical specialist
Previous chest surgery; pneumomediastinum; pulmonary barotrauma; traumatic pneumothorax including cardiothoracic surgery	N/A	All cases  Candidate might be fit to dive if injury has healed and is associated with acceptable lung function and thoracic imaging
Previous spontaneous pneumothorax	N/A	All cases  Candidate may be fit to dive if treated by bilateral surgical pleurectomy and associated with normal lung function and thoracic imaging performed after surgery
Pulmonary fibrosis	Disease which impairs gas transfer	All other cases
Sarcoidosis	Active sarcoidosis	Resolved sarcoidosis demonstrated by normal lung function and chest radiography
Tuberculosis	Active tuberculosis	After curative treatment if lung function and chest radiography are normal
Chronic lung disease not noted elsewhere	N/A	All cases

## Asthma

65 When assessing an asthmatic diver, you should refer to the *British guideline on the management of asthma* by the British Thoracic Society/Scottish Intercollegiate Guidelines

Network.<sup>18</sup> Table 12 of the guideline categorises inhaled corticosteroids by dose for adults.

66 Individuals with asthma may be permitted to dive if they are well controlled on low dose inhaled corticosteroids (ICS) alone or low dose ICS with the addition of a long-acting  $\beta_2$  agonist, and:

- are free of asthma symptoms (a validated questionnaire can be used to check if symptoms are well controlled);
- have normal spirometry (see paragraph 61);
- have a negative exercise challenge test (<15% fall in PEF or FEV<sub>1</sub>); and
- where doubt exists, a diving medical specialist has been consulted.

67 A diver with asthma should monitor their condition with regular, twice daily, PEF measurements and bring records of these measurements to subsequent medicals. They should not dive if they have:

- current asthma symptoms, ie symptoms requiring relief medication in the 48 hours preceding a dive;
- reduced PEF (>10% fall from their normal best values in the 48 hours preceding a dive); or
- increased peak flow variability (>20% diurnal variation on any day in the week preceding a dive).

# Cardiovascular system

68 The cardiovascular system should be clinically and functionally compatible with diving and enable the diver to sustain strenuous activity in the event of an emergency. There should not be an increased risk of loss of consciousness or incapacitation compared with the healthy, general population.

69 At each medical, you should carry out a comprehensive examination of the cardiovascular system. An ECG is not required at initial or annual medical examination unless clinically indicated. Where you obtain an ECG, you should discuss any abnormality with a cardiologist.

70 You should obtain resting blood pressure at each examination, taken in accordance with the NICE guideline on hypertension in adults.<sup>19</sup>

## Hypertension

71 Hypertension may increase the risk of immersion pulmonary oedema (see paragraph 85). A diver with Stage 1 hypertension (140/90 to 159/99 mmHg) may be fit to dive provided that:

- their blood pressure is adequately controlled;
- no medication is required, or any medication taken has no implications for diving safety; and
- there is no evidence of target organ damage (investigations should include ECG, fundoscopy, and urine and blood tests to assess renal function).

72 Where doubt exists, you should consult a diving medical specialist.

## Ischaemic heart disease

73 Symptomatic ischaemic heart disease is incompatible with diving. The requirement for medication to control symptoms is a contraindication, but preventive medication such as aspirin or lipid lowering agents is acceptable.

74 An individual found incidentally to have ischaemic heart disease needs further assessment by a diving medical specialist.

75 An individual who is symptom free following conventional coronary bypass surgery, percutaneous coronary intervention (angioplasty) or minimally invasive surgical

revascularisation, requires careful assessment by a diving medical specialist (also see Table 2 for traumatic pneumothorax and cardiothoracic surgery).

## **Dysrhythmia**

76 Any dysrhythmia that might cause incapacity in water will disqualify from diving.

77 Disorders of cardiac rhythm, except for infrequent ventricular extrasystoles, require evaluation by a diving medical specialist and are likely to be a cause for disqualification. Sinus arrhythmia is normal in young people.

78 A diver with a family history of sudden cardiac death and/or abnormalities of heart rhythm should be assessed by a diving medical specialist.

## **Pacemaker**

79 In most cases, the indication for pacing is likely to be a contraindication to diving. The individual requires careful assessment with consideration of the type of diving and type of pacemaker, and input from a diving medical specialist and, if necessary, the manufacturer of the pacemaker.

