Ministry of Defence

Defence Standard 68-284 Part 03

Issue 1 **Date:** **28 October 2020**

Breathing Gases for Non-Medicinal Life-Support Applications

Part: 03 : Compressed Natural Breathing Air

Section 1

Foreword

Defence Standard Structure

Section 1 (Generated by the StanMIS toolset)

- Revision Note
- Historical Record
- Warning
- Standard Clauses

Section 2 (Technical information provided by Subject Matter Expert)

- Title
- Introduction (optional)
- Table of Contents
- Scope
- Technical Information to include Tables and Figures
- Annexes (as required)

Section 3 (Generated by StanMIS toolset)

- Normative References
- Definitions
- Abbreviation

REVISION NOTE

A long overdue revision to keep the Def Stan aligned with applicable civil / military standards to keep it up-to-date and relevant. Defence Standard 68-284 has been re-issued in 4 new Parts.

HISTORICAL RECORD

This standard supersedes the following:

Def Stan 68-284 Issue 3 Dated 03 April 2009;

Def Stan 68-284 Issue 2 Dated 8 November 2002;

Def Stan 68-284 Issue 1 Dated 12 October 2001;

Def Stan 68-75 Issue 3 Dated 30 June 1995;

Def Stan 68-75 Issue 2 Dated 23 April 1993;

Def Stan 16-8 Issue 4 Dated 19 February 1993;

Def Stan 16-1 Issue 3 Dated 16 October 1992;

Def Stan 68-75 Issue 1 Dated 31 March 1983;

Def Stan 16-8 Issue 3 Dated 31 May 1977;

Def Stan 16-1 Issue 2 Dated 18 July1972;

Def Stan 16-8 Issue 2 Dated 10 February 1972;

WARNING

The Ministry of Defence (MOD), like its contractors, is subject to both United Kingdom and European laws regarding Health and Safety at Work. Many Defence Standards set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work.

STANDARD CLAUSES

a) This standard has been published on behalf of the Ministry of Defence (MOD) by UK Defence Standardization (DStan).

b) This standard has been reached following broad consensus amongst the authorities 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. If any difficulty arises which prevents application of the Defence Standard, DStan shall be informed so that a remedy may be sought.

c) Please address any enquiries regarding the use of this standard in relation to an invitation to tender or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the invitation to tender or contract.

d) Compliance with this Defence Standard shall not in itself relieve any person from any legal obligations imposed upon them.

e) This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.

Section 2

Breathing Gases for Non-Medicinal Life-Support Applications
Part 03: Compressed Natural Breathing Air

Introduction

The Defence Standard (Def Stan) aims to provide a unified gas standard to encompass non-medicinal breathing gases procured or in-situ produced for use in Ministry of Defence (MOD) aircraft, diving and marine life-support applications. It provides specifications for, including purity requirements and contaminant limits, breathing gases procured or in-situ produced for aircraft, diving and marine non-medicinal life-support applications. It includes compressed natural breathing air (CNBA), oxygen / helium mixtures (Heliox), oxygen / nitrogen mixtures (Nitrox), oxygen / nitrogen / helium mixtures (Trimix), molecular sieve oxygen concentrating system (MSOCS) product gas, and breathing oxygen (in liquid and gaseous forms), for use by the MOD.

It is arranged in four parts as follows:

- Part 01: Supply Requirements
- Part 02: Breathing Oxygen
- Part 03: Compressed Natural Breathing Air
- Part 04: Breathing Gas Mixtures

The technical authority of this Def Stan is the Defence Strategic Fuels Authority, MOD Abbey Wood, Bristol BS34 8JH, United Kingdom. The Def Stan is produced on behalf of the MOD operating communities.

Scope

This part of the Def Stan specifies the requirements for non-medicinal compressed natural breathing air (CNBA) procured or in-situ produced for life-support applications and provides reference methods of test. It includes CNBA for aircraft applications, and marine /diving fire-fighting and emergency escape applications on board HM ships and submarines.

- Pure air, procured or in-situ produced specifically for specialised cooling applications (ie detector cooling), is excluded as this is not a breathing gas and its requirements are specified in Def Stan 58-96.
- Medicinal CNBA is excluded as it is covered by the European Pharmacopoeia monograph, however, where CNBA is to be used for therapeutic purposes at pressure, ie during recompression treatments and hyperbaric therapy, it should comply with the requirements of this part of the Def Stan.
- Reference methods of test are provided to give guidance on testing. They are not prescriptive, and alternative methods (AMs), which have been demonstrated in specific cases to DSFA's satisfaction to produce results adequate for the measurand, are acceptable.

