STANDARDS RELATED DOCUMENT

ADivP-01.1

ALLIED GUIDE TO DIVING OPERATIONS - NATIONAL INFORMATION

Edition A Version 3

January 2020

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED DIVING PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

17 February 2020

1. The enclosed Standards Related Document, ADivP-01.1, Edition A, Version 3, ALLIED GUIDE TO DIVING OPERATIONS - NATIONAL INFORMATION, which has been approved in conjunction with ADivP-01 by the nations in the MILITARY COMMITTEE MARITIME STANDARDIZATION BOARD (MCMSB), is promulgated herewith.

2. ADivP-01.1, Edition A, Version 3 is effective upon receipt and supersedes ADivP-01.1, Edition A, Version 2, which shall be destroyed in accordance with the local procedure for the destruction of documents.

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4. This publication shall be handled in accordance with C-M(2002)60.

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

NATO Nations

Each Nation may replace this page with its own National Letter of Promulgation

RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATIONS BY NATIONS

Note. *The reservations listed on this page include only those that were recorded at the time of promulgation and may not be complete. Refer to the NATO Standardisation Document Database for the complete list of existing reservations*

RECORD OF SPECIFIC RESERVATIONS

NATION	SPECIFIC RESERVATIONS

Note. *The reservations listed on this page include only those that were recorded at the time of promulgation and may not be complete. Refer to the NATO Standardisation Document Database for the complete list of existing reservations*

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REFERENCES

1. NATO STANDARDISATION COVERING DOCUMENTS

STANAG 1372 – Allied Guide to Diving Operations

2. RELATED DOCUMENTS

a. ADivP-02 – Allied Guide to Diving Medical Disorders

b. ADivP-03 – Standard to Quantify the Characteristics of Granular Carbon Dioxide (CO_2) Absorbent Material for Diving and Hyperbaric Applications

c. ADivP-04 - Diving Gas Quality

d. ADivP-05 - Standard Unmanned Test Procedures and Acceptance Criteria for Underwater Breathing Apparatus

e. ADivP-06 – Diving Systems – Oxygen Cleaning Procedures and Standards

f. ADivP-07 – Minimum Competency and Currency for NATO Divers

g. AAP-06 - NATO Glossary of Terms and Definitions

h. AJP-03.12 - Allied Joint Doctrine for Military Engineering

i. ALP-1 Procedures for Logistic Support Between NATO Navies

ji. ALP 1.1 Catalogue of Naval Port Information

k. AMP-03 Vol I - NATO Mine Countermeasures Vehicles and Equipment

l. APP-11- NATO Message Catalogue

m. ATP-06 Vol I - Naval Mine Warfare Principles

n. ATP-06 Vol II - Naval Mine Countermeasures Operations Planning and Evaluation

o. ATP-08 Vol I Doctrine for Amphibious Operations

p. ATP-08 Vol II Tactics, Techniques and Procedures for Amphibious Operations

q. ATP-10 - Search and Rescue

r. ATP-24 Vol I - Naval Mine Countermeasures - Tactics and Execution

s. ATP-52 - Land Force Combat Engineer Doctrine

CONVENTIONS USED IN THIS PUBLICATION

CHANGE SYMBOLS

Revised text in changes is indicated by a black vertical line in either margin of the page, like the one printed next to this paragraph. The change symbol indicates added or restated information. A change symbol in the margin adjacent to the chapter number and title indicates a new or completely revised chapter.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to warnings, cautions, and notes used in this manual:

WARNING

AN OPERATING PROCEDURE, PRACTICE, OR CONDITION THAT MAY RESULT IN INJURY OR DEATH IF NOT CAREFULLY OBSERVED OR FOLLOWED.

CAUTION

AN OPERATING PROCEDURE, PRACTICE, OR CONDITION THAT MAY RESULT IN DAMAGE TO EQUIPMENT IF NOT CAREFULLY OBSERVED OR FOLLOWED.

Note. *An operating procedure, practice, or condition that requires emphasis.*

WORDING

Word usage and intended meaning throughout this publication is as follows:

“Shall” indicates the application of a procedure is mandatory.

“Should” indicates the application of a procedure is recommended.

“May” and “need not” indicates the application of a procedure is optional.

Will” indicates future time. It never indicates any degree of requirement for application of a procedure

CHAPTER 1 - DIVING BREATHING GASES AND INTEROPERABILITY OF GAS SUPPLIES

0101 General

Different diving breathing gases are used by nations for various diving operations. However, nations use similar diving breathing gases for specific tasks and operations. Each diving breathing gas (mixture) should comply with certain purity standards, which are given in para 0106 to 0109.

0102 Diving Breathing Gases

1. The following diving breathing gases are normally used for diving apparatus and they conform to the proportions:

a. **Air.** Available by all Nations.

b. **Oxygen.** Available by all Nations.

c. **Oxygen-Nitrogen Mixtures:**

(1) 60% O_2/40% N_2

(2) 60% O_2/40% N_2

(2) 40% O_2/60% N_2

(3) 32.5% O_2/67.5% N_2

(4) 30% O_2/70% N_2.

(5) 46% O_2/54% N_2

(6) 28% O_2/72% N_2

d. **Oxygen/Nitrogen/Helium Mixtures.**

(1) 23%/O_2/36%/N_2/41% He. Available by FRA & ESP

(2) 18%/O_2/41%/N_2/41% He. Available by BEL, ESP, FRA and TUR (open circuit)

e. **Oxygen/Helium Mixtures.** Available by all Nations except POL at up to 14 days notice.

2. The relationship between gas mixtures and maximum diving depth is shown in para 0110.

0103 Standard Marking of Gas Cylinders for Diving Breathing Gases

1. All gas cylinders shall clearly show the following minimum markings:

   a. Charging pressure in BAR or PSI.

   b. The contents of the cylinder (to be shown as follows):

      (1) *Air:* AIR.

      (2) *Oxygen:* OXYGEN and/O_2.

      (3) *Oxygen-Nitrogen Mixtures.* Chemical symbols and percentages of contained gases e.g:

      - Oxygen-nitrogen mixtures: 60% O_2/40% N_2,
      - Oxygen-helium mixtures: 2% O_2/98% He

2. The aforementioned markings do not apply to medical gas cylinders. Cross servicing of medical gas cylinders is dealt with in STANAG 2121 Med (BS 1319).

0104 Interoperability of Gas Supplies

1. Interoperability of gas supplies is determined by the following aspects:

   a. The possibility to connect for charging purposes (interchangeability).

   b. The knowledge of national demands concerning gas purity standards (see paras 0106-0109).

2. The charging of standard gas or breathing mixture gas cylinders throughout NATO may require nations to provide standard connections as for:

   a. **ISO 12209.** For use between breathing apparatus cylinders, pumps and storage cylinders containing breathing air

   b. **BS 1319 1976.** For use between breathing apparatus cylinders, pumps and storage cylinders containing pure oxygen.

   c. **EN 144 Part 2.** For use between breathing apparatus cylinders, pumps and storage cylinders containing oxygen and nitrogen mixtures.

0105 Carbon Dioxide Absorbent Materials

1. Closed and semi-closed circuit life-support systems, such as diving re-breathers or compression chambers, require a method for controlling carbon dioxide levels. This may be achieved by the use of absorbent materials.

2. NATO STANAG 1411 (ADivP-03). Standard to quantify the characteristics of carbon dioxide (CO2) absorbent material for diving, submarine and marine applications.

3. STANAG 1411 (ADivP-03). Absorbent grades that may be supplied by Member Nations are identified in Table 1-1 below, but should be confirmed to ensure availability.

Table 1-1. Member Nations Using and Able to Provide Material to STANAG 1411

Nation	NATO S-H[1]	NATO S-L[2]	NATO L-H[3]	NATO L-L[4]	NATO Li-S[5]	NATO Li-L[6]	Other Information
BEL	-			√			Sofnolime CS2580B D Grade
CAN	√			-			Molecular Products
DEU	-			√			Drager Divesorb Pro in 4.5 kg tubs 4240-12-348-4361
DNK	√						Molecular Products Sofnolime CS2580B D-Grade Size 1.0-2.5mm
ESP	√			√			Dragersorb, Sofnolime and molecular products
FRA	-			-			FRA use alternative method for characterisation of absorbent material
GBR	√	-	-	√	-	-	
GRC	-			√			Drager Divesorb Pro 4.5 kg tubs (NSN: 4240-12-348-4361) 18 kg tubs (NSN: 4240-12-376-0682)
ITA	-			√			Drager DIVE SORB PRO according National specification for diving applications NAV-15-MM-12PCEd March 2003
LTU	√						IAW STANAG 1411
NLD	√			√			Draeger Divesorb Pro in 4,5 kg tubs 4240-12-348-4361 Molecular Products Sofnolime CS2580B D-grade Size 1.0-2.5 mm
NOR	√						Molecular Products Size 1.0-2.5mm CS 2580 d Grade (797)
POL	√			√			Molecular Products
PRT	√			-			Draeger Divesorb Pro 4240-12-376-0682 in 18 kg tubs grade Size 2.0-4.0 mm Molecular Products Sofnolime 4240-MD-034-2238 in 20Kg tubes grade Size 1.0-2.5 mm
ROU	√			√			Dragersorb and molecular products
SVN	-			√			Drager Divesorb Pro in 4.5 kg tubs 4240-12-348-4361
TUR							
USA	√			√			
NATO-UNCLASSIFIED							

Absorbent designations:

1. Soda lime, small grain, high activity.
2. Soda lime, small grain, low activity.
3. Soda lime, large grain, high activity.
4. Soda lime, large grain, low activity
5. Lithium hydroxide, small grain.
6. Lithium hydroxide, large grain.

0106 National Levels of Contaminants for Compressed Air

National compressed air quality levels are given below. Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1-2. National Levels of Contaminants for Compressed Air
(As Defined in STANAG 1458, Annex B)

Property	Unit	STANAG	BEL	CAN	CZE	DEU
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free from any detectable odour	(Nil)	Free from adverse odours
Water	$mg.m^{-3}$	35	≤ 50	37.3 (>200 psi) 261.25 (≤200 psi)	25	35
Carbon Monoxide	ppm (v)	10	≤ 15	5	15	5
Carbon Dioxide	ppm (v)	500	≤ 500	500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.5	< 0,5	3	0.5	0,5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	NA	25 (methane) & non-methane hydrocarbons: 1/10 of occupational exposure limit	Nil	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	NA	5	Nil	2.0
Oxygen	%	21 ± 1.0	21 ± 1	21 ± 1.0	Nil	21 ± 1.0
Nitrogen	%	Remainder	Remainder	N/A	Nil	Remainder
NATO-UNCLASSIFIED						

Property	Unit	STANAG	DNK	ESP	FRA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Nil
Water	$mg.m^{-3}$	35	35	100	100
Carbon Monoxide	ppm (v)	10	8	10	5
Carbon Dioxide	ppm (v)	500	500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.5	0.5	0,5	0.5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	N/A	30	6.6
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	N/A	2	N/A
Oxygen	%	21 ± 1.0	21 ± 1.0	20-22	21± 0.5
Nitrogen	%	Remainder	N/A	Remainder	Remainder
NATO-UNCLASSIFIED					

Table 1-2. National Levels of Contaminants for Compressed Air
(As Defined in STANAG 1458, Annex B)

Property	Unit	STANAG	GBR	GRC	HRV	ITA
Odour	Subjective	Free from adverse odours	Free from adverse odours	No significant odour or taste	Free from adverse odours	Free from adverse odours
Water	$mg.m^{-3}$	35	35	35	35	50
Carbon Monoxide	ppm (v)	10	3	3	10	10
Carbon Dioxide	ppm (v)	500	500	500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.5	0.5	0.5	0.5	1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	30	N/A	30	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2	N/A	2.0	NA
Oxygen	%	21 ± 1.0	21 ± 1.0	21 ± 1.0	21 ± 1.0	21 ± 1.0
Nitrogen	%	Remainder	Remainder	Remainder	Remainder	NA
NATO-UNCLASSIFIED						

Property	Unit	STANAG	LTU	NLD	NOR	POL
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Nil	Nil	Free from adverse odours
Water	$mg.m^{-3}$	35	≤35	35	50	50
Carbon Monoxide	ppm (v)	10	≤15	10	10	10
Carbon Dioxide	ppm (v)	500	≤500	500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.5	≤0.5	0.3	1	N/A
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	NA	NA	NA	5.0
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	NA	Nil	NA	NA
Oxygen	%	21 ± 1.0	21 ± 1.0	21	20.5-21.5	20-22
Nitrogen	%	Remainder	Remainder	NA	NA	Remainder
NATO-UNCLASSIFIED						

Table 1-2. National Levels of Contaminants for Compressed Air
(As Defined in STANAG 1458, Annex B)

Property	Unit	STANAG	PRT	SVN	TUR	USA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Not objectionable	Not objectionable
Water	$mg.m^{-3}$	35	35	NA	NA	NA
Carbon Monoxide	ppm (v)	10	10	10	20	20
Carbon Dioxide	ppm (v)	500	500	500	500	1000
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.5	0.5	5	5	5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	30	NA	25	25
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2.0	NA	NA	NA
Oxygen	%	21 ± 1.0	21 ± 1.0	20-22	21 ± 1.0	20-22
Nitrogen	%	Remainder	Remainder	Remainder	NA	NA
NATO-UNCLASSIFIED						

NA = Not Applicable

Notes:

1. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

2. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0107 National Levels of Contaminants for Oxygen Compatible Compressed Air

National oxygen compatible compressed air quality levels are given below. Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1-3. National Levels of Contaminants for Oxygen Compatible Compressed Air (As Defined in STANAG 1458, Annex C).

Property	Unit	STANAG	BEL	CAN	DEU
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free from any detectable odour	Free from adverse odours
Water	$mg.m^{-3}$	35	≤ 50	37.3 (>200 psi) 261.25 (≤200 psi)	25
Carbon Monoxide	ppm (v)	10	≤ 15	5	5
Carbon Dioxide	ppm (v)	500	≤ 500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.1	< 0,5	3	0,1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	≤ 30	25 (methane) & non-methane hydrocarbons: 1/10 of occupational exposure limit	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	≤ 2	5	2.0
Oxygen	%	21 ± 1.0	21 ± 1	21 ± 1.0	21 ± 1.0
Nitrogen	%	Remainder	Remainder	N/A	Remainder
NATO-UNCLASSIFIED					

Property	Unit	STANAG	DNK	ESP	FRA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	-
Water	$mg.m^{-3}$	35	25	100	-
Carbon Monoxide	ppm (v)	10	8	10	-
Carbon Dioxide	ppm (v)	500	500	500	-
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.1	0.1	0.1	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	NA	30	-
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	NA	2.0	-
Oxygen	%	21 ± 1.0	21 ± 1.0	21 ± 1.0	-
Nitrogen	%	Remainder	N/A	Remainder	-
NATO-UNCLASSIFIED					

Table 1-3. National Levels of Contaminants for Oxygen Compatible Compressed Air (As Defined in STANAG 1458, Annex C).