## **Persistent (patent) foramen ovale (PFO)**

80 Routine screening for a PFO is not required. However, a large right to left shunt, usually across a PFO, is a risk factor for neurological, inner ear and cutaneous DCI.<sup>20</sup> Any diver who has a history of such DCI or a family history of PFO or atrial septal defect, should be assessed by a diving medical specialist. This is particularly important where the dive profile was not obviously contributory to the DCI, as the presence of a PFO or other right to left shunt would be pertinent to an assessment of the overall risk to the diver of continuing to dive.

81 A diver who has migraine with aura should be assessed by a diving medical specialist. This is because of the strong association between migraine with aura and the presence of a large right to left shunt. The latter increases the risk of DCI.

## **Valvular heart disease**

82 Auscultation of the heart should be normal. Murmurs are acceptable only if deemed physiological or haemodynamically unimportant. Evidence of valvular heart disease requires assessment by a diving medical specialist.

83 Congenital heart disease, even if repaired surgically or by interventional techniques, requires assessment by a diving medical specialist.

## **Peripheral circulation**

84 The peripheral circulation should be sufficient to provide adequate peripheral perfusion even in cold conditions. Evidence of impaired circulation, either on history or examination, requires further evaluation. Peripheral vascular disease may predispose to cold injury. Contraindications include:

- varicose veins associated with circulatory impairment, eg varicose eczema; and
- conditions known to be associated with impaired organ perfusion.

## **Immersion pulmonary oedema (IPO)**

85 Any diver with a history of IPO should be assessed by a diving medical specialist. Investigation is important as IPO may be an indication of underlying heart disease. An individual who has had IPO is at risk of further episodes, particularly if they are hypertensive, and a return to diving is unlikely.<sup>21</sup>

## Nervous system

86 The central nervous system should be clinically and functionally compatible with diving. Assessment of the central nervous system includes both physical and psychological aspects (see paragraphs 95-105).

87 A careful history is essential. You should specifically seek a history of visual, hearing, speech, swallowing, motor, sensory, balance, coordination, bladder and bowel dysfunction, headaches and excessive daytime somnolence. You should look for and note conditions that may mimic DCI or jeopardise safety, and conduct an assessment to determine if any such condition could affect fitness to dive.

88 At each medical, you should perform a comprehensive neurological examination and include assessment of the cranial nerves, motor and sensory systems, gait, balance and coordination. Tendon reflexes and plantar responses should be elicited. You should record baseline clinical findings in detail on the MA2 form to allow detection of any subsequent variation.

## Neurological conditions

89 The following are contraindications to diving:

- Any form of seizure activity, other than febrile convulsions occurring before the age of five years. However, if a diver remains seizure free for 10 years without treatment, they may be fit to dive. A single seizure, without a demonstrable structural or metabolic cause, should be considered on an individual basis and if a diver remains seizure free for five years without treatment, they may be fit to dive. You should seek advice from a diving medical specialist in all cases.
- Loss or impairment of consciousness or awareness and/or disturbances of speech, vision or motor control, or recurrent episodes of fainting.
- Severe motion sickness.
- Severe migraine particularly with neurological aura.
- Excessive daytime somnolence or uncontrolled sleep apnoea.

90 Neurological diseases such as stroke, multiple sclerosis or Parkinson's disease should be considered on an individual basis and will require an opinion from a diving medical specialist.

91 Following a stroke or transient ischaemic attack, a diver requires at least 12 months without further problems to be considered fit to dive. An opinion from a diving medical specialist is necessary and the possibility of other cardiovascular pathology should be



excluded. Any long-term medication required after the event should be compatible with diving.

## **Intracranial surgery**

92 A history of intracranial surgery is not an absolute contraindication to diving provided there is no history of subsequent epilepsy, increased risk of seizure or persisting neurological deficit. The reason for intracranial surgery is often the more important factor when assessing epilepsy risk. Cases require a neurological assessment by a diving medical specialist.

## **Head injury**

93 A history of moderate to severe head injury carries a risk of post-traumatic epilepsy. The individual needs careful assessment with input from a diving medical specialist to determine their risk when compared with the normal, healthy population. The epilepsy risk assumes significance when there has been a depressed skull fracture, intracranial haematoma, unconsciousness or post-traumatic amnesia (PTA) >30 minutes, or when focal neurological signs have accompanied the injury. PTA is taken from the time of injury until the point from which there is continuous memory.