List of Contents

Section 2 2-1

Introduction 2-1

Scope 2-1

Technical Content 2-3

1. Compressed Natural Breathing Air 2-3

1.1. Requirements 2-3

1.2. Production Method 2-3

1.3. Supply 2-3

1.4. Label 2-3

1.5. Quality Assurance – Procured 2-3

1.6. Quality Assurance – In-Situ Produced 2-3

1.7. Pre-Use Testing 2-3

Table 1 Purity requirements for compressed natural breathing air (CNBA) 2-4

Table 2 Moisture requirements for compressed natural breathing air (CNBA) 2-6

Table 3 Particulate matter requirements for compressed natural breathing air (CNBA) 2-8

Table 4 Sampling points for compressed natural breathing air (CNBA) 2-9

Technical Content

1. Compressed Natural Breathing Air

1.1. Requirements

1.1.1. Purity & Moisture. Requirements for compressed natural breathing air (CNBA) procured or produced in-situ by CNBA production systems are aligned with requirements specified in BS EN 12021, CSA Z180.1-13, CGA G-7.1 Grade E, NATO STANAG 1458 and NATO STANAG 3610, and shall comply with the requirements of Table 1 in respect of purity and Table 2 in respect of moisture.

1.1.2. Particulate Matter – In-Situ Produced. In-situ produced CNBA shall either comply with the particulate requirements in Table 3, or have particulate filtering at use by passing the CNBA through an absolute micron rating (AMR) filter of 5µm as close as possible to the point of delivery. The filtering option provides a backstop to legacy systems. New systems shall comply with the particulate requirements in Table 3.

1.2. Production Method

The standard method of production of CNBA should be by dynamic / displacement compression of air using air compressors.

1.3. Supply

Cylinders and manifolded cylinder packs (MCPs) for CNBA shall be supplied to the MOD in accordance with Part 01 of the Def Stan.

1.4. Label

1.4.1. Standard. Cylinders and MCPs are to be marked as conforming to the Def Stan shall have the marking “Def Stan 68-284 CNBA” suitably annotated on the cylinder shoulders for cylinders and on the frames for MCPs.

1.4.2. NATO Code Number & Product Description. If the CNBA is for aircraft use, cylinders and MCPs are to be marked in accordance with NATO STANAG 7146 shall have the marking “AIR-2012, Air, Compressed” suitably annotated on the cylinder shoulders for cylinders and on the frames for MCPs.

1.5. Quality Assurance – Procured

1.5.1. Certification. Suppliers shall provide a Certificate of Conformity (CoC) to the requirements with each delivery of CNBA.

1.5.2. Receipt. If the CNBA being delivered does not have a valid CoC, or any damage to the cylinders and MCPs is evident, the whole delivery shall be rejected.

1.6. Quality Assurance – In-Situ Produced

1.6.1. Requirements. Air produced in-situ by CNBA production systems is subject to quality assurance requirements laid out in JSP 319 Pt 2 Vol 1.

1.6.2. Sampling Points. Tests should be conducted on air sampled from or as close to the final point of delivery as possible that aligns with the prescriptions in Table 4.

1.7. Pre-Use Testing

Users shall carry out odour and moisture tests on a representative selection of CNBA cylinders and MCPs before they are put into service. Cylinders and MCPs that fail to meet the odour requirement specified in Table 1, or the moisture requirement specified in Table 2, shall be declared unserviceable and returned in accordance with Defence Logistic Framework (DLF). Refer to JSP 319 Pt 2 Vol 1 for details.

Table 1 Purity requirements for compressed natural breathing air (CNBA).

Contaminant / Constituent / Property	Limit	Test Method	Note
Odour	Free from unacceptable odour	BS EN 12021 NA.5	1a, & 2
Oxygen (O_2)	21±1%(v)	BS EN 12021 NA.11	1g
Carbon Dioxide (CO_2)	500 ppm(v) max	BS EN 12021 NA.7 or NA.8	1b
Carbon Monoxide (CO)	5 ppm(v) max		3
Oil	0.5 mg/m^3 max	BS EN 12021 NA.15	1c, & 4
Total volatile non-substituted hydrocarbons (vapour or gas) as Methane (CH_4) equivalent	30 ppm(v) max	BS EN 12021 NA.7 or NA.8	1d
Chlorofluorocarbons and halogenated hydrocarbons	2 ppm(v) max	BS EN 12021 NA.7 or NA.9	1e
Total non-toxic gases (exclude Nitrogen (N_2))	1 %(v) max	BS EN 12021 NA.10	1f, 5
Other toxic / irritating substance (each substance)	TBA	BS EN 12021 NA.7	6, 7, 8, 9 & 10