Property	Unit	STANAG	GBR	HRV	GRC	ITA
Odour	Subjective	Free from adverse odours	-	Free from adverse odours	Nil	Free from adverse odours
Water	$mg.m^{-3}$	35	-	35	50	50
Carbon Monoxide	ppm (v)	10	-	10	10	10
Carbon Dioxide	ppm (v)	500	-	500	500	500
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.1	-	0.1	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	-	30	N/A	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	-	2.0	N/A	NA
Oxygen	%	21 ± 1.0	-	21 ± 1.0	20.5-21.5	21± 1.0
Nitrogen	%	Remainder	-	Remainder	N/A	NA
NATO-UNCLASSIFIED						

Property	Unit	STANAG	LTU	NLD	POL
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free from adverse odours	Free from adverse odours
Water	$mg.m^{-3}$	35	≤35	35	35
Carbon Monoxide	ppm (v)	10	≤8	10	3
Carbon Dioxide	ppm (v)	500	≤500	500	100
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.1	≤0.5	0.1	NA
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	NA	30	1.0
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	NA	2.0	NA
Oxygen	%	21 ± 1.0	21 ± 1.0	21 ± 1.0	20-22
Nitrogen	%	Remainder	Remainder	Remainder	Remainder
NATO-UNCLASSIFIED					

Table 1-3. National Levels of Contaminants for Oxygen Compatible Compressed Air (As Defined in STANAG 1458, Annex C).

Property	Unit	STANAG	PRT	SVN	TUR	USA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odour	-
Water	$mg.m^{-3}$	35	35	NA	35	-
Carbon Monoxide	ppm (v)	10	10	10	10	-
Carbon Dioxide	ppm (v)	500	500	500	500	-
Oil (Carbon Content ≥C6)	$mg.m^{-3}$	0.1	0.1	5	0.1	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent (Carbon content < C6)	ppm (v)	30	30	NA	30	-
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2.0	NA	2.0	-
Oxygen	%	21 ± 1.0	21 ± 1.0	20-22	%21 ± 1.0	-
Nitrogen	%	Remainder	Remainder	Remainder	Remainder	-
NATO-UNCLASSIFIED						

Notes:

1. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

2. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0108 National Levels of Contaminants for Oxygen

National Quality Levels for Breathing Oxygen are given below. Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1.4. National Levels of Contaminants for Oxygen
(As Defined in STANAG 1458, Annex D).

Property	Unit	STANAG	BEL prEN 12021	CAN	DEU
Oxygen	%	>99.5	> 99.5 %	99.6	>99.5
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free from any detectable odour	Free from adverse odours
Water	$mg.m^{-3}$	5	≤ 7	18.65	15
Carbon Monoxide	ppm (v)	1	≤ 1	2	1
Carbon Dioxide	ppm (v)	5	≤ 10	200	5
Oil	$mg.m^{-3}$	0.1	< 0.1	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	≤ 30	50 (Methane)	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	≤ 2	5	2.0
Other non-toxic gases	%	Remainder	< 0.5	0.4%	0.5
NATO-UNCLASSIFIED					

Property	Unit	STANAG	DNK	ESP	FRA
Oxygen	%	>99.5	>99.5	>99.5	99.5
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odours
Water	$mg.m^{-3}$	5	5	20	20
Carbon Monoxide	ppm (v)	1	1	1	1
Carbon Dioxide	ppm (v)	5	5	5	10
Oil	$mg.m^{-3}$	0.1	0.1	0.1	0.5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	30	25
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2.0	2.0	5
Other non-toxic gases	%	Remainder	<0,5%	Remainder	Remainder
NATO-UNCLASSIFIED					

Table 1.4. National Levels of Contaminants for Oxygen
(As Defined in STANAG 1458, Annex D).

Property	Unit	STANAG	GBR	HRV	GRC	ITA
Oxygen	%	>99.5	99.5	>99.5	99.5	>99.5
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Nil	Free from adverse odours
Water	$mg.m^{-3}$	5	5	5	5	5
Carbon Monoxide	ppm (v)	1	1	1	1	1
Carbon Dioxide	ppm (v)	5	5	5	5	5
Oil	$mg.m^{-3}$	0.1	0.1	0.1	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30 Methane + 3 as ethane equivalent	30	N/A	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	1 Refrigerants 0.1 Solvents	2.0	N/A	NA
Other non-toxic gases	%	Remainder	0.5	Remainder	0.5	NA
NATO-UNCLASSIFIED						

Property	Unit	STANAG	NLD	NOR	POL
Oxygen	%	>99.5	>99.5	99.5	99.5
Odour	Subjective	Free from adverse odours	Free from adverse odours	Nil	Free from adverse odours
Water	$mg.m^{-3}$	5	15	60	5
Carbon Monoxide	ppm (v)	1	1	5	1
Carbon Dioxide	ppm (v)	5	5	300	5
Oil	$mg.m^{-3}$	0.1	0.1		NA
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	-	30
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2.0	-	NA
Other non-toxic gases	%	Remainder	Remainder	-	NA
NATO-UNCLASSIFIED					

* LTU. Civilian commercial companies providing this breathing gas are not certified.

Table 1.4. National Levels of Contaminants for Oxygen
(As Defined in STANAG 1458, Annex D).

Property	Unit	STANAG	PRT	SVN	TUR	USA
Oxygen	%	>99.5	>99.5	99.5	>99.5	99.5
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odours	Odour free
Water	$mg.m^{-3}$	5	5	20	5	5.55 (7ppm)
Carbon Monoxide	ppm (v)	1	1	5	1	0
Carbon Dioxide	ppm (v)	5	5	10	5	10
Oil	$mg.m^{-3}$	0.1	0.1	5	0.1	0.2ppm
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	50	30	
Chlorofluorocarbons and halogenated hydrocarbons	ppm (v)	2.0	2.0	NA	2.0	
Other non-toxic gases	%	Remainder	Remainder	Remainder	Remainder	0.5 (AR,N2)
NATO-UNCLASSIFIED						

NA = Not Applicable

Notes:

1. Other non-toxic gases to include asphyxiants such as nitrogen, argon and other Group 18 Noble gases.

2. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

3. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0109 National Levels of Contaminants for Oxygen in Nitrogen Gas Mixtures (Nitrox)

National levels of contaminants for oxygen in helium and nitrogen gas mixtures are given below. Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1-5. National Levels of Contaminants for Oxygen in Nitrogen Gas Mixtures (As Defined in STANAG 1458, Annex E).

Property	Unit	STANAG	BEL	CAN	DEU
Odour	Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free of any detectable odours	Free from adverse odours
Water	$mg.m^{-3}$	5	≤ 15	18.65	15
Carbon Monoxide	ppm (v)	1	≤ 3	2	3
Carbon Dioxide	ppm (v)	5	≤ 5	200	5
Oil	$mg.m^{-3}$	0.1	< 0.1	0.1	0,1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	≤ 30	10 (methane)	30
Oxygen	≤40%	± 0.5 %	< 20% ± 0.5 by volume	99.6%	(Stated [a] ± 0,5 [b]) %
Oxygen	>40%	± 1 %	≥ 20% ± 1 by volume	99.6%	(Stated [a] ± 1,0 [b]) %
Nitrogen	%	Remainder	Remainder	99.995%	Remainder
Other non-toxic gases	%	0.5	< 1		1
NATO-UNCLASSIFIED					

Property	Unit	STANAG	DNK	ESP	FRA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odours
Water	$mg.m^{-3}$	5	5	20	20
Carbon Monoxide	ppm (v)	1	1	1	1
Carbon Dioxide	ppm (v)	5	5	5	10
Oil	$mg.m^{-3}$	0.1	0.1	0.1	0.5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	25	25	25
Oxygen	≤40%	± 0.5 %	N/A	%	% ±1.0
Oxygen	>40%	± 1 %	N/A	%	% ±1.0
Nitrogen	%	Remainder	Remainder	Remainder	Remainder
Other non-toxic gases	%	0.5	0.5	0.5	n/a
NATO-UNCLASSIFIED					

Table 1-5. National Levels of Contaminants for Oxygen in Nitrogen Gas Mixtures (As Defined in STANAG 1458, Annex E).

Property	Unit	STANAG	GBR	GRC	HRV	ITA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Nil	Free from adverse odours	Free from adverse odours
Water	$mg.m^{-3}$	5	5	5	5	5
Carbon Monoxide	ppm (v)	1	1	1	1	1
Carbon Dioxide	ppm (v)	5	5	5	5	5
Oil	$mg.m^{-3}$	0.1	0.1	0.1	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	N/A	30	30
Oxygen	≤40%	± 0.5 %	±0.5	±0.5	%	± 0.5
Oxygen	>40%	± 1 %	±1.0	±1.0	%	± 1.0
Nitrogen	%	Remainder	Remainder	Remainder	Remainder	NA
Other non-toxic gases	%	0.5	0.5	0.5	0.5	NA
NATO-UNCLASSIFIED						

Property	Unit	STANAG	NLD	NOR	POL
Odour	Subjective	Free from adverse odours	Free from adverse odours	-	Free from adverse odours
Water	$mg.m^{-3}$	5	15	-	35
Carbon Monoxide	ppm (v)	1	1	-	1
Carbon Dioxide	ppm (v)	5	5	-	50
Oil	$mg.m^{-3}$	0.1	0.1	-	NA
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	-	30
Oxygen	≤40%	± 0.5 %	± 0.5	-	±0.5
Oxygen	>40%	± 1 %	± 1.0	-	±1.0
Nitrogen	%	Remainder	NA	-	Remainder
Other non-toxic gases	%	0.5	NA	-	NA
NATO-UNCLASSIFIED					

* LTU. Civilian commercial companies providing this breathing gas are not certified.

Table 1-5. National Levels of Contaminants for Oxygen in Nitrogen Gas Mixtures (As Defined in STANAG 1458, Annex E).

Property	Unit	STANAG	PRT	SVN	TUR	USA
Odour	Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	-	-
Water	$mg.m^{-3}$	5	5	20	-	-
Carbon Monoxide	ppm (v)	1	1	5	-	-
Carbon Dioxide	ppm (v)	5	5	10	-	-
Oil	$mg.m^{-3}$	0.1	0.1	5	-	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent	ppm (v)	30	30	50	-	-
Oxygen	≤40%	± 0.5 %	%	%	-	-
Oxygen	>40%	± 1 %	%	%	-	-
Nitrogen	%	Remainder	Remainder	Remainder	-	-
Other non-toxic gases	%	0.5	0.5	NA	-	-
NATO-UNCLASSIFIED						

NA = Not Applicable

Notes:

1. Other non-toxic gases to include asphyxiants such as argon and other Group 18 Noble gases.

2. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

3. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0110 National Levels of Contaminants for Oxygen in Helium Gas Mixtures (Heliox)

National levels of contaminants for oxygen in helium gas mixtures are given below: Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1-6. National Levels of Contaminants for Oxygen in Helium Gas Mixtures (As Defined in STANAG 1458, (Annex F).

Property		Unit	STANAG	BEL prEN 12021	CAN	DEU
Odour		Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free of any detectable odours	Free from adverse odours
Water		$mg.m^{-3}$	5	≤ 15	18.65	15
Carbon Monoxide		ppm (v)	1	≤ 0.2	2	0,2
Carbon Dioxide		ppm (v)	5	≤ 5	200	5
Oil		$mg.m^{-3}$	0.1	< 0.1	0.1	0,1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	30	≤ 30	10 (methane)	30
Hydrogen		ppm (v)	10	≤ 10	-	10
Oxygen	≤ 10%	%	Specified ±0.25	Stated ±0.25	± 0.5%	Specified ±0.25
Oxygen	>10% ≤20%	%	Specified ±0.5	Stated ±0.5	± 0.5%	Specified ±0.5
Oxygen	>20%	%	Specified ±1.0	Stated ±1.0	± 0.5%	Specified ±1.0
Helium		%	Remainder	Remainder	Remainder	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	< 0.5	-	0.5
Other non-toxic gases	Oxygen >10%≤20%	%	0.2		0.4%	0.5
Other non-toxic gases	Oxygen >20%		0.5		-	0.5

NATO-UNCLASSIFIED

Property		Unit	STANAG	DNK	ESP	FRA
Odour		Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	-
Water		$mg.m^{-3}$	5	20	20	-
Carbon Monoxide		ppm (v)	1	1	1	-
Carbon Dioxide		ppm (v)	5	5	5	-
Oil		$mg.m^{-3}$	0.1	0.1	0.1	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	30	30	30	-
Hydrogen		ppm (v)	10	10	10	-
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	-
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	-
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	-
Helium		%	Remainder	Remainder	Remainder	-
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	0.1	-
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	0.2	-
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	0.5	-

NATO-UNCLASSIFIED

Table 1-6. National Levels of Contaminants for Oxygen in Helium Gas Mixtures (As Defined in STANAG 1458, (Annex F).

Property		Unit	STANAG	GBR	GRC	HRV	ITA
Odour		Subjective	Free from adverse odours	Free from adverse odours	-	Free from adverse odours	Free from adverse odours
Water		$mg.m^{-3}$	5	5	-	5	5
Carbon Monoxide		ppm (v)	1	1	-	1	1
Carbon Dioxide		ppm (v)	5	5	-	5	5
Oil		$mg.m^{-3}$	0.1	0.1	-	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	30	30	-	30	30
Hydrogen		ppm (v)	10	10	-	10	NA
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	Specified ±0.25	Specified ±0.25
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0
Helium		%	Remainder	Remainder		Remainder	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	0.1	0.1	NA
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	0.2	0.2	NA
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	0.5	0.5	NA

NATO-UNCLASSIFIED

Property		Unit	STANAG	NLD	NOR	POL
Odour		Subjective	Free from adverse odours	Free from adverse odours	-	Free from adverse odours
Water		$mg.m^{-3}$	5	15	-	35
Carbon Monoxide		ppm (v)	1	1	-	1
Carbon Dioxide		ppm (v)	5	5	-	50
Oil		$mg.m^{-3}$	0.1	0.1	-	NA
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	30	30	-	30
Hydrogen		ppm (v)	10	10	-	1
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	-	Specified ±0.25
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	-	Specified ±0.5
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	-	Specified ±1.0
Helium		%	Remainder	Remainder	-	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	-	0.1
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	-	0.2
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	-	0.5

NATO-UNCLASSIFIED

* LTU. Civilian commercial companies providing this breathing gas are not certified.

Table 1-6. National Levels of Contaminants for Oxygen in Helium Gas Mixtures (As Defined in STANAG 1458, (Annex F).

Property		Unit	STANAG	PRT	SVN	TUR	USA
Odour		Subjective	Free from adverse odours	Free from adverse odours	NA	NA	-
Water		$mg.m^{-3}$	5	5	NA	NA	-
Carbon Monoxide		ppm (v)	1	1	NA	NA	-
Carbon Dioxide		ppm (v)	5	5	NA	NA	-
Oil		$mg.m^{-3}$	0.1	0.1	NA	NA	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	30	30	NA	NA	-
Hydrogen		ppm (v)	10	10	NA	NA	-
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	-	Specified ±0.25	-
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	-	Specified ±0.5	-
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	-	Specified ±1.0	-
Helium		%	Remainder	Remainder	NA	Remainder	-
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	N/A	NA	-
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	N/A	NA	-
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	N/A	NA	-
NATO-UNCLASSIFIED							

NA = Not Applicable

Notes:

1. Other non-toxic gases to include asphyxiants such as argon and other Group 18 Noble gases.

2. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

3. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0111 National Levels of Contaminants for Oxygen in Helium and Nitrogen Gas Mixtures (Trimix)

National levels of contaminants for oxygen in helium and nitrogen gas mixtures are given below. Properties not complying with STANAG 1458 are shaded in grey.

Requirement: At 20 °C, 101.3 kPa (1013 mbar)

Table 1-7. National Levels of Contaminants for Oxygen in Helium and Nitrogen Gas Mixtures (As Defined in STANAG 1458 (Annex G).