94 Mild episodes of head injury ( $\leq 30$  minutes unconsciousness or PTA) provide grounds for temporary unfitness for a minimum of four weeks, subject to review by an AMED. However, mild head injuries may lead to persisting post-concussional symptoms and divers should not return to diving until these have resolved.

## Mental health

95 Individuals should be free from psychiatric symptoms and cognitive impairment. They should not exhibit psychological or personality issues that would interfere with their in-water safety or that of others. Particular attention should be paid to anxiety disorders due to the clear link between anxiety/panic and diving accidents.

96 You should also consider the risk of recurrence of psychiatric or psychological disorders, noting the various stressors associated with the type of work, remote location and risks involved.

97 The diver should be psychologically capable of undertaking the diving activity. Their manner, attitude, verbal and intellectual responses form part of the examination. Where any doubt exists, you may need to obtain a specialist psychological assessment.

### Schizophrenia, bipolar affective disorder and recurrent depression

98 Schizophrenia, bipolar affective disorder and recurrent depression, if symptomatic, would disqualify an individual from all types of diving.

99 When these disorders are asymptomatic due to treatment, you should obtain an opinion from a diving medical specialist.

### Conditions treated with psychotropic medication

100 The use of psychotropic medication, eg SSRIs for anxiety and/or depression, is a contraindication for saturation diving. For other types of diving where there is a continuing need for psychotropic medication, you should consult a diving medical specialist.

101 Use of psychotropic medication for management of chronic pain needs individual assessment and input from a diving medical specialist.

102 The following disorders, if resolved, and where there have been no further episodes, eg for six months while off psychotropic medication, may be compatible with diving (obtaining a specialist report might be appropriate to confirm the diagnosis and prognosis).

- Single episodes of depression (more severe episodes may need to be considered in the same way as recurrent depression).

- Deliberate self-harm (if there is a history of recurrent self-harm, you should obtain a specialist report).
- Anxiety disorders (some anxiety responses may be specific to the diving environment, therefore resolution on land may not equate with resolution in water).
- Isolated psychotic episodes (you should obtain a specialist report).

## **Attention deficit hyperactivity disorder (ADHD)**

103 You should assess any case of ADHD on an individual basis and consult a diving medical specialist.

## **Phobias**

104 Agoraphobia and/or claustrophobia are contraindications to diving. Most simple, specific phobias would not disqualify an individual from diving provided they do not interfere with in-water safety.

## **Alcohol, drug or substance misuse**

105 Alcohol, drug or substance misuse is incompatible with diving. As a minimum, there should be evidence of a lengthy period of stability, eg 12 months off the misused substance, without medication or relapse. Obtaining a specialist report may be appropriate to confirm the diagnosis and prognosis.

## Musculoskeletal system

106 Divers should have the appropriate degree of mobility, strength and dexterity for the diving activities and work carried out. Musculoskeletal problems require an individual functional risk assessment.

107 Divers with a history of low back pain require careful assessment because of the risk of sudden incapacitation and sciatic pain mimicking DCI.

108 Routine surveillance for dysbaric osteonecrosis is not required. MRI and/or long bone radiography is indicated in cases of suspected dysbaric osteonecrosis.

# Ear, nose and throat

## Hearing

109 Hearing that allows understanding of normal conversational voice is adequate for all types of diving at work. If there is any doubt, a risk assessment should be conducted, taking account of relevant factors, including the diver's ability to communicate and respond to warning signals, communications systems used and type of diving. Initial examination requires a pure tone audiometric assessment covering the range 500 Hz–8 KHz. An audiogram should be repeated after an episode of aural barotrauma, inner ear DCI or where required as part of a hearing health surveillance programme.

110 Asymmetrical hearing loss is not itself a contraindication to diving. However, a significant unilateral loss requires careful assessment and investigation to establish fitness.

## Ear

111 Narrowing of the ear canal, particularly that caused by exostoses, should not prevent diving unless it causes recurrent infection or inadequate assessment of tympanic membrane and eustachian tube function.

112 A history of freezing or non-freezing cold injury to the pinna may disqualify and a risk assessment of further exposure should be performed.