Note:

1. No change from Def Stan 68-284 Issue 3.
   a. The limit is the same as that specified in BS EN 12021, CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 1458. This is not specified in NATO STANAG 3610.
   b. The limit is the same as that specified in BS EN 12021, CSA Z180.1-13, NATO STANAG 1458 and NATO STANAG 3610, and is more restrictive that that specified in CGA G-7.1 Grade E.
   c. The limit is the same as that specified in BS EN 12021 and NATO STANAG 1458, and is more restrictive that that specified in CSA Z180.1-13 and CGA G-7.1 Grade E. This is not specified in NATO STANAG 3610. The limit specified in CSA Z180.1-13 and CGA G-7.1 Grade E include particulates as well.
   d. The limit is not specified in BS EN 12021 and NATO STANAG 1458, and is less restrictive than that specified in CSA Z180.1-13 and CGA G-7.1 Grade E. This is not specified in NATO STANAG 3610.
   e. The limit is the same as that specified in NATO STANAG 1458. It is not specified in BS EN 12021 and CGA G-7.1 Grade E, and is more restrictive that that specified in CSA Z180.1-13. This is not specified in NATO STANAG 3610.
   f. The limit is not specified in BS EN 12021, CSA Z180.1-13, CGA G-7.1 Grade E, NATO STANAG 1458 and NATO STANAG 3610.
   g. The limit is the same as that specified in BS EN 12021, CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 1458, and is more restrictive than that specified in NATO STANAG 3610.
2. Free from unacceptable odour that may have an adverse effect on the user or breathing apparatus.
3. Adopted a less restrictive limit specified in BS EN 12021 and CSA Z180.1-13 after considering the potential detrimental effects on health and concluded that the risk is minimum. Nevertheless, this is more restrictive than that specified in CGA G-7.1 Grade E, NATO STANAG 1458 and NATO STANAG 3610.
4. Oil may be present due to previous contamination, use of oil lubricated compressor or by compressing an air source with oil vapour present.
5. These gases include Argon (Ar), Helium (He) and all other noble gases.
6. Where substances other than those listed are found, the substances shall be identified and reported to the applicable authority for determination of maximum limits and appropriate test methods based on the sensitivity and specificity of the methods.

7. The limit shall not be greater than one tenth (1/10) of the 8-hour time-weighted average (TWA) Workplace Exposure Limit (WEL) given in the Health & Safety Executive (HSE) publication, Workplace Exposure Limits (EH40).
8. Where the gaseous trace contaminants are detected by FTIR analysis but cannot fully identified, they shall be quantified using gas chromatography - mass spectrometry (GC-MS) or other alternative methods (AMs). This approach is the same as that given in Def Stan 68-284 Issue 3 A.6 Method for the Determination of Other Trace Contaminants.
9. Hydrogen Sulphide (H_2S) limit is given as 0.5ppm(v) in NATO STANAG 3610, and is the same as the 1/10 of the 8-hour TWA WEL for the same given in the HSE publication, Workplace Exposure Limits (EH40).
10. Ammonia (NH_3) limit is given as 20ppm(v) in NATO STANAG 3610, and is much less restrictive than the 1/10 of the 8-hour TWA WEL for the same given in the HSE publication, Workplace Exposure Limits (EH40). The more restrictive limit shall be applied.

Table 2 Moisture requirements for compressed natural breathing air (CNBA).