Property		Unit	STANAG	BEL prEN 12021	CAN	DEU
Odour		Subjective	Free from adverse odours	The gas shall be free from unsatisfactory odour or taste	Free of any detectable odours	Free from adverse odours
Water		$mg.m^{-3}$	5	≤ 15	18.65	15
Carbon Monoxide		ppm (v)	1	≤ 0.2	2	0,2
Carbon Dioxide		ppm (v)	5	≤ 5	200	5
Oil		$mg.m^{-3}$	0.1	< 0.1	0.1	0,1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	25	≤ 30	10 (methane	30
Hydrogen		ppm (v)	10	≤ 10-	-	10
Oxygen	≤10%	%	Specified ±0.25	Stated ±0.25	Specified ±0,25	-
Oxygen	>10% ≤20%	%	Specified ±0.5	Stated ±0.5	Specified ±0,5	± 0.5%
Oxygen	>20%	%	Specified ±1.0	Stated ±1.0	Specified ±1,0	-
Helium	≤20%		Specified ±0.5	Stated ±1.0	Specified ±1,0	-
Helium	>20%	%	Specified ±1.0	Stated ±1.0-	Specified ±1,0	-
Nitrogen		%	Remainder	Remainder	-	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	< 1	1	-
Other non-toxic gases	Oxygen >10%≤20%	%	0.2		1	-
Other non-toxic gases	Oxygen >20%	%	0.5		1	-

Table 1-7. National Levels of Contaminants for Oxygen in Helium and Nitrogen Gas Mixtures (As Defined in STANAG 1458 (Annex G).

Property		**Unit**	**STANAG**	**DNK**	**ESP**	**FRA**
Odour		Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odours
Water		$mg.m^{-3}$	5	5	20	20
Carbon Monoxide		ppm (v)	1	1	1	1
Carbon Dioxide		ppm (v)	5	5	10	10
Oil		$mg.m^{-3}$	0.1	0.1	0.5	0.5
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	25	25	25	25
Hydrogen		ppm (v)	10	10	10	10
Oxygen	≤10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	-
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	% ±0.5
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	% ±0.5
Helium	≤20%		Specified ±0.5	Specified ±0.5	Specified ±0.5	-
Helium	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±2.0	Specified ±2.0
Nitrogen		%	Remainder	Remainder	Remainder	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	0.1	-
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	0.2	N/A
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	0.5	N/A
NATO-UNCLASSIFIED						

Property		**Unit**	**STANAG**	**GBR**	**GRC**	**HRV**	**ITA**
Odour		Subjective	Free from adverse odours	Free from adverse odours	Nil	Free from adverse odours	Free from adverse odours
Water		$mg.m^{-3}$	5	5	5	5	5
Carbon Monoxide		ppm (v)	1	1	1	1	1
Carbon Dioxide		ppm (v)	5	5	5	5	5
Oil		$mg.m^{-3}$	0.1	0.1	0.1	0.1	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	25	25	N/A	25	25
Hydrogen		ppm (v)	10	10	10	10	NA
Oxygen	≤10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	Specified ±0.25	Specified ±0.25
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0
Helium	≤20%		Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5
Helium	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0
Nitrogen		%	Remainder	Remainder	Remainder	Remainder	NA
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	0.1	0.1	NA
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	0.2	0.2	NA
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	0.5	0.5	NA
NATO-UNCLASSIFIED							

Table 1-7. National Levels of Contaminants for Oxygen in Helium and Nitrogen Gas Mixtures (As Defined in STANAG 1458 (Annex G).

Property		**Unit**	**STANAG**	**NLD**	**POL**	**PRT**
Odour		Subjective	Free from adverse odours	Free from adverse odours	Free from adverse odours	Free from adverse odours
Water		$mg.m^{-3}$	5	15	35	5
Carbon Monoxide		ppm (v)	1	1	1	1
Carbon Dioxide		ppm (v)	5	5	50	5
Oil		$mg.m^{-3}$	0.1	0.1	NA	0.1
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	25	25	25	25
Hydrogen		ppm (v)	10	10	10	10
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	Specified ±0.25
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0
Helium	≤20%		Specified ±0.5	Specified ±0.5	Specified ±0.5	Specified ±0.5
Helium	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	Specified ±1.0
Nitrogen		%	Remainder	Remainder	Remainder	Remainder
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	0.1	0.1
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	0.2	0.2
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	0.5	0.5

****** LTU Armed Forces do not use TRIMIX breathing gasses

Table 1-7. National Levels of Contaminants for Oxygen in Helium and Nitrogen Gas Mixtures (As Defined in STANAG 1458 (Annex G).

Property		**Unit**	**STANAG**	**PRT**	**TUR**	**USA**
Odour		Subjective	Free from adverse odours	Free from adverse odours	N/A	-
Water		$mg.m^{-3}$	5	5	N/A	-
Carbon Monoxide		ppm (v)	1	1	N/A	-
Carbon Dioxide		ppm (v)	5	5	N/A	-
Oil		$mg.m^{-3}$	0.1	0.1	N/A	-
Total volatile non-substituted hydrocarbons (vapour or gas) as methane equivalent		ppm (v)	25	25	N/A	-
Hydrogen		ppm (v)	10	10	N/A	-
Oxygen	≤ 10%	%	Specified ±0.25	Specified ±0.25	Specified ±0.25	-
Oxygen	>10% ≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	-
Oxygen	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	-
Helium	≤20%	%	Specified ±0.5	Specified ±0.5	Specified ±0.5	-
Helium	>20%	%	Specified ±1.0	Specified ±1.0	Specified ±1.0	-
Nitrogen		%	Remainder	Remainder	Remainder	
Other non-toxic gases	Oxygen ≤10%	%	0.1	0.1	N/A	-
Other non-toxic gases	Oxygen >10%≤20%	%	0.2	0.2	N/A	-
Other non-toxic gases	Oxygen >20%	%	0.5	0.5	N/A	-

NA = Not Applicable

Notes:

1. Other non-toxic gases to include asphyxiants such as nitrogen, argon and other Group 18 Noble gases.

2. Particulate matter can arise from the internal surface of storage containers and/or supply hoses. It is essential, therefore, that in addition to the filtration of the supply from the compressing plant the particulate matter size is limited by passing the gas through a filter as close as possible to the point of delivery.

3. Percent (%) and percent tolerances are absolute, i.e. percent of the total gas not of individual component.

0112 Relationship Between the Composition of Diving Breathing Gases and Maximum Diving Depth

The relationship between the composition of diving breathing gases, and maximum diving depth allowed by national regulations using that mixture is given below:

Table 1-8. Relationship Between the Composition of Diving Breathing Gases and Maximum Diving Depth

NATION	TYPE OF GAS							
	O_2	Air	Oxy-Nitrogen Mixtures				Oxygen Nitrogen Helium Mixtures	Oxy-Helium Mixtures
			60/40	40/60	32½/67½	30/70		
BEL	7 m# (23 ft)	60 m (197 ft)	24 m (79 ft)	42 m (138 ft)	55 m (180 ft)	NA	80 m (262 ft)	80 m (262 ft)
BGR	20 m (66 ft)	60 m (197 ft)	NA	45 m (148 ft)	NA	NA	NA	140 m (459 ft)
CAN	8 m (26 ft)	55 m (180 ft)	24 m (79 ft)	42 m (138 ft)	NA	NA	NA	100 m (328 ft)
DEU	10 m (33 ft)	50 m (164 ft)	24 m (79 ft)	NA	54 m (177 ft)	NA	NA	NA
DNK*	7 m (23 ft)	50 m (164 ft)	16 m (52 ft)	30 m (98 ft)	39 m (128 ft)	NA	NA	80 m (262 ft)
ESP**	7 m (23 ft)	50 m (164 ft)	25 m (82 ft)	45 m (148 ft)	55 m (180 ft)	60 m (197 ft)	80 m (262 ft)	90 m (300 ft)
FRA**	7 m (23 ft)	50 m (164 ft)	24 m (79 ft)	45 m (148 ft)	NA	60 m (197 ft)	80 m (262 ft)	NA
GBR	6 m# (20 ft)	50 m (164 ft)			NA	NA	NA	60 m (200 ft)
GRC	15 m (50 ft)(4)	58 m (190 ft)	24 m (79 ft)	42 m (138 ft)	54 m (177 ft)	NA	NA	60 m (196 ft)
ITA	12 m (1) (39 ft)	60 m (200 ft)	24 m (79 ft)	42 m (138 ft)	54 m (177 ft)	NA	NA	81 m (2) 250 m (3)
LTU	7 m# (23 ft)	50 m (164 ft)	25 m (82 ft)	45 m (148 ft)	55 m (180 ft)	NA	NA	NA
NLD	7 m### (23 ft)	60 m (200 ft)	24 m (79 ft)	42 m (138 ft)	55 m (180 ft)	NA	81 m (266 ft)	81 m
NOR	15 m ***# (49 ft)	50 m (164 ft)	24 m (79 ft)	42 m (138 ft)	55 m (180 ft)	NA	NA	81 m (270 ft)
POL	7 m**## (23 ft)	55 m (180 ft)	15 m (49 ft)	40 m (130 ft)	50 m (164 ft)	NA	90 m (300 ft)	NA
PRT	8 m (26 ft)	54 m (177 ft)	24 m (79 ft)	42 m (138 ft)	54 m (177 ft)	NA	NA	81 m (270 ft)
TUR	15 m (49 ft)	58 m (190 ft)	24 m (79 ft)	42 m (138 ft)	54 m (177 ft)	NA	80 m (262 ft)	91 m (300 ft)
SVN	NA	60 m (197 ft)	25 m (82 ft)	45 m (150 ft)	55 m (180 ft)	NA	NA	NA
USA	50 ft## (16 m)	190 ft (58 m)	NA	NA	NA	150 ft (46 m)	NA	950 ft (292 m)
NATO-UNCLASSIFIED								

NA = Not applicable

Notes:

** DNK also use the following oxy-nitrogen mixtures: 46/54 Maximum Depth 30 m (98 ft). 28/72 Maximum Depth 50 m (160 ft).*

*** ESP & FRA also use the following Nitrox mixture: 50/50 Maximum Depth 32 m (105 ft).*

 # GBR and BEL, 15 m (49 ft) for single excursion (After additional training).

(1) ITA 15 minutes maximum time - increasing bottom time for shallower depths,

(2) Heliox SCUBA,

(3) Heliox Saturation Diving

(4) GRC Normally 6 m (20 ft) with single short excursion to 15m (50 ft).

USA Normally 6 m (20 ft) with single excursion to 15 m (50 ft).

NLD 14 m (46 ft) for single excursion.

**## POL *15 m (49 ft) for single excursion*

****# NOR Normally 7 m (23 ft) with single excursion to 15 m (50 ft)*

0113 Real (non-ideal) gas behaviour

1. Introduction.

When performing gas calculations it is normally assumed that gases are 'ideal' and a doubling in cylinder pressure will result in a doubling of available gas for the diver to breathe. However, most gases do not behave in this manner and this method may result in a large error of predicted gas volume.

2. Background.

The combined (ideal) gas law combines Boyle's, Avagadro's, Gay-Lussac's and Charles's laws:

Combined gas law -

$$PV = nRT \qquad \textit{Equation 1}$$

Where:
P is the pressure.
V is the volume.
n is the number of moles
R is the ideal gas constant (8.31451 $J \cdot mol^{-1} \cdot K^{-1}$)
T is the temperature (measured in Kelvin).

For comparing the same amount of a substance under two different sets of conditions, the combined gas law can be written as:

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$ *Equation 2*

Where:
P is the pressure.
V is the volume.
T is the temperature (measured in Kelvin).

Equation 2 is commonly used to calculate free gas volumes of diving cylinders. The combined gas law makes two underlying assumptions: the volume occupied by the gas molecules themselves is negligible, and they only collide they do not attract or repel each other. However, at pressures used to store diving gases, finite molecular volumes and the forces between the molecules become significant factors. This results in the gases behaving in a non-ideal manner.

3. ***Non-ideal Gases****.*

a. Many non-ideal (real) gas laws have been developed which account for these factors, they include van der Waals, virial, Berthelot, Dieterici, Clausius, Peng and Robinson, Wohl, Beattie-Bridgeman and the Benedict-Webb-Rubin equations.

b. The van der Waals equation of state for non-ideal gases is the most commonly used and is presented here. This equation is based on the combined gas law, but the pressure is modified by a factor representing the attraction between the particles, and the volume is modified by a factor representing the volume occupied by the gas molecules.

$$\left(P + \frac{n^2 a}{V^2}\right)(V - nb) = nRT \qquad \textit{Equation 3}$$

Where:

P is the pressure of the gas
V is the total volume of the container containing the gas
a is a measure of the attraction between particles
b is the volume excluded by a mole of particles
n is the number of moles
R is the gas constant

Table 6.6 shows the free volume (Standard Temperature and Pressure Dry - STPD) of various gas compositions plotted against charging pressure. It also shows a dotted line which shows the ideal gas behaviour.

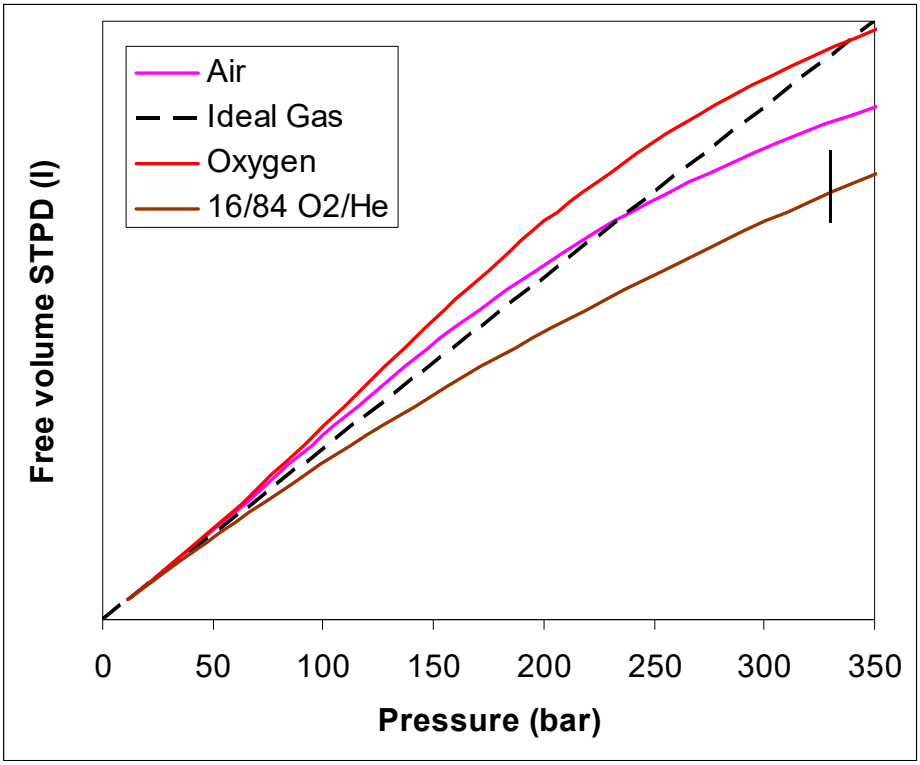
Where the lines for the gas mixtures are above the ideal gas line, a greater volume of gas will be stored than predicted by the ideal gas equation. Conversely, where the lines for the gas mixtures are below the ideal gas line, a smaller volume of gas will be available than predicted by the ideal gas equation.

- Pure oxygen produces a larger volume of gas than predicted for pressures up to 340 bar.

- Air produces a larger volume of gas than predicted for pressures up to 240 bar, above this less gas is available than predicted. At 350 bar this is approximately a 15 % reduction in volume.

- An oxygen in helium mixture releases a smaller volume of gas than predicted by the ideal gas law at all pressures. For a 16 % oxygen in helium mixture at 200 bar this is approximately a 16 % reduction in volume while at 350 bar it is a 25 % reduction.

Table 6-9. Pressure Volume Relationship for Air, Oxygen, Oxygen in Helium Mixture and Ideal Gas.