113 The tympanic membrane should be intact and its movement seen on performing an equalisation manoeuvre such as the Valsalva or Toynbee. Scarred tympanic membranes and healed or surgically repaired perforations do not prohibit diving as long as individuals have intact tympanic membranes and normal eustachian tube function.

114 A history of chronic dilatatory or recurrent baro-challenge-induced eustachian tube dysfunction may be a contraindication to diving. If there is doubt about whether eustachian tube function is adequate, you should refer the diver for an ENT opinion, to consider tympanogram or eustachian tube dysfunction testing, or for a trial of pressure.

115 The following are contraindications to diving:

- persistent/recurrent or chronic otitis externa;
- active acute middle ear infection until resolved;

- active chronic middle ear disease, such as cholesteatoma. If in the medical history, it will require advice from a diving medical specialist to ensure adequate eustachian tube function;
- stapedectomy;
- mastoid surgery unless the underlying disease process has been resolved, there remains an intact posterior ear canal wall (no mastoid cavity) and an intact functional tympanic membrane with adequate eustachian tube function;
- middle ear barotrauma until all symptoms and signs have fully resolved;
- any inner ear pathology, particularly persistent or episodic vertigo, disequilibrium, or imbalance of otological origin, such as Ménière's disease, benign paroxysmal positional vertigo, unilateral vestibular loss, or untreated semi-circular canal/labyrinthine fistulae or dehiscence. Resolved 'labyrinthitis' is not a contraindication in the absence of persistent imbalance unless concern exists regarding ongoing functional vestibular deficit;
- tinnitus of sufficient severity to interfere with underwater safety;
- a history of either inner ear barotrauma or inner ear DCI, particularly where there is evidence of residual symptoms (persistent tinnitus, hearing loss or balance disturbance that is not otherwise already disqualifying), will need careful evaluation to inform further consideration of fitness, including discussion with a diving medical specialist;
- recurrent barotraumatic or unresolved facial palsy;
- middle ear, cochlear or brainstem hearing implants may be a contraindication. Advice should be sought from a diving medical specialist;
- previous skull base fracture involving the temporal bone associated with otic capsule disruption or CSF leak.

## Nose and throat

116 The nose should be clear with no obstruction impeding equalisation of the paranasal sinuses. Significant obstruction caused by conditions such as a deviated nasal septum or nasal polyps may be amenable to medical or surgical treatment. After successful treatment, the individual can dive.

117 Acute infection of the nose/sinuses is a contraindication to diving until resolved.

118 Untreated chronic rhinosinusitis, with or without nasal polyps, is a contraindication to diving. Provided treatment is successful, an individual can dive. Requirement for ongoing topical or oral medication such as decongestants, antihistamines or steroids, requires careful consideration and may need advice from a diving medical specialist. Functional endoscopic sinus surgery is not a contraindication to diving.

119 A history of recurrent sinus barotrauma, particularly where surgical emphysema of the orbit or pneumocephalus has occurred, or a history of anterior skull base surgery,

known anterior skull base bony defects or surgically repaired CSF leak, requires advice from a diving medical specialist as diving may be contraindicated.

120 Any untreated regional facial pain syndrome that may reasonably be confused with active DCI is a contraindication to diving.

121 Maxillofacial, craniofacial, or auricular abnormalities precluding effective use of diving equipment are a contraindication to diving.

122 Any condition or history of surgery causing a significantly impaired, obstructed or incompetent larynx is a contraindication to diving, as is the presence of a laryngectomy, tracheostomy or uncorrected laryngocele.

## Vision

123 Visual acuity, with or without correction, and colour vision, should be adequate for the type of diving activity. For distance, visual acuity of 6/9 is likely to be adequate. The requirement for near vision should consider the need to read a watch, computer, depth gauge, tables and instrumentation. Colour vision is important for specific inspection tasks. You should use appropriate colour vision screening and confirmatory functional tests, if needed. You should carry out a confrontational visual field test and, if clinically indicated, perform fundoscopy.

124 Divers requiring optical correction can use a prescription faceplate if using a facemask. Soft, gas permeable contact lenses are suitable while hard, impermeable lenses are unsuitable unless fenestrated. There is a risk of infection with all contact lenses and it may be difficult to maintain sterility in a saturation environment. Use of disposable lenses may reduce this risk.

125 The risk associated with diving after ophthalmic surgery requires careful evaluation and individual assessment in conjunction with the surgeon and/or a diving medical specialist. Certain procedures may involve the instillation of gas into the globe and individuals should not dive until all gas is reabsorbed.