End Usage	Supply Pressure (p)	Dew Point Limit	Test Method	Note
Compressed air supplied to compression chambers measured at or close to, the point of connection to the chamber	Any	-49°C max	BS ISO 8573-3 Table 2, 4 or 6	6
Air supplied in cylinders for diving and marine life-support	40 < p ≤ 200 bar	-46°C max		1a
	p > 200 bar	-49°C max		1d
Compressed air production systems for cylinder filling for cylinders with standard cylinder revalidation interval (including systems for filling portable cylinders)	200 < p ≤ 300 bar	-52°C max		1b, 2, & 3
Ship HP air production systems with purification for cylinder filling for fixed cylinders with standard cylinder revalidation interval	p ≤ 300 bar	-55°C max		1b
	300 < p ≤ 350 bar	-57°C max		4
Ship HP air production systems with purification for cylinder filling for fixed cylinders with extended cylinder revalidation interval	p ≤ 310 bar	-65°C max		5
Air supplied in cylinders for aircraft use	Any	-61°C max		1c

Note:

1. No change from Def Stan 68-284 Issue 3.
   a. The limit is the same as that specified in BS EN 12021, and is less restrictive than that specified in CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 1458 for certain pressure ranges.
   b. The limit is more restrictive than that specified in BS EN 12021, CSA Z180.1-13, CGA G-7.1 Grade E, and NATO STANAG 1458.
   c. This is not specified in NATO STANAG 3610.
   d. The limit is the same as that specified in BS EN 12021 and NATO STANAG 1458, and is less restrictive than that specified in CSA Z180.1-13 and CGA G-7.1 Grade E for certain pressure ranges.
2. The systems are suitable for refilling cylinders for diving and marine life-support since the dew point is lower than that for air supplied in cylinders for the applications.
3. The systems are not suitable for refilling cylinders for aircraft use since the dew point is higher than that for air supplied in cylinders for the applications.
4. This is a new requirement. This recognises the trend towards increasing system pressures and achieves the same pressure dewpoint as the existing limit.
5. This is a new requirement. This recognises the need for extended cylinder revalidation interval and achieves the same safety requirement as the existing limit. Extended cylinder revalidation interval applies exclusively to fixed cylinders designed for this regime which form part of a ship's system.
6. This limit is unchanged from Def Stan 68-284 Issue 3 for supply pressure above 200 bar. It is the same as that specified in BS EN 12021 and NATO STANAG 1458, and is less restrictive than that specified in CSA Z180.1-13 and CGA G-7.1 Grade E. However, for supply pressure below 200 bar, the limit is simplified though more restrictive than that specified in Def Stan 68-284 Issue 3 and BS EN

12021. Nevertheless, it is less restrictive than that specified in CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 1458.

Table 3 Particulate matter requirements for compressed natural breathing air (CNBA).

Particle Size	Limit	Test Method	Note
1 – 3µm	60,000 particles/m^3 max	BS ISO 8573-4	1, 2, 5, & 6
3 – 10µm	10,000 particles/m^3 max		1, 3, 5, & 6
over 10µm	0 particles/m^3 max		4, 5, & 6

Note:

1. Inherited the more restrictive limit specified in Def Stan 68-284 Issue 3 Clause 7.2.4.b.
2. The limit 0.6 particles/cm^3 (or 600,000 particles/m^3) specified in Def Stan 68-284 Issue 3 Clause 7.2.4.b is believed to be a typo error. This is corrected to 0.06 particles/cm^3 (or 60,000 particles/m^3) aligning it to the same order of magnitude as that specified in Def Stan 68-284 Issue 3 Clause 7.2.4.a.
3. The limit 0.1 particles/cm^3 (or 100,000 particles/m^3) specified in Def Stan 68-284 Issue 3 Clause 7.2.4.b is believed to be a typo error. This is corrected to 0.01 particles/cm^3 (or 10,000 particles/m^3) aligning it to the same order of magnitude as that specified in Def Stan 68-284 Issue 3 Clause 7.2.4.a.
4. Inherited the more restrictive limit specified in Def Stan 68-284 Issue 3 Clause 7.2.4.a.
5. Particulate matter requirements are expressed in term of mass per volume in CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 3610. The limits are 1mg/m^3, 5mg/m^3 and 5mg/m^3, respectively. No requirement is specified in BS EN 12021. The limits for CSA Z180.1-13 and CGA G-7.1 Grade E include oil as well.
6. Consider the worst scenario, ie 60,000 particles/m^3 of 3µm particles and 10,000 particles/m^3 of 10µm particles, and assume they are all steel particles with density of 8.05g/cm^3. The total particle mass is then calculated to be 0.049mg/m^3. This confirms the particulate matter requirements specified here are more restrictive than that specified in CSA Z180.1-13, CGA G-7.1 Grade E and NATO STANAG 3610.

Table 4 Sampling points for compressed natural breathing air (CNBA).