NATO-UNCLASSIFIED

4. Operational Considerations

- Free gas volumes of pure oxygen may be safely calculated using the combined gas law equation

- Free gas volumes of oxygen in nitrogen mixtures (*i.e.* air and nitrox) at pressures less than 240 bar can be safely calculated using the combined gas law

- Free gas volumes of oxygen in nitrogen mixtures (*i.e.* air and nitrox) at pressures greater than 240 bar should be calculated using a non-ideal gas formula (*i.e.* van der Waals equation)

- Free gas volumes of gas mixtures containing helium (*i.e*. heliox and trimix diving gases) should be calculated using a non-ideal gas formula (*i.e.* van der Waals equation).

CHAPTER 2 - STANDARD ADAPTOR SET FOR COMPRESSION CHAMBERS

0201 NATO TUP Requirements

1. To aid NATO diving interoperability, the obligation for member nations to be able to provide Transfer Under Pressure TUP facilities has been a long established requirement. However recent improvement in recompression chamber design and increased Health and Safety legislation, has required many nations to upgrade facilities to a multi-occupant chamber in order to fulfil national requirements.

2. This has led to a number of NATO nations who now do not have recompression facilities that are compatible with conducting a TUP. Accordingly they are unable to provide TUP with other nations who still use one man/duocom style chambers and may require this facility. In order to ensure diving safety for those nations, it is **Strongly Recommended** that when conducting diving operations outside the scope of their own national TUP facilities, nations confirm TUP facilities are available to be provided by the host nation **BEFORE** commencing diving operations.

0202 General

1. Nations use compression chambers with entrances of various dimensions. To achieve the interchangeability of compression chambers a common NATO entrance is agreed. A suitable adaptor set is required for chambers, which do not conform to the standard NATO entrance.

2. It is a matter of national interest that nations produce their own adaptor set suitable for their particular compression chambers. An adaptor set consists of a female coupling (locking ring) and a male coupling (reducing ring).

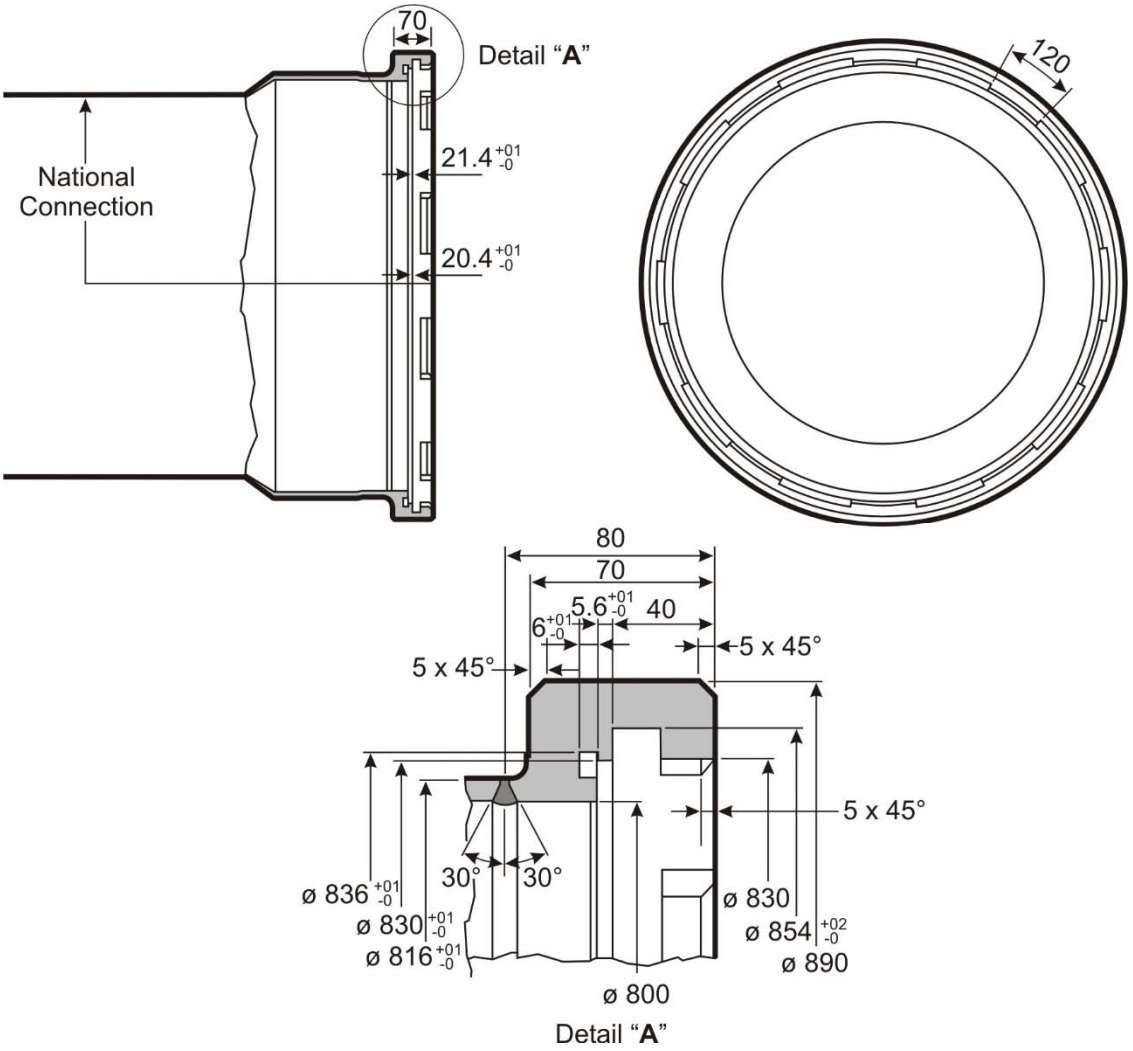
0203 Standard Connections or Adaptor Set required for the Interchangeability of Compression Chambers

Chamber adaptor sets as described in paras 0203 and 0204 will be adopted for use between fixed multi-occupant compression chambers and transportable compression chambers and be provided with a safety interlock preferably on the main chamber. These adaptor sets allow for a transportable compression chamber provided with a reducing ring as described in para 0704 to be locked onto the fixed multi-occupant chamber, for the door of the transportable chamber to be opened, and if necessary removed, and for the patient to be transferred without loss of pressure. They should be clearly marked to indicate that they are NATO adaptors, and are to be manufactured to withstand a working pressure of at least 5 bar (71psi) and a test pressure of at least 7.5 bar (107psi). The minimum dimensions required for the fixed multiplace chamber are given in para 0205, and for the transportable chamber in para 0206. Required horizontal clearances for mating are given in para 0207.

0204 Adaptor Set Female Coupling (Locking Ring)

The dimensions of the standard female coupling (locking ring) are given in Figure 2-1 below.

Figure 2-1. Female Coupling (Locking Ring) (Schematic)

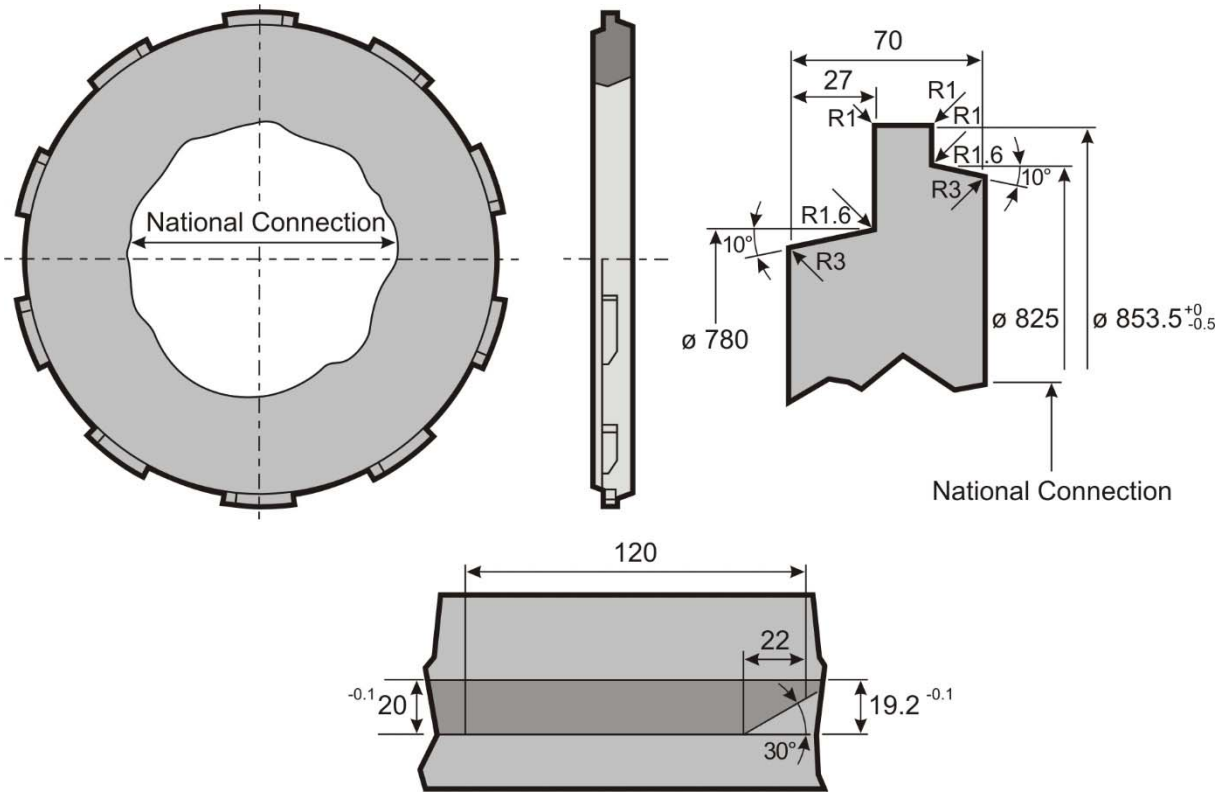


NATO UNCLASSIFIED

0205 Adaptor Set Male Coupling (Reducing Ring)

The dimensions of the standard male coupling (reducing ring) are given in Figure 2-2 below.

Figure 2-2. Male Coupling (Reducing Ring) (Schematic)

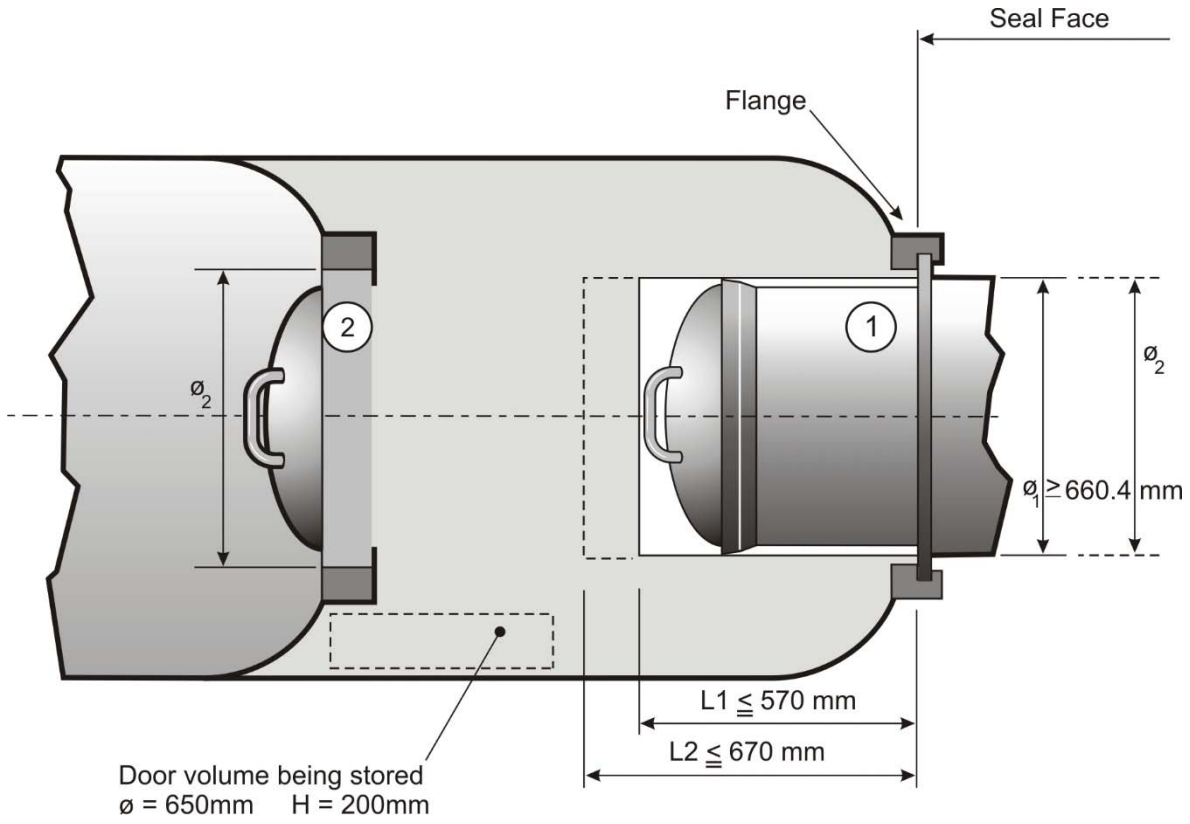


NATO UNCLASSIFIED

0206 Basic Dimensions for a Treatment Chamber to Allow Mating with a Transport Chamber

The required dimensions for a treatment chamber to allow mating with a transport chamber are given in Figure 2-3 below.

Figure 2-3. Dimensions of Treatment Chamber (Schematic)



NATO UNCLASSIFIED

Notes:

1. L1 = Minimum length for mating with door of transport chamber locked.
L2 = Minimum length to allow removal of transport chamber door.

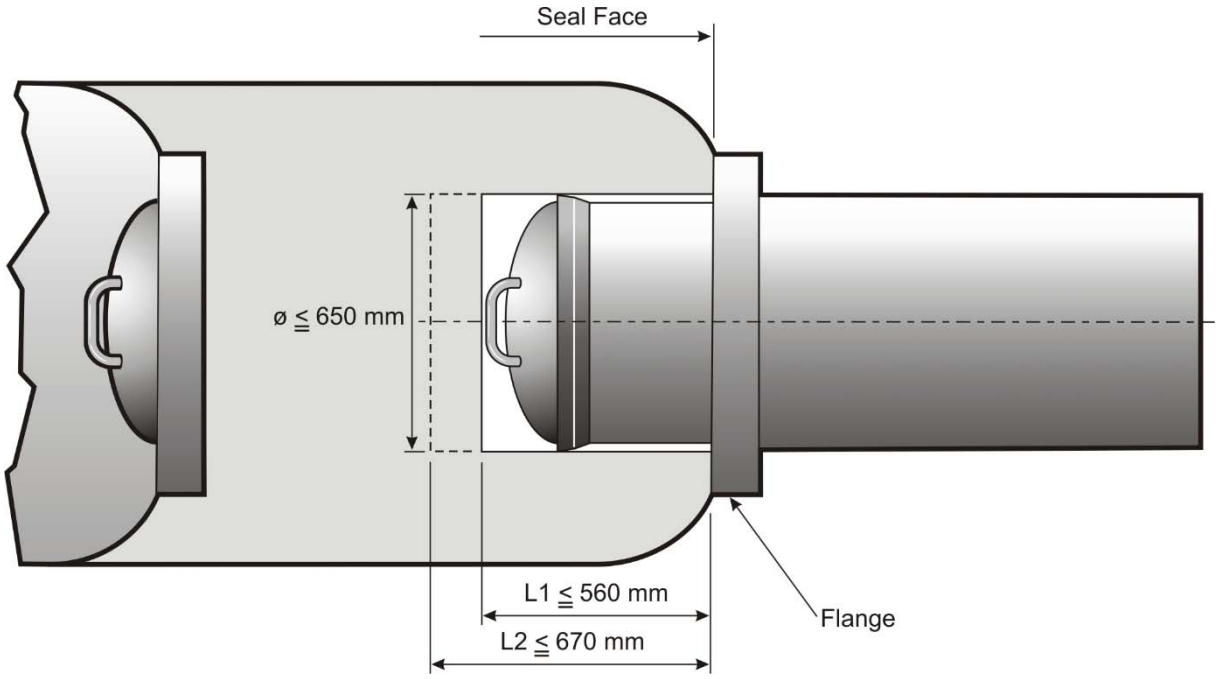
2. All new design treatment chambers will provide a minimum inside diameter of 700 mm for entrances 1 and 2.