## Dental health

126 Divers require a high standard of dental health. It may be necessary to retain a mouthpiece and the presence of dental cavities may be associated with barotrauma. Unattached dentures should be removed during any diving activity.

127 Divers should see a dentist at a frequency based on current NHS guidelines and their own dental status. In cases of doubt about dental health, an opinion from the dentist should be obtained.

## Endocrine system

128 Diving results in numerous neurological reflexes and hormonal responses. It is unlikely that those suffering from endocrine conditions leading to impaired thermoregulation or cardiac or muscular insufficiency, would be found fit to dive. A proven or suspected abnormality requires detailed assessment.

### Diabetes

129 The detection of previously unknown glycosuria requires investigation. When an individual with diabetes mellitus, whether insulin, tablet or diet controlled, is seen for the first time, you should refer them to a diving medical specialist for detailed individual assessment. If the condition then changes, you should consider whether further referral to the diving medical specialist would be appropriate.

130 When assessing fitness to dive in an individual who has diabetes, you should consider the nature of the work and diving environment, the degree of control achieved by treatment and safety of the diver and others on the diving project. Regular (at least annual) review by the clinician overseeing their care is required and they should be well motivated and educated in relation to their diabetes care. Evidence of satisfactory diabetes control should be available for each medical. It is unlikely that an individual with diabetes would be fit for saturation diving.

131 Evidence of poor control with hypoglycaemic or hyperglycaemic episodes is likely to lead to disqualification. The presence or development of diabetic complications such as atherosclerosis, cardiomyopathy, retinopathy, peripheral vascular disease, diabetic foot syndrome, nephropathy or neuropathy, will disqualify.

### Thyroid disease

132 Gross thyroid disease is a contraindication to diving. Individuals with stable thyroid disease (such as treated thyrotoxicosis or hypothyroidism) may be fit to dive provided they have no cardiovascular complications of the disorder. On replacement therapy, stable hypothyroidism can be compatible with professional diving even when one or two doses of thyroxine are missed.

### Other disorders

133 Use of cortisol replacement for whatever reason is a contraindication to diving because of the risk of collapse associated with illness, injury or stress.

134 Divers with any other endocrine disorder or those receiving systemic steroid therapy should be referred to an endocrinologist and the results discussed with a diving medical specialist for detailed individual assessment.

## Gastrointestinal system

135 You should examine the abdomen. Gastrointestinal function should be normal with no increased tendency to vomiting, dyspepsia, uncontrolled reflux, bleeding, perforation, diarrhoea or pain. Reflux that is well controlled with proton pump inhibitors may be acceptable. There should be no evidence of liver disease.

136 Active inflammatory bowel disease, gall bladder pathology and pancreatitis are contraindications to diving. Quiescent disease would require an opinion from a diving medical specialist. The presence of an abdominal wall hernia should be considered on an individual basis in relation to the type of diving. Undiagnosed dyspepsia requires investigation. Gastrointestinal surgery which results in the potential for gas trapping, requires an opinion from the surgeon and, if necessary, a diving medical specialist.

137 A history of peptic ulceration requires careful assessment. Active peptic ulcer disease is a contraindication to diving. If an individual has peptic ulceration that is kept under review and is quiescent with medication, they may be fit to dive.

138 The presence of a stoma is likely to be compatible with limited types of diving activity. Advice from the individual's surgeon may be needed and, if necessary, a diving medical specialist.

# Genitourinary system

139 At each medical, you should obtain dipstick urinalysis for blood, protein and glucose. Abnormal results require investigation.

140 A history of renal disease or urinary tract investigation requires more detailed assessment. The presence of genitourinary or renal tract disease associated with abnormal renal function is usually a cause for disqualification. Cases of renal calculi and colic should be assessed on an individual basis after specialist investigation.

141 If the history suggests prostatic disease, it should be carefully evaluated. The occurrence of acute retention would be a particular problem for saturation divers.

## Skin

142 The skin barrier should be functionally intact and without increased susceptibility to infection.

143 Any condition that may affect thermal control is a contraindication to diving. Prolonged periods in water and exposure to high humidity, especially in saturation environments, increase the risk of skin infection and can exacerbate many pre-existing dermatoses. Severe exfoliative disorders are a contraindication as are untreated infections.