End Usage	Sampling Point	Note
Air supplied in cylinders	Samples taken from or tested at cylinder	–
Compressed air systems for compression chambers	Samples taken from or tested at point of use, or entry to compression chamber air system	–
Compressed air production systems for cylinder filling	Samples taken from or tested at cylinder charging point	–
Ship HP air production systems with purification for cylinder filling	Samples taken from or tested at cylinder charging point	–
Shoreside compressed air production systems with purification used for charging ships' compressed air systems while alongside	Samples taken from or tested at the point where the hose to the ship is connected to the shoreside system	–
Note: –		

Section 3

Normative References

1 The publications shown below are referred to in the text of this standard. Publications are grouped and listed in alpha-numeric order.

Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting **<http://dstan.uwh.diif.r.mil.uk/>** for those with RLI access or **<https://www.dstan.mod.uk>** for all other users. All referenced standards were correct at the time of publication of this standard (see 2, 3 & 4 below for further guidance), if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

Def Stans

Number	Title
01-005, Iss 18	Fuels, Lubricants and Associated Products
58-096, Iss 04	Pure gases for weapons systems and detector cooling applications
68-284, Pt 01, Iss 01	Breathing Gases for Non-Medicinal Life-Support Applications - Supply Requirements

STANAGs

Number	Title
1458 Edition 2	DIVING GAS QUALITY - ADivP-04 EDITION A
3610 Edition 4	CHARACTERISTICS OF CONDITIONED BREATHABLE AIR SUPPLIED TO AIRCRAFT ON THE GROUND - AAGSP-3 EDITION A
7146 Edition 4	ASSIGNMENT OF NATO CODE NUMBERS TO GASES USED IN AIRCRAFT CROSS-SERVICING - AAGSP-10 EDITION A

Allied Publications

Number	Title
AAGSP-03 Edition A Version 1	CHARACTERISTICS OF CONDITIONED BREATHABLE AIR SUPPLIED TO AIRCRAFT ON THE GROUND
AAGSP-10 Edition A Version 1	ASSIGNMENT OF NATO CODE NUMBERS TO GASES USED IN AIRCRAFT CROSS-SERVICING
ADivP-04 Edition A Version 1	DIVING GAS QUALITY

Other References

Standard Type	Standard Name
BS / BS EN / BS ISO Standards	BS EN 12021, Respiratory Equipment – Compressed Gases for Breathing Apparatus
BS / BS EN / BS ISO Standards	BS ISO 8573-3, Compressed Air – Part 3: Test Methods for Measurement of Humidity
BS / BS EN / BS ISO Standards	BS ISO 8573-4, Compressed Air – Part 4 Test Methods for Solid Particle Content
Other Civilian/Industry Standards	CGA G-7.1, Commodity Specification for Air
Other Civilian/Industry Standards	CSA Z180.1-13, Compressed Breathing Air & Systems
Other Civilian/Industry Standards	HSE EH40, Health & Safety Executive, Workplace Exposure Limits – Containing the List of Workplace Exposure Limits for Use with the Control of Substances Hazardous to Health Regulations (as amended)
Other Civilian/Industry Standards	JSP 319, Ministry of Defence, Joint Service Safety Regulations for the Storage & Handling of Gases

2 Reference in this Standard to any normative references means in any Invitation to Tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care should be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions shall always apply due to safety and regulatory requirements.

3 In consideration of clause 2 above, users shall be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an Invitation to Tender or contract. Correct identification of standards is as defined in the ITT or contract.

4 DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.

Definitions

For the purpose of this standard, ISO/IEC Guide 2 ‘Standardization and Related Activities – General Vocabulary’ and the definitions shown below apply.

Definition	Description
Absolute Micron Rating	It expresses the ability of the filter to remove at least 98.7% of a specific size particle. For instance, an absolute rating of 10µm simply means that filter captures at least 98.7% of contaminants 10µm in size.
Alternative Method	Measurement method which is not a reference method but has been demonstrated in specific cases to applicable authority’s satisfaction to produce results adequate for the measurand.
Compressed Natural Breathing Air	Compressed air that meets breathing air quality criteria, and the air is taken directly from the atmosphere without additional gaseous additives however some filtering / processing may be necessary.
Contaminant	Refer to impurity.
Could	The verb describes an activity that is a good practice but recognises that there are other methods available to the practitioner that provide an equally satisfactory good outcome.
Dew Point	Defined as the temperature at which dew or condensation, forms on cooling a gas. It is a measurement taken at normal atmospheric pressure (1,013mbar absolute, 20°C). NOTE: For temperatures below 0°C, the term Frost Point should strictly be used, but the term Dew Point is often used to include Frost Points (as does this Def Stan).
Heliox	Diving gas mixture, comprising a specified mixture of oxygen and helium, capable of supporting life under defined diving or hyperbaric conditions.
Impurity	Any constituent other than the main constituents.
In-Situ Produced	Commodity / product produced at MOD facility.
Must	The verb describes an activity that is mandatory, and descends directly from national legislation.
Nitrox	Diving gas mixture, comprising a specified mixture of oxygen and nitrogen, capable of supporting human life under defined diving or hyperbaric conditions. NOTE: Compressed breathing air made from a mixture of liquefied gases may be considered as Nitrox if it conforms to the Nitrox requirements.
Normal Atmospheric Pressure	1,013mbar absolute, 20°C.