3. CAN uses DUOCOM transport chambers which need L1 > 1090 mm for mating and L2 > 1900 mm to remove the boot. This is in excess of the minimum requirements and so the DUOCOM chamber will not be fully compatible.

0207 Basic Dimensions for a Transport Chamber to allow Mating with a Treatment Chamber

The required dimensions for a transport chamber to allow mating with a treatment chamber are given in Figure 2-4 below.

Figure 2-4. Dimensions of Transport Chamber (Schematic)



NATO UNCLASSIFIED

Notes:

1. L1 = Maximum length for mating with door of transport chamber locked.
L2 = Maximum length to allow removal of transport chamber door.

2. It must be possible to equalize the pressure and remove the door when the end of the transport chamber is placed in a cylinder of 650 mm diameter and 700 mm long.

0208 Nations Utilising Transportable Compression Chambers and Required Horizontal Clearance for Coupling Compression Chambers

A list of transportable compression chambers used by nations, their weight occupied, and the minimum horizontal clearance required to mate to a treatment chamber is given below:

Table 7-1. Required Horizontal Clearance for Coupling Compression Chambers

Nation	Type of Chamber	Weight Occupied (approx)	Minimum Horizontal Clearance
BEL	NA	NA	NA
CAN	Drager Duocom (with undercarriage)	410 Kg 675 Kg	270 cm
CZE	HAUX Starcom 1300/5.5 (with undercarriage)	3500 Kg 20000 Kg	110 cm
DEU	NA	NA	NA
DNK	HAUX Starmed Containerised	18000 Kg	NA
ESP	DART	445 Kg	325 cm
FRA	DCN	550kg	320cm
GBR	NA	NA	NA
GRC	NA	NA	NA
ITA	NA	NA	NA
LTU	HAUX Starcom 1500/14	20000 Kg	NA
NLD	DART-ATEL Duocom	445 Kg	325 cm
NOR	NA	NA	NA
POL	NA	NA	NA
PRT	NA	NA	NA
SVN	Galeazzi	350 Kg	250 cm
TUR	HYTECH DART-ATEL P1247 HAUX Medistar/Medilock	500 Kg 600 Kg	325 cm 235 cm
USA	NA	NA	NA
NATO UNCLASSIFIED			

NA = Not Applicable, Nation **does not** have a TUP capability.

CHAPTER 3 - RELATED CIVILIAN DOCUMENTS

Civilian documents relevant to the subject matter of this book, both international and national are listed as follows:

0301 International

1. International Maritime Organisation - Code of Safety for Diving Systems - 1985.

2. Petroleum Engineering Division of the UK Department of Energy/Norwegian Petroleum Directorate - Draft Guidelines for minimum performance requirements and standard unmanned test procedures for underwater breathing apparatus.

0302 European Economic Community

1. European Diving Technology Committee - Guidance Notes for Safe Diving - Published with the agreement of the EDTC by the Mines Safety and Health Commission of the EEC.

2. European standard – Respiratory Equipment - Open circuit self-contained compressed air diving apparatus –Requirements testing, marking.

3. European Standard - Respiratory Protective Devices - Definitions of terms and pictograms. (EN 132: 1999).

4. European Standard - Respiratory Protective Devices - List of equivalent terms (EN 135: 1999).

5. European Standard - Respiratory Equipment - Self-contained re-breathing diving apparatus (EN 14143: 2013).

6. European Standard - Respiratory Equipment - Open circuit umbilical supplied compressed gas diving equipment - Part 1: Demand apparatus (EN 15333-1:2008)

7. European Standard - Respiratory Equipment - Open circuit umbilical supplied compressed gas diving equipment - Part 2: Free Flow Apparatus (EN 15333-2:2009)

8. European standard - Diving accessories - Buoyancy compensators – Functional and safety requirements, test methods (EN 1809: 2019 & A1: 2016)

9. European standard - Diving accessories - Combined buoyancy and rescue devices – functional and safety requirements, test methods (EN 12628: 1999)

10. European standard - Diving suits-part1: Wet suits – requirements and test methods (EN 14225-1: 2017)

11. European standard - Diving suits-part 2: Dry suits – requirements and test methods (EN 14225-2: 2017)

12. European Standard - Diving suits part 3. Actively heated or cooled suits (systems) - requirement and test methods (EN 14225-3 2017)

14. European Standard - Pressure Vessels for Human Occupancy. - Multi place pressure chamber systems for hyperbaric therapy - Performance, safety requirements and testing (EN 14931: 2006)

0303 National

1. Belgium (BEL)/
Codex on the wellbeing at work, book V, title 4 (activities in hyperbaric environment).

2. Bulgaria (BGR) - Nil

3. Canada (CAN)

a. Canada Oil and Gas Regulations - Diving.

b. Canadian Standards Association - CSA Standard

Z275.1 Hyperbaric Facilities

Z275.2 Occupational Diving Safety Code

Z275.3 Work in Pressurized Environments

Z275.4 Occupational Diving Competency

Z275.5 Training for Diving Operations

Z275.6 UXO Diving

4. The Czech Republic (CZE)

a. Cruise Public Notice SPS 1/2002 dated 21.06.2002

b. Safety Cruise Rule of the Czech Republic - Public Notice No 344/1991 Coll. dated 10.06.1991

Water Law No 254/2001 Coll. As amended by the Act No 76/2002 Coll. Public Notice of Ministry of Transport Ch 7 Para 5 according to Law No 254/2001 Coll.

5. Denmark (DNK)

a. Danish Divers Act No.936 of 10 October 2010.

b. Ministry of Industry Regulations:

(1) Regulation concerning Diving Equipment - No.823 of 5 November 1999.

(2) Regulation concerning Safeguarding of Commercial Diving - No.828 if 1st September 2000.

(3) Regulation concerning Medical Examination of Commercial Diver Candidates and Commercial Divers - No.476 of 17 June 1999.

(4) Regulation concerning Commercial Diving Examinations and Courses - No.1520 of 15th December 2009.

(5) Regulation concerning offshore diving operations and diving equipment – No. 685 of 12 July 2000.

6. France (FRA)

a. Official Bulletin of the Ministry of Labour, Special Section No.74 - 48B Special protective measures applicable to divers.

b. Underwater welding procedures (publication imminent).

c. French Federation of Underwater Research and Sports (FFESSM) Regulations.

7. Germany (DEU)

a. Germanischer Lloyd SE: Rules for classification and Construction - I Ship Technology -5 Underwater Technology (2009)

- Chapter 1 - Diving Systems and Diving Simulators.
- Chapter 2 - Manned Submersibles.
- Chapter 3 -Unmanned submersibles (ROV, AUV) and Underwater Working Machines.

b. Council directive of 21 December on the approximation of the laws of the member states relating to personal protective equipment (89/686/EWG*89/686/EEC* 89/686/CEE).

c. German regulations for Safety and Health at Work Number 23 (BGVC23 2001)

8. Great Britain (GBR)

a. **Acts and Regulations**

(1) The Health and Safety at Work etc Act 1974.

(2) The Mineral Workings (Offshore Installations) Act 1971.

(3) The Oil and Pipelines Act 1985.

(4) The Diving Operations at Work Regulations 1997 SI 1997 No 2776.

(5) The Merchant Shipping (Diving Operations) Regulations 1975, SI 1975 No.116.

(6) The Merchant Shipping (Submersible Craft Construction and Survey) Regulations 1981, SI 1981 No.1098.

(7) The Submarine Pipelines (Diving Operations) Regulations 1976, SI 1976 No.923.

(8) The Submarine Pipelines (Inspectors etc) Regulations 1977, SI 1977 No.835.

b. **Guidance Codes and Manuals**

(1) Health and Safety Executive Employment Medical Advisory Service - MA 1 - The Medical Examination of Divers.

(2) Department of Energy Petroleum Engineering Directorate - Guidelines for the specification and operation of dynamically positioned diving support vessels.

(3) Diving information sheets issued by the Health and Safety Executive.

(4) International Marine Contractors Association (IMCA)

c. **Standards**

(1) British Standards (various used as procurement standards).

(2) Defence Standards (various used as procurement standards).

(3) Lloyds Register of Shipping - Rules and regulations for the construction and classification of submersibles and diving systems - 2019.

9. Greece (GRC) - Nil.

10. Italy (ITA)

a. RINA – Registro Navale Italiano

(1) European Directive 96/98/EC and subsequent amendments certification program for:

- Buoyancy compensators.
- Self-contained underwater breathing apparatus.
- Diving Accessories.
- Half mask /Full face mask.
- Diving suits (Dry & Wet).

(2) RES.15/E (2011). Rules for the classification of underwater units.

(3) NC/C.34 (1997). Rules for the type approval and testing of portable flexible hyperbaric chambers.

b. UNI – Ente nazionale italiano di Unificazione

(1) UNI 11366. Safety and Health in professional diving industry.

11. Lithuania (LTU) – General safety rules of Diving Works endorsed by the Ministry of Transport and Communications are not applicable to Military Divers.

12. Netherlands (NLD) - Health and Safety rules for Professional Diving.

13. Norway (NOR)

a. Norwegian Petroleum Directorate and the Norwegian Board of Health - Regulations relating to manned underwater operations in the petroleum activities. Issued 1990-06-11. Last amended 1998-02-25. ISBN 82-7257-595-7:

(1) Guidelines to regulations relating to manned underwater operations etc.

(2) Guidelines on qualifications for personnel engaged in manned underwater operations.

(3) Guidelines for the specification and operation of dynamically positioned support vessels.

(4) Guidelines for evaluation of breathing apparatus for use in manned underwater operations etc.

b. Det Norske Veritas (The Norwegian Veritas)- Rules for Certification of Diving Systems. 1998-01-01. NV 1.88.400.

c. Act no 4 of 1977-02-04 Relating to Workers protection and Working environment:

(1) Regulation no. 441 - Pressure vessels for Diving and Respiratory Protective Devices of 1983-11-15.

(2) Regulation no. 511 - Diving of 1998-07-02.

d. European Standard EN 12021 adopted by Norwegian Standard as NS-EN 12021 - Respiratory protective devices - Compressed air for breathing apparatus. 1999-05-01.

14. Poland (POL)

a. The law, date of issue 17.10.2003 (Dz. U. nr 199 poz. 1936) on underwater works performing.

b. Minister of defence decree, date of issue 13.07.2005 (Dz. U. Nr 185, poz. 1547) in the matter of underwater works performing.

c. Minister of defence decree, date of issue 15.07.2005 (Dz. U. Nr 150, poz. 1261) in the matter of define the military qualifications for personnel performing underwater works.

d. Minister’s of health decree, date of issue 12.12.2002 (Dz. U. Nr 216, poz.1831) in the matter of underwater works performing.

e. Minister’s of infrastructure decree, date of issue 19.05.2004 (Dz. U. Nr 116, poz. 1210) in the matter of Occupational Health and Safety during underwater works performing.

15. Portugal (PRT)

a. Act No.070 of 1 September 2014. - (Regulations for professional diving exercise).

b. Act No.024 of 20 March 2013. - (Regulation for recreational diving activity).

16. Spain (ESP)

a. Order 14 OCT 1997, Safety Rules for underwater activities.

b. Resolution 20 ENE 1999, Dirección General de la Marina Mercante, updating tables belong to Order 14 OCT 1997, Safety Rules for underwater activities.

c. Order 20 JUL 2000, change to Safety Rules for underwater activities, Order 14 OCT 1997 L.O. 5/2002, 19 JUN.

d. Decree 366/2005 08 APR, Regulation of technical instruction MIE AP-18 belong to Regulation of pressure apparatus, breathing apparatus, and diving system installations for underwater activities.

e. Resolution 09 JUN 2009, de la Dirección General de Trabajo, Regulation and Register of the first Agreement of professional divers and hyperbaric systems.

f. Decree 2060/08 de 12 DIC (BOE 31/2009), Regulation for Pressure Containers.

g. Safety rules for underwater activities in sea and interior waters Order of 30 JUL 81 (BOE 271).

h. Coral - Fishing Regulations - (RD Number 1212 of 8 JUN 84 (BOE 152/84).

i. Ministry of Industry: Regulation of pressure containers.

17. Turkey (TUR) – Diving Industry Regulations (Sanayi Dalgıçlığı Yönetmeliği)

18. United States of America (USA)

a, Occupational Safety and Health Administration (OSHA) 29 CFR 1910.410, 420, 422, 430.

b. National Oceanic and Atmospheric Administration (NOAA) Circular 74-62.

c. National Oceanic and Atmospheric Administration (NOAA) Diving Manual.