# Haematology

144 There is no requirement for a full blood count or sickle cell test at initial or annual medicals, unless clinically indicated.

145 Sickle cell anaemia and thalassaemia major are contraindications to diving. Carriers of sickle cell trait may be fit to dive. You should consult a diving medical specialist.

## Appendix 1 Medical questionnaire for diving at work

You should complete the medical questionnaire below, sign the declaration and ask your GP to countersign it to confirm your medical history. Your GP may charge a fee for this, but they do not need to examine you. This document is essential for working as a professional diver. Further information on medical examinations and fitness standards for working divers is available on HSE's website ([www.hse.gov.uk/diving/index.htm](http://www.hse.gov.uk/diving/index.htm)).

Question	Yes	No
Have you ever had any diving related condition, eg barotrauma, decompression illness, immersion pulmonary oedema?		
Are you pregnant or likely to be pregnant?		
Are you taking any medication (prescribed or otherwise)?		
Do you have any allergies?		
Do you have a family history of sudden cardiac death and/or abnormalities of heart rhythm?		
Have you ever had, or do you now have the following?		
COVID-19		
Cancer		
Lung disease, eg COPD, asthma		
Collapsed lung (pneumothorax)		
Injury or surgery to the chest, lungs or heart		



Question	Yes	No
Disease of the heart and circulation, eg high blood pressure, angina, heart attack, chest pains, palpitations		
Disease of the brain or nervous system, eg epilepsy, stroke, multiple sclerosis, nerve damage		
Blackouts, recurrent fainting, collapsing or dizziness		
Motion sickness		
Migraine		
Head injury with loss of consciousness, or surgery to the skull or brain		
Mental health problems (including panic attacks and claustrophobia)		
Drug and/or alcohol misuse		
Bone or joint problems or surgery, eg sciatica, spinal surgery		
Ear, nose, throat or sinus problems		
Eye problems, eg loss of vision, double vision		
Diabetes or other hormone problems		
Stomach or intestinal problems or surgery (including stomas)		
Urinary, kidney or prostate problems		
Skin disease		
Blood or bleeding disorders		
Any other medical condition(s) not covered above		

**Additional details (if you answered 'Yes' to any question)**

**Declaration**

Under Section 33(1)(k) of the Health and Safety at Work etc. Act 1974, it is an offence to knowingly or recklessly make a false statement for the purpose of obtaining a document, which includes a certificate of medical fitness to dive issued by an Approved Medical Examiner of Divers (AMED). You should check that your answers are accurate and complete.

**Candidate diver** – I certify that the above answers are accurate and complete

Signature..... Date.....

Name..... Date of birth.....

Address.....  
.....

**GP** – I confirm the medical history

Signature..... Date.....

Name..... GMC number.....

Practice stamp

## Appendix 2 Summary of routine investigations to perform at initial and annual medical examinations

Investigation	Initial examination	Annual examination
BMI	Yes	Yes
Waist circumference	Yes	Yes
Exercise test	Yes	Yes
Spirometry	Yes	Yes
Post-exercise PEF or FEV <sub>1</sub>	Yes	Yes
Chest radiography	If clinically indicated	If clinically indicated
Resting ECG	If clinically indicated	If clinically indicated
Resting blood pressure	Yes	Yes
Audiometry	Yes	If clinically indicated
Urinalysis	Yes	Yes
Full blood count	If clinically indicated	If clinically indicated
Sickle cell test	If clinically indicated	N/A

## Appendix 3 Diver's Medical Record

This form is for use alongside MA1 and for retention with MA2 and any additional clinical notes.

### Diver details

Name  Date of birth

Address

### AMED details

Name  HSE PIN number

Address

### Date of examination and AMED's signature

	Date of examination	Signature
Year 1		
Year 2		
Year 3		
Year 4		
Year 5		

**Diving history**

**Medical history**

**Medication**

**Allergies**

### General medical considerations

	Year 1	Year 2	Year 3	Year 4	Year 5
Smoking status					
Alcohol consumption					
Height (m)					
Weight (kg)					
BMI (kg/m <sup>2</sup> )					
Waist circumference (cm)					
Risk assessment for exercise testing satisfactory					
VO <sub>2</sub> max (ml/kg/min)					