Oil	Defined as a mixture of hydrocarbons and other organic compounds composed of six or more carbon atoms (C6+). NOTE 1: It may exist as oil aerosol (ie liquid oil suspended in a gaseous medium), oil liquid and as oil vapour. NOTE 2: Oil may arise from the use of an oil-lubricated compressor. NOTE 3: This definition mirrors that defined in BS EN 12021 and encompasses all types of oils. It includes synthetic oils based on silicone fluids, phosphate ester fluids, mineral oils and etc (refer to Def Stan 01-005).
Procured	Commodity / product from manufacturer or value-added re-seller.
Purity	Concentrations of the main constituents, ie concentrations of nitrogen, oxygen and argon in a sample of fresh air.
Reference Method	Measurement method taken as a reference by convention, which gives the accepted reference value of the measurand.
Shall	The verb describes an activity that is mandatory, but stems from defence regulations in the absence of national legislation.
Should	The verb describes an activity that is the best practice. If the activity is followed, then this will be considered sufficient to demonstrate compliance with a regulation. However, alternative approaches may be utilised where this produces an outcome as good as required by the Regulation.
Trimix	Diving gas mixture, comprising a specified mixture of oxygen, helium and nitrogen, capable of supporting human life under diving or hyperbaric conditions.

Abbreviations

Abbreviation	Description
%(v)	Percent by volume (dry gas) at normal atmospheric pressure (1,013mbar absolute, 20°C)
µm	Micrometre
AM	Alternative Method
AMR	Absolute Micron Rating
BS EN	British Standard European
BS ISO	British Standard International Standard Organisation
CFC	Chlorofluorocarbon
CGA	Compressed Gas Association
CNBA	Compressed Natural Breathing Air
CoC	Certificate of Conformity
Def Stan	Defence Standard
DLF	Defence Logistics Framework
DSFA	Defence Strategic Fuels Authority
DStan	UK Defence Standardization
EH	A numbered series of HSE publications: Guidance Notes, Environmental Hygiene
FTIR	Fourier Transform Infrared
GC-MS	Gas Chromatography – Mass Spectrometry
HCFC	Hydrochlorofluorocarbon
Heliox	Helium and oxygen gas mixture (Refer to Definitions for details)
HM	Her Majesty's
HP	High Pressure
HSE	Health and Safety Executive
JSP	Joint Services Publication
MCP	Manifolded cylinder pack

MOD	Ministry of Defence
MSOCS	Molecular Sieve Oxygen Concentrating System
NATO	North Atlantic Treaty Organisation
Nitrox	Nitrogen and oxygen gas mixture (Refer to Definitions for details)
ppm(v)	Parts per million by volume (dry gas) at normal atmospheric pressure (1,013mbar absolute, 20°C)
STANAG	Standardization Agreement
TBA	To Be Advised
Trimix	Oxygen, helium and nitrogen gas mixture (Refer to Definitions for details)
TWA	Time-Weighted Average
WEL	Workplace Exposure Limit

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File Reference

The DStan file reference relating to work on this standard is 68/284/3.

Contract Requirements

When Defence Standards are incorporated into contracts, users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

Revision of Defence Standards

Defence Standards are revised as necessary by an up-issue or amendment. It is important that users of Defence Standards ensure that they are in possession of the latest issue or amendment. Information on all Defence Standards can be found on the DStan Websites https://www.dstan.mod.uk and http://dstan.uwh.diif.r.mil.uk/, updated weekly. Any person who, when making use of a Defence Standard, encounters an inaccuracy or ambiguity is encouraged to notify UK Defence Standardization (DStan) without delay in order that the matter may be investigated and appropriate action taken.