CHAPTER 4 - CONSUMABLES USED IN DIVING OPERATIONS

0401 Belgium (BEL)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-99-304-5753
Description	INTERSORB DIVE GRADE 812, 5l jerrycan"
Manufacture Standard	STANAG N°1411

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-01-555-1693
Description	CHRISTO-LUBE MCG-111
Manufacture Standard	Lubrication technology, Inc 7595 Gallia Pike Franklin Furnace, OHIO 45629

b. **General Purpose**

NATO Stock Number	9150-01-364-0218
Description	Silicone graisse robinets 100 g Pate 428 Rhodorsil silicone
Manufacture Standard	Usine silicones BP 22 69191 Saint - Fons Cedex Telephone (7) 870.92.31 Telex - Rhone 900870F France
NATO Stock Number	9150-13-119-0437
Description	Silicone spray
Manufacture Standard	T.F.V., 101, Zuiderring, 2400, MOL, BELGIUM

0402 Canada (CAN)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-21-857-8940
Description	Soda Lime for removal of CO2 in U/W Breathing Apparatus, 8-12 Mesh British Standard To CF Specification D-87-003-001/SF-000 Dated 1992-12-01
Manufacture Standard	

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-01-364-0218
Description	Christo-Lube MCG III for use in ALL Diver's Breathing Oxygen Systems (1 LB jar 8oz tube)
Manufacture Standard	MIL Spec# Mil-G-276175

b. **General Purpose**

NATO Stock Number	6850-00-3432-6548
Description	Dow Corning 111 Silicone Based Lubricant
Manufacture Standard	Mil-S-86608, S-736

0403 Denmark (DNK)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-99-728-7759
Description	4.5 kg of Soda Lime Granulate, for Interspiro ACSC Diving Apparatus
Manufacture Standard	Molecular Products SOFNOLIME

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-22-609-4370
Description	KRYTOX GPL-205 in 14g tube
Manufacture Standard	

0404 France (FRA)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-14-307-6604
Description	Soda Lime Granules in 5 Kg jars (case of 6)
Manufacture Standard	DRAGER PRO

2 Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-14-375-0663
Description	Grease Fomblin in 100g tube
Manufacture Standard	Fomblin
NATO Stock Number	9150-14-399-6537
Description	Oil Fomblin in 1 Kg can
Manufacture Standard	Fomblin

b. **General Purpose**

NATO Stock Number	6810-14-213-0244T
Description	Glycerine Solution in 2 litre can
Manufacture Standard	
NATO Stock Number	6810-14-213-0243
Description	Glycerine Solution in 20litre can
Manufacture Standard	
NATO Stock Number	6810-14-213-0242T
Description	Glycerine Solution in 200itre can
Manufacture Standard	
NATO Stock Number	6810-14-302-7437
Description	Glycerine Solution in bulk
Manufacture Standard	

0405 Germany (DEU)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-12-348-4361
Description	Granular Lime in Polypropylene Container, 4,5 kg
Manufacture Standard	Dräger Dive Sorb pro, HstC: CH 5810

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	8030-12-124-6565
Description	Compound, Anti-Sieze (S-717) for hyperbaric oxygen installations, 500 g tin
Manufacture Standard	US Mil - T - 5542 (Mi)
NATO Stock Number	9150-12-362-2464
Description	Halocarbon Grease 28 g tube
Manufacture Standard	HstC: CH 5810
Stock Number	SMO34
Description	Christo-Lube
Manufacture Standard	HstC: C8389

b. **General Purpose**

NATO Stock Number	9150-12-130-3716
Description	Grease (G-394) for compressed air equipment and rubber maintenance, loose
Manufacture Standard	DTD 847 B
NATO Stock Number	9150-12-192-6651
Description	Grease (G-394) for compressed air equipment and rubber maintenance, 200 g tube
Manufacture Standard	DTD 847 B
NATO Stock Number	9150-12-148-7049
Description	Grease (G-394) for compressed air equipment and rubber maintenance, 500 g tin
Manufacture Standard	DTD 847 B

NATO Stock Number Description Manufacture Standard	6810-12-121-1765 Glycerine
NATO Stock Number Description Manufacture Standard	9150-12-372-8900 Silicon oil
Stock Number Description Manufacture Standard	331900268 Special Grease for bottles
NATO Stock Number Description Manufacture Standard	9150-13-117-5838 Renolit (Silicon Grease W416)
NATO Stock Number Description Manufacture Standard	9150-12-306-3742 Molykote
NATO Stock Number Description Manufacture Standard	6859-12-303-5253 Silicon spray
NATO Stock Number Description Manufacture Standard	9150-12-182-1191 Grease Pencil
Stock Number Description Manufacture Standard	6850-12-340-4360 Baysilone

0406 Greece (GRC)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-12-348-4361
Description	Granular Lime in Polypropylene Container, 4,5 kg
Manufacture Standard	Dräger Dive Sorb pro, HstC: CH 5810

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-12-362-2464
Description	Halocarbon Grease
Manufacture Standard	Dräger Safety AG&CO

b. **General Purpose**

NATO Stock Number	9150-12-363-5511
Description	Silicon Grease W410
Manufacture Standard	Dräger Safety AG&CO

0407 Great Britain (GBR)

1. Carbon Dioxide Absorbent

NATO Stock Number	6505-99-541-3854
Description	Soda Lime in Polypropylene container W/Lid
Manufacture Standard	UK standard CS2580B Grade D
NATO Stock Number	681Q 99 2201632
Description	Soda Technical Granular, Non-indicating No.8-12 Mesh, CO2 Absorbent 20 kg Drum
Manufacture Standard	UK Standard CS2580B Grade D

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	0883-9150-01-442-4235
Description	Grease, Special Purpose, 2 oz tube (Crystolube)
Manufacture Standard	Proprietary product

b. **General Purpose**

NATO Stock Number	5970-99-220-2421
Description	Insulating filling compound, paste form, non-corrosive to metals, specifically resistant to moisture, 50 g tube XG-250 (NATO S-736)
Manufacture Standard	UK DEF STAN 59-10/2
NATO Stock Number	6850-99-224-8408
Description	Insulating filling compound, paste form, non-corrosive to metals, specifically resistant to moisture, 1 kg tin XG-250 (NATO S-736)
Manufacture Standard	UK DEF STAN 59-10/2
NATO Stock Number	5970-99-807-0400
Description	Insulating filling compound, paste form, non-corrosive to metals, specifically resistant to moisture, 5 kg tin XG-250 (NATO S-736)
Manufacture Standard	UK DEF STAN 59-10/2

0408 Italy (ITA)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-12-348-4361
Description	Drager Sorb Pro Soda Lime in hemi-spherical pellets
Manufacture Standard	ISO 3310, 2-4 mm

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	N/A
Description	OMG Oxygrease - 7 grams
Manufacture Standard	Proprietary product
NATO Stock Number	9150-01-364--218
Description	Christo-Lube MCG 111
Manufacture Standard	MIL-PRF-27617F Types I, II and III

b. **General Purpose**

NATO Stock Number	6850-00-3432-6548
Description	Dow Corning 111
Manufacture Standard	Mil0S-86608, S-736
NATO Stock Number	N/A
Description	3m Silicone Spray (P/N 62-4678-4930-3)
Manufacture Standard	Proprietary Standards

0409 Lithuania (LTU)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-14-307-6604
Description	Soda Lime Granules in 20 kg jars
Manufacture Standard	DRAGER PRO

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-01-364-0218
Description	Christo-Lube MCG 111
Manufacture Standard	Lubrication Technology, inc 7595 Gallia Pike Franklin Furnace OHIO 45629

0410 Netherlands (NLD)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-17-055-3036
Description	Soda Lime in Polypropylene containers. (20 ltr)
Manufacture Standard	4240-12-348-4361 Granular Lime in Polyproylene Container 4,5 kg Manufacture Standard: Draeger Dive Sorb Pro, HstC, CH5810

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number:	9150-01-441-9016
Description:	Christo-Lube, lubricant grease MCG 111 Batch 153 (2 oz)
Manufacture Standard	

b. **General Purpose**

NATO Stock Number	H9150-99-220-1438
Description	Grease G-394 (General Purpose). For use in pneumatic systems and rubber seals (100 g)
Manufacture Standard	DEF STAN 91-56/1
NATO Stock Number	H9150-12-124-5785
Description	Grease S-743. (General Purpose) For use in reducing valve (1kg)
Manufacture Standard	DEF STAN 91-38/1 (Grade PX-7)

0411 Norway (NOR)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-99-778-7520
Description	Pustekalk, 8-10 mesh for Interspiro Oxy-Dive Soda lime in polypropylene container with lid 20 litres.
Manufacture Standard	UK standard CS2580B Grade D

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-25-145-6700
Description	Braycote grease, syringes 2 oz, Oxygen resistant grease max 300 bar.
Manufacture Standard	Mil-G-27617 type III, 806 Castrol Inc.

b. **General Purpose**

NATO Stock Number	6850-25-101-2793
Description	Silicone compound 50 gram tube.
Manufacture Standard	Mil- S-8660B AMD3.

0412 Poland (POL)

1. Carbon Dioxide Absorbent

NATO Stock Number	6810-99-225-1786 6810-01-412-0637
Description	Sofnolime, D Grade, 1,0 – 2,5 mm granules, available in 4.5 kg canisters. Sofnolime, L Grade, 2,0 – 5,0 mm granules, available in 4.5 kg canisters.
Manufacture Standard	Molecular Products Ltd. Mill End, Essex, CM6 2LT UK

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-01-364-0218
Description	CHRISTO-LUBE MCG-111
Manufacture Standard	Peter Built Co 7990 county road 20 Galion OHIO 44833
NATO Stock Number	9150-00-961-8995
Description	KRYTOX 240 AC
Manufacture Standard	Du Pont Type 111 MIL-G-27617D

b. **General Purpose**

NATO Stock Number	-
Description	MOLYKOTE 55M Silicone Grease
Manufacture Standard	Dow Corning GMBH Rheingaustrasse 34 Wiesbaden 65201 GERMANY

0413 Portugal (PRT)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-12-376-0682 4240-MD-034-2238
Description	Draeger Divesorb Pro grade Size 2.0-4.0 mm Molecular Products Sofnolime grade Size 1.0-2.5 mm
Manufacture Standard	Drager Germany SN AREB-F002 Service Sorbents France CS2580B Grade D

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-01-441-9016
Description	Christo-Lube, lubricant grease MCG 111
Manufacture Standard	Batch 153 (2 oz)

b. **General Purpose**

NATO Stock Number	9150-01-441-9016
Description	Christo-Lube, lubricant grease MCG 111
Manufacture Standard	Batch 153 (2 oz)

0414 Spain (ESP)

1. Carbon Dioxide Absorbent

NATO Stock Number Description Manufacture Standard	6810-14-307-6604 Soda Lime Type GERS, CA(OH)2 82% DCAN Toulon
NATO Stock Number Description Manufacture Standard	4240-12-348-4361 Granular Lime in Polypropylene Container, 4,5 kg Dräger Dive Sorb pro, HstC: CH 5810
NATO Stock Number Description Manufacture Standard	6810-14-307-6604 Soda Lime Granules in 5 Kg container (case of 6) DRAGER PRO
NATO Stock Number Description Manufacture Standard	4220-20-003-4144 SOFNOLIME CS2580B D GRADE" MOLECULAR Products LTD, Parkway, Harlow Business Park, HARLOW, ESSEX, CM195FR UK

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number Description Manufacture Standard	9150-33-525-9285 Grease-Silicone "SUPERGRAS" MIL-S-8660B
NATO Stock Number Description Manufacture Standard	SMO34 Christo-Lube HstC: C8389

0415 Slovenia (SVN)

1. Carbon Dioxide Absorbent

NATO Stock Number	4240-12-348-4361
Description	4.5 kg Soda Lime Granulate, Dive Sorb Pro
Manufacture Standard	DRAGER

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-14-545-1482
Description	Christolube MCG 111
Manufacture Standard	

b. **General Purpose**

NATO Stock Number	9150-14-545-1482
Description	Christolube MCG 111
Manufacture Standard	

0417 Turkey (TUR)

1. Carbon Dioxide Absorbent

NATO Stock Number	-
Description	CO2 Absorbent, Granular FSN L-6505-053-2461. 5 gallon container
Manufacture Standard	US MIL SPEC 6505-01-113-0110

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible Nil Listed**

b. **General Purpose**

NATO Stock Number	9150-00-235-9062
Description	Compressor Oil 2190 TEP
Manufacture Standard	US MIL SPEC L - 17331

0417 United States of America (USA)

1. Carbon Dioxide Absorbent

NATO Stock Number	6505-00-053-2461
Description	CO2 Absorbent, Granular FSN 9L 5 gallon container.
Manufacture Standard	MIL SPEC 6505-01-113-0110

2. Lubricants and Greases for use on Diving Equipment

a. **Oxygen Compatible**

NATO Stock Number	9150-00-961-8995
Description	Halocarbon Grease
Manufacture Standard	MIL SPEC G 27617 D

b. **General Purpose**

NATO Stock Number	9150-00-235-9062
Description	Compressor Oil 2190 TEP
Manufacture Standard	MIL SPEC L-17331

CHAPTER 5 - MILITARY APPLICATIONS OF REMOTELY OPERATED VEHICLES (ROVs) AND AUTONOMOUS UNDERWATER VEHICLES (AUV) OUTSIDE OF MINE WARFARE

0501. Regular Application of ROV/AUVs

1. Underwater Inspections. These tasks are performed day-to day by divers, frequently in an unfavourable environment (e.g. muddy and polluted water). In order to accomplish this type of mission, an ROV/AUV should have some or all of the following features:

a. An automatic navigation system able to follow a set path.

b. A system capable of maintaining the ROV/AUV at a constant distance from the surface to be inspected; such control may be exercised electronically by means of a sonar rangefinder, or mechanically by keeping the vehicle in contact with the hull by means of wheels.

c. An accurate and highly sensitive camera to recognise a suspect object in the dark, the camera lens must be moveable to the left and right, also up and down to enable an object to be displayed even if it is not in line with the ROV/AUV.

d. To overcome the turbidity of the water in ports, possibly an acoustic camera combined with the ROV/AUV visual camera unit.

e. When possible a rear facing camera should be fitted to assist egress from confined spaces.

2. Beach Survey. Beach survey by special forces in enemy held-territory is extremely dangerous. A ROV/AUV designed for this mission would eliminate the risk to personnel and would supply images with centimetric accuracy and of a quality higher than those transmitted via satellite. The ROV/AUV should have some or all of the following features:

a. A camera unit able to work on land in the dark, in water containing particles in suspension (an image intensification camera combined with an acoustic camera).

b. Of heavy construction to avoid the ROV/AUV being affected by swell. Propulsion by means of tracks offers good stability and allows work on the foreshore (change of medium).

c. A precise positioning system.

d. A mine destruction system.

3. Ventilation of a Submarine. Ventilation of a submarine in difficulties on the seabed could be entrusted to an ROV, designed and developed specially for this type of task. The lives of the submariners depend on the success of the operation. The ROV should have some or all of the following features:

a. An accurate 3D steering system to allow optimum positioning on its target.

b. The ability to clamp itself to the submarine in cases where the latter is not resting on a flat seabed.

c. An automatic system with special tools adapted for displacing of ventilation hoses and to operate the valves.

4. Support for Human Diving Operations. ROV/AUVs can provide various types of support for:

a. **Offensive Support.** Emplacement of a heavy explosive charge (possibly remotely).

b. **Passive Support.** Decoying, smokescreen, diversion, jamming.

c. **Logistic Support.** Deployment of equipment, gas reservoir, an additional light source, an audiovisual link with the surface.

0502. ROV's Matrix. The following matrix represents all of the ROVs currently used by participating nations with their main characteristics.