### Respiratory system

	Year 1	Year 2	Year 3	Year 4	Year 5
Air entry					
Percussion note					
Added sounds					
FEV <sub>1</sub>					
FVC					
FEV <sub>1</sub> /FVC ratio					
PEF					
PEF or FEV <sub>1</sub> 5 min post exercise					
PEF or FEV <sub>1</sub> 10 min post exercise					
PEF or FEV <sub>1</sub> 15 min post exercise					

## Cardiovascular system

	Year 1	Year 2	Year 3	Year 4	Year 5
Pulse					
BP (mmHg)					
ECG (as required)					
Heart sounds					
Murmur(s)					
Peripheral pulses and circulation					
Varicose veins					

## Nervous system

### *Cranial nerves*

	Year 1	Year 2	Year 3	Year 4	Year 5
II-XII					

### *Peripheral nerves*

	Year 1	Year 2	Year 3	Year 4	Year 5
Tone					
Power					

### *Reflexes*

	Year 1	Year 2	Year 3	Year 4	Year 5
Biceps					
Triceps					
Supinator					
Knee					
Ankle					
Plantar					

**Sensation**

	Year 1	Year 2	Year 3	Year 4	Year 5
Light touch					
Pinprick					
Temperature					
Two-point discrimination					
Proprioception					
Vibration					

**Other findings**

	Year 1	Year 2	Year 3	Year 4	Year 5
Appearance					
Posture					
Gait					
Balance					
Coordination					
Involuntary movements					
Speech					

**Mental health**

	Year 1	Year 2	Year 3	Year 4	Year 5
Mental state assessment					

**Musculoskeletal system**

	Year 1	Year 2	Year 3	Year 4	Year 5
Spine					
Upper limbs					
Lower limbs					



## ENT

	Year 1		Year 2		Year 3		Year 4		Year 5	
	R	L	R	L	R	L	R	L	R	L
Audiometry (as required)										
External meatus										
Tympanic membranes										
Eustachian tube function										
Nasal airways										

## Vision

	Year 1		Year 2		Year 3		Year 4		Year 5	
	R	L	R	L	R	L	R	L	R	L
Distance vision										
Near vision										
Visual fields										
Fundi (as required)										
Colour vision (as required)										

## Dental health

	Year 1	Year 2	Year 3	Year 4	Year 5
Regular dental assessments					

## Endocrine system

	Year 1	Year 2	Year 3	Year 4	Year 5
Evidence of endocrine disease					

## Abdomen

	Year 1	Year 2	Year 3	Year 4	Year 5
Masses/organomegaly					
Evidence of herniae					

### Urinalysis

	Year 1	Year 2	Year 3	Year 4	Year 5
Blood					
Protein					
Glucose					

### Skin

	Year 1	Year 2	Year 3	Year 4	Year 5
Functionally intact					

### Haematology

	Year 1	Year 2	Year 3	Year 4	Year 5
Haemoglobin (g/l) (as required)					

### Overall assessment of fitness to dive

	Year 1	Year 2	Year 3	Year 4	Year 5
Fit/unfit					
Restrictions					

### Abnormalities/additional findings

--

## Appendix 4 Cardiac screening tool

Question	Yes	No
Is there a family history of sudden cardiac death and/or abnormalities of heart rhythm?		
If undertaken, is the resting ECG normal?		
If the ECG is abnormal, has it been investigated?		
Is there a history or evidence of the following?		
Hypertension		
<ul style="list-style-type: none"> <li>• BP <math>\geq</math> 160/100 mmHg</li> </ul>		
<ul style="list-style-type: none"> <li>• Target organ damage</li> </ul>		
Coronary artery disease		
<ul style="list-style-type: none"> <li>• Angina</li> </ul>		
<ul style="list-style-type: none"> <li>• CABG</li> </ul>		
<ul style="list-style-type: none"> <li>• Coronary angioplasty</li> </ul>		
Cardiac arrhythmia		
<ul style="list-style-type: none"> <li>• Implanted pacemaker</li> </ul>		
<ul style="list-style-type: none"> <li>• Implanted cardiac defibrillator</li> </ul>		
Peripheral vascular disease		
<ul style="list-style-type: none"> <li>• Intermittent claudication</li> </ul>		

Question	Yes	No
• Aortic aneurysm		
Cardiomyopathy		
Heart failure		
Any other heart disease		

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## Further information

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