Table 5-1. NATO ROVs Grid

				APPLICATION							
NATION	**CLASS**	**MAX DEPTH Metres (Feet)**	**No**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CAN	DSIS	1000 (3280)	1							X	
CAN	BOIV	300 (984)	1							X	
CAN	PHANTOM 4	300 (984)								X	
DEU	HY-BALL	300 (984)	2	X	X					X	
DNK	DOUBLE EAGLE	300 (984)	5							X	
DNK	FALCON	300 (984)	2	X						X	
ESP	SCORPION 3 PERRY	550 (1805)	1							X	
ESP	PLUTO	300 (984)	4							X	
ESP	NAVAJO (SUBATLANTIC)	300 (984)	3	X			X			X	X
FRA	ACHILLE	400 (1312)	1	X							
FRA	ULISSE	1000 (3280)	1	X							
FRA	DIOMEDE	2000 (6562)	1	X		X					

NATION	**CLASS**	**NAVIGATION**	**MANIPULATOR ARMS (CAPACITY/Kg)**	**DIMENSIONS (METRES)**	**WEIGHT (Kg)**	**OBSERVATIONS**
CAN	DSIS	Sounder Sonar 1 Colour Camera 2 x B/W Camera	2 arms 125Kg	2.3 x 1.3 x 1.6	1850	Used for deep seabed intervention salvage
CAN	BOIV	Sonar 1 Colour Camera 1 x B/W Camera	0	2.5 x 1.1 x .1		Used for bottom object inspection
CAN	PHANTOM 4	Sonar 1 Colour Camera	1 Kg	1.5 x .85 x 0.7	118	Used to support dive ops
DEU	HY-BALL			0.65 x 0.53 x 0.48	43	
DNK	DOUBLE EAGLE	Sounder Sonar 2 Cameras	2 Kg	1.9 x 1.3 x 0.8	300	Payload 80Kg
DNK	FALCON	1 Colour Camera Electronic compass	1 arm 10 Kg	1.0 x 0.76 x 0.58	43	
ESP	SCORPION 3 PERRY	Sounder, Sonar Gyro Depth gauge 2 Cameras	2 Arms 27 & 150 Kg	2.03 x 1.44 x 1.14	1370	
ESP	PLUTO	Sounder, Sonar B/W Sonar Compass Counter Charge Release System		1.7 x 0.6 x 0.8	160	Dive unit available apart from HMC. Remove UXO's counter charge capability
ESP	NAVAJO	Sounder, Sonar Giro Depth gauge 1 camera	1 Arm 10 kg	1.4 x 0.6 x 0.3	60 kg	
FRA	ACHILLE	Depth Gauge Sonar Camera	1 Kg	0.72 x 0.6 x 0.51	70 KG	
FRA	ULISSE	Depth Gauge Altimeter/Sonar Compass/Acoustic Localisation system 1x colour Video Camera 1 x B/W Camera	17 Kg	1.34 x 1.09 x 1.0	526 KG	Speed 2 Kts

FRA	DIOMEDE	Depth Gauge Altimeter/Sonar Compass/Acoustic Localisation system 1x colour Video Camera 1 x B/W Camera 1 x *blueview* Camera	1 arm 7 function/130 Kg 1 arm 5 function/130 Kg	2.004 x 1.242 x 1.114	350 KG	
NATO UNCLASSIFIED						

Table 5-1 (continued). NATO ROVs Grid

				APPLICATION							
NATION	**CLASS**	**MAX DEPTH Metres (Feet)**	**No**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
GBR	SEAEYE FALCON	300 (984)	2	X							
GBR	SEABOTIX LBV	150 (492)	2	X							
GRC	VIDEORAY PRO 4	300 (984)	1	X			X			X	X
ITA	PLUTO STD	300 (984)	8	X			X			X	
ITA	PLUTO PLUS	300 (984)	8	X			X			X	
ITA	PLUTO GIGAS	600 (1968)	8	X			X			X	
ITA	FALCON	300 (984)	2	X		X	X	X		X	X
ITA	OBSERVER	150 (492)	8	X			X	X		X	

NATION	**CLASS**	**NAVIGATION**	**MANIPULATOR ARMS (CAPACITY/Kg)**	**DIMENSIONS (METRES)**	**WEIGHT (Kg)**	**OBSERVATIONS**
GBR	SEAEYE FALCON	1 Colour & 1 B/W Low Light Camera	15 Function Manipulator 30kg Capacity	1.00 x 0.5 x 0.6	50 (95 with Manipulator)	Used for Underwater Inspections, Object Location & Recovery. 1 Based in Plymouth and 1 in Faslane
GBR	SEABOTIX LBV	1 Colour & 1 B/W Low Light Camera		0.53 x 0.235 x 0.254	10	Used for Underwater Survey & Inspections. 1 Based in Plymouth and 1 in Faslane
GRC	VIDEORAY PRO 4	Multibeam Sonar, Compass, Camera, Auto Leading, Auto Depth	4,5 (Lifting Power 20Kg)	0.38 x 0.29 x 0.23	4.8	Mini ROV (100m cable)
ITA	PLUTO STD	Sonar B/W Video Camera Photo Camera Electronic Compass		1.7 x 0.6 x 0.8	160	UXO's.Counter Charge Capability
ITA	PLUTO PLUS	3 Sonar Colour Camera, Electronic Compass, SBL Transponder Fibre-Optic Umbilical		2.2 x 5.8 x 7.7	315	UXO's.Counter Charge Capability
ITA	PLUTO GIGAS	4 Sonar Colour Camera, Electronic Compass, SBL Transponder Fibre-Optic Umbilical		3.3 X 6.1 X 7.8	600	UXO's.Counter Charge Capability
ITA	FALCON	Colour Camera Electronic Compass	1 Arm - 10Kg	1.0x 0.7 x 0.5	43	
ITA	OBSERVER	2 Colour Camera Digital Compass USBL Positioning		0.4 x 0.2 x 0.2	7	Mini ROV
NATO UNCLASSIFIED						

Table 5-1 (continued). NATO ROVs Grid

				APPLICATION							
NATION	**CLASS**	**MAX DEPTH Metres (Feet)**	**No**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
ITA	GNOM	150 (492)	2	X			X			X	
ITA	REMUS 100	100 (328)	1		X			X			
NLD	REMUS 100	100 (328)	5		X						
NLD	ROV	300 (984)	4	X			4			X	
NOR	SCORPION 21	1000 (3280)	1	X		X				X	
NOR	VIDEORAY PRO	300 (984)	3	X			X			X	
POL	SEAEYE FALCON (Saab)	300 (984)	3	X			X			X	X
POL	LBV 150 (Seabotix Inc.)	150 (492)	2	X			X			X	
PRT	GAVIA	200 (656)	2		X		X	X			
PRT	SEACON	100 (328)	3		X		X	X			
PRT	LBV 150 (Seabotix Inc.)	150 (492)	1	X			X			X	X
SWE	SJOUGGLAN	250 – 350 (820 – 1148)	11	X						X	
SWE	ENKELUV	250 – 350 (820 – 1148)	16								
SWE	DUBBLE-LUV	300 (984)	7								

NATION	**CLASS**	**NAVIGATION**	**MANIPULATOR ARMS (CAPACITY/Kg)**	**DIMENSIONS (METRES)**	**WEIGHT (Kg)**	**OBSERVATIONS**
ITA	GNOM	Colour Camera Digital Compass Ultra Thin Umbilical		0.3 x 0.1 x 0.1	3	Mini ROV
ITA	REMUS 100	Side Scan Sonar LBL/USBL Doppler-Assisted		Length = 0.16 Diameter = 0.2	37	AUV
NLD	REMUS 100	Inertial/Long Base Line	5 kg			Underwater search /Harbour Protection
NLD	ROV	Long Base Line				Underwater search /Harbour Protection
NOR	SCORPION 21	Sonar 2 x Sounders 4 x Cameras	Lift 250/kg law 4448N	2.03 x 1.14 x 1.04	1710	Torpedo recovery & minefield work. Speed 1.7Kts application No 3. Scorpion 21 can assist if connectors and hoses are available
NOR	VIDEORAY PRO 4	Sonar, Compass 2 x Cameras		0.38 x 0.29 x 0.23	6	Mini ROV
POL	SEAEYE FALCON (Saab)	Sonar, Compass, 2 x camera	1 arm 6 - 10 Kg	1.0 x 0.76 x 0.58	70	
POL	LBV 150 (Seabotix Inc.)	Sonar, Compass, 2 x camera	NA	0.530 x 0.245 x 0.254	11	
PRT	GAVIA	Inertial/LBL	-	Length 2.4	76	MCM AUV
PRT	SEACON	Inertial/LBL	-	Length 1.87	45	MCM AUV
PRT	LBV 150 (Seabotix Inc.)	Sonar, Compass, 2 x camera	-	0.530 x 0.245 x 0.254	10.4	Mini ROV
SWE	SJOUGGLAN	CSKDTV	1 Kg	1.4 x 0.85 x 0.8	80	ROV
SWE	ENKELUV	CLDV	1 Camera Arm	1.4 x 0.85 x 0.6	90	MCR ROV
SWE	DUBBLE-LUV	CLDV	1 Camera Arm	2.1 x 1.3 x 0.6	300	MCR ROV

NATO UNCLASSIFIED

Table 5-1 (continued). NATO ROVs Grid

				APPLICATION							
NATION	**CLASS**	**MAX DEPTH Metres (Feet)**	**No**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
SWE	MACAROV	300 (984)	2								
SWE	MANTIS	760 (2493)	3			X				X	
SWE	PHANTOM HD2	150 (492)	14							X	
TUR	TCB AHTAPOT	3000 (9843)	1	X		X	X		X	X	X
TUR	TCB ISTAKOZ	1000 (3280)	2	X		X	X		X	X	X
TUR	TCB DENIZATI	300 (984)	1	X			X			X	
TUR	TCB DENIZYILDIZI	200 (656)	4	X			X			X	X
USA	MINI ROV	300 (984)	3	X						X	
USA	DEEP DRONE	2200 (7217)	1	X						X	
USA	MAGNUM 38	2500 (8202)	1	X						X	
USA	CURV III	6000 (19685)	1	X						X	
USA	TRIUMPH	1063 (3487)	1	X						X	
USA	TUWVS	1525 (5003)	2	X						X	
USA	ATV	6000 (19685)	1	X						X	
USA	AN/SQL 48	CLASSIFIED	55	See Observations							

NATION	**CLASS**	**NAVIGATION**	**MANIPULATOR ARMS (CAPACITY/Kg)**	**DIMENSIONS (METRES)**	**WEIGHT (Kg)**	**OBSERVATIONS**
SWE	MACAROV	CLDP + SV		2.1 x 1.3 x 0.85	600	AUV/ROV
SWE	MANTIS	CSLDTV	2 x 50Kg	2.5 x 2.5 x 1.6	650	ADS/ROV
SWE	PHANTOM HD2	CSLDTV	1 x 1Kg	1.4 x 0.85 x 0.8	70	ROV
TUR	TCB AHTAPOT	USBL, Sonar, 8 x Camera	2 x 250 Kg	3 x 1.8 x 1.7	1800	Underwater & Salvage Command Istanbul
TUR	TCB ISTAKOZ	USBL, Sonar, 4 x Camera	2 x 150 Kg	2.4 x 1.3 x 1.3	1600	Underwater & Salvage Command Istanbul
TUR	TCB DENIZATI	USBL, Sonar, Camera	-	1 x 0.8 x 0.6	82	Underwater & Salvage Command Istanbul
TUR	TCB DENIZYILDIZI	USBL, Sonar, Camera	1 x 20	0.4 x 0.3 x 0.6	30	Underwater & Salvage Command Istanbul
USA	MINI ROV	Sonar, Sounder Camera	1 x 10Kg	1.2 x 1.1 x 2.2	224	US Navy SupSalv
USA	DEEP DRONE	Sonar, Sounder 3 Cameras	2 x 100Kg	2.5 x 2.7 x 2.1	1310	US Navy SupSalv
USA	MAGNUM 38	Sonar, Sounder 2 Cameras	2 x 100Kg	3.2 x 2.0 x 2.2	1306	US Navy SupSalv high thrust/high current 300kg savage lift capability
USA	CURV III	Sounder 2 x Sonar's 4 x Cameras	2 x 100Kg	3.2 x 2.0 x 2.2	5038	Deep water 80hp ROV. Redundant systems US Navy SupSalv

Table 5-1 (continued). NATO ROVs Grid

NATION	CLASS	NAVIGATION	MANIPULATOR ARMS (CAPACITY/Kg)	DIMENSIONS (METRES)	WEIGHT (Kg)	OBSERVATIONS
USA	TRIUMPH	Sounder Sonar Camera	2 X 90kg	4.8 x 2.5 x 30	1270	US Navy/NWWC Keyport WA
USA	TUWVS	Sounder Sonar Camera	2 x 100Kg	2.4 x 1.5 x 1.6	2008	US Navy/CSDR 5 San Diego CA
USA	ATV	Sounder Sonar Camera	2 x 100Kg	4.3 x 1.8 x 2.2	4852	US Navy/CSDR 5 San Diego CA
NATO UNCLASSIFIED						

APPLICATIONS

1 = Inspections of Hulls and Dock Gates.

2 = Beach Survey.

3 = Ventilation of Submarines.

4 = Survey and Investigation of Wrecks.

5 = Environmental Monitoring.

6 = Maintenance of Underwater Equipment.

7 = Support of Human Diving Operations.

8 = Recovery of Objects.

CHAPTER 6 – NATIONAL SAFE DISTANCES DURING UNDERWATER EXPLOSIONS

Table 6-1. National Safe Distances During Underwater Explosions

	BEL	CAN	DEU	DNK	ESP	FRA
OILRIG	5nm	(d)	R=12√W	2000m	Table 1.1(p)	-
PIPELINE	2000 m (6560 ft)	"	R=20√W	300m	Table 1.5	R2(240)
CABLE	1000 m (3280 ft)	"	R=20√W	300m	Table 1.5	R2(210)
COAST	4000m (e) (13100 ft)	"	(f)	200m	Table 1.1	-
SHIP	R=12√W (190m)(j)	"	R=20√W	R=12√W (h)(j)	Table 1.1	Mil 210 Mer: 420 Large: 840m
OTHER	$R=270^3\sqrt{W}$ (1700m)(k) Divers Wellheads 2 nm	"	Divers: (r) Swimmer: > 2000 m	Fish Farm: >2.5nm	Table 1.1/1.5	Divers: 2000 Wreck: 210 Locks: 2000
EXP/SCI	Unknown	Sci	Sci	Exp/Sci	Sci	Exp
PUBS	1,2,5	1,2,3	2,6	2	1,3,4	
FORMULA	$R=270^3\sqrt{W}$ R=12√W		R=20√W $R=14.4^3\sqrt{W}$		$R=270^3\sqrt{W}$	
REDUCED BY		(l), (m)	(m)			
REMARKS			For Divers: Annex B		Tables: Annex B	For R2 R3 Tables; annex B
NATO-UNCLASSIFIED						

	GBR	GRC	ITA	LTU	NLD
OILRIG	(c)	(a) (d)	2nm (b)	NA	2000 m
PIPELINE	"	(a) (d)	2nm	NA	2000 m
CABLE	"	(a) (d)	2nm	NA	1000 m
COAST	"	(a) (d)	2nm (g)	NA	(explosive weight < 50 kg): 4000 m (explosive weight > 50 kg): 7000 m
SHIP	4000 m (13100 ft) commercial	R=12 √W (j)	R=12√W (j)	R=12√W (h)(j)	Ship (gas/oil carrier): R=36√W Ship (cargo/bulk carrier): R=24√W Ship (navy ship): R=12√W
OTHER	No fly zone: 1000 m (3280 ft)	$R=270\ ^3\sqrt{W}$ Diver (k)	$R=270^3\sqrt{W}$ Diver (k)	$R=270^3\sqrt{W}$ (1700 m)(k) Diver	$R=270^3\sqrt{W}$ Diver (k) Wreck: 1000 m Measurement equipment: 1000 m No fly: 1500 m Wellheads 2 nm
EXP/SCI	Exp			Unknown	
PUBS	No	1,2,3,6		-	1,2,5,8
FORMULA				-	$R=270^3\sqrt{W}$ R=20√W
REDUCED BY	(o)		(xxxxxl)	-	
REMARKS	Depth<10m (33 ft) Dist 50%			-	

Table 6-1. National Safe Distances During Underwater Explosions (Continued)

	NOR	POL	PRT	SVN	TUR	USA
OILRIG	2nm			(a), (d)	Not Avail	(a) (d)
PIPELINE	2nm	$R=140\sqrt[3]{W}$		(a), (d)	Not Avail	"
CABLE	500m	$R=100\sqrt[3]{W}$		(a), (d)	Not Avail	"
COAST	(i) & (n)	$R=140\sqrt[3]{W}$		(a), (d)	Not Avail	"
SHIP	Mil: 1nm Civil: 2nm	$R=22\sqrt[3]{W}$	$R=9*\sqrt{W}$ (142m)		$R=12\sqrt{W}$ (j)	"
OTHER	Fish farms 2nm	$R=20\sqrt[3]{W}$ (warship) $R=70\sqrt[3]{W}$ (merchant ship) $R=100\sqrt[3]{W}$ (rowboat)	$R=270\sqrt[3]{W}$ Diver (k)	$R=270\sqrt[3]{W}$ Diver (k)	$R=270\sqrt[3]{W}$ Diver (k)	(q)
EXP/SCI	Sci	$R=1250\sqrt[3]{W}$ (swimmers) $R=210\sqrt[3]{W}$ (divers-dry suit) $R=1000\sqrt[3]{W}$ (divers-wet suit) $R=140\sqrt[3]{W}$ (fish)	Exp/Sci			
PUBS	no	Exp/Sci			1,2	2,3,4
FORMULA		No	$R=9*\sqrt{W}$ $R=270\sqrt[3]{W}$	$R=270\sqrt[3]{W}$	$R=12\sqrt{W}$ $R=270\sqrt[3]{W}$	
REDUCED BY		$R=K\sqrt[3]{W}$				
REMARKS		(l)				
NATO-UNCLASSIFIED						

Footnotes to table:

W = charge rate in kilograms (TNT equivalent)
R = distance in metres.
nm = nautical miles
m = metres

a. Depends on charge size and overpressure structure able to withstand.

b. If the kind of explosive charge is unknown: increase distance by 20%.

c. Depends on type of seabed: Mud=6,000 m sand/shingle=8,000 m/rock=10,000 m.

d. Depends on charge weight, location of charge and orientation of charge relevant to the diver.

e. Countermining: when W□500 lbs R=3 nm.

f. If depth <6 m AND W<10 KG use 1,000 m, if W>10KG use 1,250 m.

g. The biggest between 2 nm and the safety distance for swimmers and divers.

h. Minimum 1,000 m for cargo and bulk carriers.

i. If infrastructure on coast line, use 500 m.

j. Formula for warships. For merchant ships R=24?W. For very large carriers R=48√W.

k. If W<2KG R=90^3√W.

l. Reduction by BUBBLE curtain.

m. Before underwater explosions are conducted, small charges (50, 100 and 200 gr) will be dropped to disperse any marine life.

n. Use shallow water to limit damage to seabed (most of the pressure will rise up into the atmosphere).

o. Density of seabed will affect wave of detonation. Increase safety distance on high-density seabed's sand/shingle and rock. If shallower than 10 m, increase surface distance by 50%.

p. If weight W>250KG, use general distances in NEPS.

q. For MH 60 helicopter when firing 33 mm laser gun at moored mines, safety distance will be 1,500 ft.

r. In accordance with National publications

Publications:

1. ADivP-01
2. NEPS
3. USN 60 series
4. NAVSEA-SWO61-AAMMAO10
5. Marine Dienstvorschrift MDv 681/1
6. US Diving Manual
7. VS9-861

CHAPTER 7 – NATIONAL DIVING CAPABILITIES

0701 National Diving Capabilities

1. Capabilities are listed in the Annexes to Chapter 7 listed below.

Annex 7A.	Belgium (BEL)
Annex 7B.	Canada (CAN)
Annex 7C.	Croatia (HRVATSKA) (HRV)
Annex 7D.	Czech Republic (CZE)
Annex 7E.	Denmark (DNK)
Annex 7F.	France (FRA)
Annex 7G.	Germany (DEU)
Annex 7H.	Great Britain (GBR)
Annex 7I.	Greece (GRC)
Annex 7J.	Italy (ITA)
Annex 7K	Lithuania (LTU)
Annex 7L.	Netherlands (NLD)
Annex 7M.	Norway (NOR)
Annex 7N.	Poland (POL)
Annex 7O.	Portugal (PRT)
Annex 7P.	Spain (ESP)
Annex 7Q.	Slovenia (SVN)
Annex 7R.	Turkey (TUR)
Annex 7S	United States of America (USA)

2. Updated tables should be forward to the ADivP-01.1 custodian for inclusion into the relevant Annex.

ANNEX 7A

BELGIUM

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	ARMY	NAVY	AIR FORCE
AIR-SCUBA (All types)	60 m	60 m	60 m
NITROX SCUBA Cobham Viper SC Abyss Mr 22	 No No	 55m 39m	 No No
HE/0_2 SCUBA Cobham Viper +	 No	 90 m	 No
TRIMIX SCUBA Abyss MR22	 No	 90 m	 No
OXYGEN-SCUBA Aqualung Amphora	 7 m 15 m (excursion)	 No	 No
AIR-SURFACE SUPPLIED KMDSI SL 27 Divator Mk 2 (AGA)	 60 m 60 m	 60 m 60 m	 No 60 m
HE 02 SURFACE SUPPLY KM DSI SL 27	 No	 No	 No
SATURATION DIVING	No	No	No
NATO UNCLASSIFIED			

Summary of Diving Activities

	ARMY	NAVY	AIR FORCE
AIR SCUBA/SHIP'S DIVERS			
Harbour Force Protection	Yes	Yes	Yes
Underwater Search	Yes	Yes	Yes
Ship Repair/Maintenance	No	No	No
SALVAGE DIVERS			
Salvage Tasks	Yes	Yes	No
Repair Tasks	Yes	Yes	No
Investigation/Non MCM Task	Yes	Yes	No
Submarine Rescue	No	No	No
CLEARANCE/EOD DIVERS			
Clearance Search and Investigation	Yes	Yes	No
Ordnance Removal Underwater/Ashore	No	Yes	No
COMBAT SWIMMERS/COMBATANT DIVERS			
Assault	Yes	No	No
Clearance/Demolition	Yes	No	No
ENGINEER DIVER			
Construction and Repair	Yes	No	No
Search	Yes	Yes	No
Reconnaissance	Yes	Yes	No
Obstacles, Breaching and Demolitions	Yes	Yes	No
SAR DIVER			
Rescue	No	No	Yes
SATURATION DIVERS	No	No	No
CIVILIAN DIVERS			
Ship Repair	Nil	Nil	Nil
Harbour Repair	Nil	Nil	Nil
NATO UNCLASSIFIED			

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**VIPER +**
Manufacturer	Cobham – Carleton Life Support
Type	Semi Closed Circuit/Open Circuit Bailout
Gas mixture	O2/HeO2 (variable rate gas mix)
Maximum depth (m/ft)	81 m
Decompression Tables	a. Cuma CF 9 - 10 – 11 – 12 b. Dive computer
Maximum bottom time	15 min at 81 msw
Total time of decompression for maximum depth profile	100 min
Personnel Number of divers	2
Minimum support team	4
RCC Requirement	Dives deeper than 60 msw
Boats:	
Support vessel	Diving Tender/MCMV
Dive platform	Large Inflatable Craft
Support	Transport boat
NATO UNCLASSIFIED	

ANNEX 7B

CANADA (CAN)

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	Navy Clearance Diver	Army Combat Engineer	Air Force SAR	Navy Reserve
AIR-SCUBA (All types)	55 m/180 ft	30 m/100 ft	30 m/100 ft	46 m/150 ft
NITROX SCUBA CCDA	43 m/140 ft	Nil	Nil	Nil
HE/0_2 SCUBA CUMA	81 m/266 ft	Nil	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil	Nil
OXYGEN-SCUBA S 10	-	-	-	-
AIR-SURFACE SUPPLIED KM Superlite 17B Divator Mk 2(AGA)	55 m/(180 ft) 55 m (180 ft)	Nil 30 m/100 ft	Nil Nil	Nil 46 m/150 ft
HE 02 SURFACE SUPPLY KM Superlite 17B	91 m/300 ft	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil	Nil
NATO UNCLASSIFIED				

Summary of Diving Activities

	Navy Clearance Diver	Army Combat Engineer	Air Force SAR	Navy Reserve
AIR SCUBA/SHIP'S DIVERS				
Harbour Force Protection	Yes	Yes	No	Yes
Underwater Search	Yes	Yes	No	Yes
Ship Repair/Maintenance	Yes	No	No	Yes
SALVAGE DIVERS				
Salvage Tasks	Yes	No	No	No
Repair Tasks	Yes	No	No	Yes
Investigation/Non MCM Task	Yes	No	No	Yes
Submarine Rescue	Yes	No	No	No
CLEARANCE/EOD DIVERS				
Clearance Search and Investigation	Yes	Yes	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS				
Assaut	No	Yes	No	No
Clearance/Démolition	No	Yes	No	No
ENGINEER DIVER				
Construction and Repair	No	Yes	No	No
Search	No	Yes	No	No
Reconnaissance	No	Yes	No	No
Obstacles, Breaching and Demolitions	No	Yes	No	No
SAR DIVER				
Rescue	No	No	Yes	No
SATURATION DIVERS	No	No	No	No
CIVILIAN DIVERS				
Ship Repair	No	No	No	No
Harbour Repair	No	No	No	No
NATO UNCLASSIFIED				

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**CUMA/SIVA+**
Manufacturer	Cobham Life Support
Type	Semi-closed circuit
Gas mixture	O_2/HeO_2 (variable rate gas mix)
Maximum depth (m/ft)	81 m (266 ft)
Decompression Tables	a. Surface O_2 (with in water O_2) b. In-water O_2
Maximum bottom time	20 min at 81 m (266 ft)
Total time of decompression for maximum depth profile	a. 160 min (65 min in-water) b. 39 min (93 min on O_2
Personnel Number of divers	1 or 2
Minimum support team	4
RCC Requirement	RCC on site for diving deeper than 45 m (148 ft)
Boats:	
Support vessel	Diving tender
Dive platform	Large inflatable craft
Support	Transport boat
NATO UNCLASSIFIED	

ANNEX 7C

CROATIA (HRVATSKA) (HRV)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY	COAST GUARD
AIR-SCUBA (All types)	50 m	50 m	50 m
NITROX SCUBA (All types)	42 m	42 m	Nil
HE/0_2 SCUBA	Nil	Nil	Nil
TRIMIX SCUBA Open circuit only	70 m	70 m	Nil
OXYGEN-SCUBA			
Aqua lung FROGS	-	6 m	-
Interspiro OXYDIVE	-	6 m	-
AIR-SURFACE SUPPLIED	Nil	Nil	Nil
HE 02 SURFACE SUPPLY	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil
NATO UNCLASSIFIED			

Summary of Diving Activities

	NAVY	ARMY	COAST GUARD
AIR SCUBA/SHIP'S DIVERS			
Harbour Force Protection	Yes	Yes	Yes
Underwater Search	Yes	Yes	Yes
Ship Repair/Maintenance	Yes	No	Yes
SALVAGE DIVERS			
Salvage Tasks	Yes	No	No
Repair Tasks	No	No	No
Investigation/Non CM Task	Yes	Yes	No
Submarine Rescue	No	No	No
CLEARANCE/EOD DIVERS			
Clearance Search and Investigation	Yes	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No
COMBAT SWIMMERS/COMBATANT DIVERS			
Assault	No	Yes	No
Clearance/Demolition	No	Yes	No
ENGINEER DIVER			
Construction and Repair	No	Yes	No
Search	No	Yes	No
Reconnaissance	No	Yes	No
Obstacles, Breaching and Demolitions	No	Yes	No
SAR DIVER			
Rescue	Yes	No	Yes
SATURATION DIVERS	No	No	No
CIVILIAN DIVERS			
Ship Repair	No	No	No
Harbour Repair	No	No	No
NATO UNCLASSIFIED			

ANNEX 7D

CZECH REPUBLIC (CZE)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	ARMY
AIR-SCUBA ALL TYPES	60 m
NITROX SCUBA	Nil
HE/0_2 SCUBA	Nil
TRIMIX SCUBA	Nil
OXYGEN-SCUBA	Nil
AIR-SURFACE SUPPLIED SP-20D	20 m
HE 02 SURFACE SUPPLY	Nil
SATURATION DIVING	Nil
NATO UNCLASSIFIED	

Summary of Diving Activities

	ARMY
AIR SCUBA/SHIP'S DIVERS	
Harbour Force Protection	No
Underwater Search	No
Ship Repair/Maintenance	No
SALVAGE DIVERS	
Salvage Tasks	No
Repair Tasks	No
Investigation/Non CM Task	No
Submarine Rescue	No
CLEARANCE/EOD DIVERS	
Clearance Search and Investigation	No
Ordnance Removal Underwater/Ashore	No
COMBAT SWIMMERS/COMBATANT DIVERS	
Assault	No
Clearance/Demolition	No
ENGINEER DIVER	
Construction and Repair	Yes
Search	Yes
Reconnaissance	Yes
Obstacles, Breaching and Demolitions	Yes
SAR DIVER	
Rescue	No
SATURATION DIVERS	No
CIVILIAN DIVERS*	
Underwater search	No No

ANNEX 7E

DENMARK (DNK)

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	NAVY
AIR-SCUBA (All types)	30 m
NITROX SCUBA (All types)	30 m
HE/0_2 SCUBA	Nil
TRIMIX SCUBA	Nil
OXYGEN-SCUBA Divex Shadow Excursion	7 m
AIR-SURFACE SUPPLIED KM27 KM 37 KM 77	 50 m 50 m 50 m
HE 02 SURFACE SUPPLY KM27 KM 37 KM77	 80 m 80 m 80 m
SATURATION DIVING	Nil
NATO UNCLASSIFIED	

Summary of Diving Activities

	NAVY
AIR SCUBA/SHIP'S DIVERS	
Harbour Force Protection	Yes
Underwater Search	Yes
Ship Repair/Maintenance	Yes
SALVAGE DIVERS	
Salvage Tasks	Yes
Repair Tasks	Yes
Investigation/Non CM Task	Yes
Submarine Rescue	No
CLEARANCE/EOD DIVERS	
Clearance Search and Investigation	Yes
Ordnance Removal Underwater/Ashore	Yes
COMBAT SWIMMERS/COMBATANT DIVERS	
Assault	Yes
Clearance/Demolition	Yes
ENGINEER DIVER	
Construction and Repair	No
Search	No
Reconnaissance	No
Obstacles, Breaching and Demolitions	No
SAR DIVER	
Rescue	Yes
SATURATION DIVERS	No
CIVILIAN DIVERS	
Ship Repair	No
Harbour Repair	No
NATO UNCLASSIFIED	

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	ISMIX
Manufacturer	Interspiro
Type	Semi-closed circuit
Gas mixture	O_2/N_2 (Constant gas mix)
Maximum depth (m/ft)	60 m
Decompression Tables	In-water same mix during the dive
Maximum bottom time	15 min at 60 m
Total time of decompression for maximum depth profile	25 min
Personnel	
Number of divers	1 or 2
Minimum support team	4
RCC Requirement	RCC on site for diving deeper than 30 m
Boats:	
Support vessel	Diving tender
Dive platform	Large inflatable craft
Support	
NATO UNCLASSIFIED	

ANNEX 7F

FRANCE (FRA)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY	AIR FORCE	GENDARMERIE
AIR-SCUBA (All types)	50 m	50 m	35 m	50 m
NITROX SCUBA (All types)	35 m	Nil	Nil	35 m
TRIMIX CRABE	80 m	Nil	Nil	Nil
TRIMIX SCUBA	80 m	Nil	Nil	Nil
OXYGEN-SCUBA FROGS/CODE	7 m	7 m	Nil	7 m
AIR-SURFACE SUPPLIED KM 37, SL 27 AND AH5	50 m	50 m	Nil	Nil
HE 02 SURFACE SUPPLY	Nil	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil	Nil
DIVING APPARATUS	NAVY	ARMY	AIR FORCE	GENDARMERIE
AIR-SCUBA (All Types)	50 m	50 m	35 m	50 m
NATO UNCLASSIFIED				

Summary of Diving Activities

	NAVY	ARMY	AIR FORCE	GENDARMERIE
AIR SCUBA/SHIP'S DIVERS				
Harbour Force Protection	Yes	No	No	Yes
Underwater Search	Yes	Yes	Yes	Yes
Ship Repair/Maintenance	Yes	No	No	No
SALVAGE DIVERS				
Salvage Tasks	Yes	No	No	No
Repair Tasks	Yes	No	No	No
Investigation/Non CM Task	Yes	No	No	No
Submarine Rescue	Yes	No	No	No
CLEARANCE/EOD DIVERS				
Clearance Search and Investigation	Yes	No	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS				
Assault	Yes	Yes	No	No
Clearance/Demolition	Yes	Yes	No	No
ENGINEER DIVER				
Construction and Repair	No	Yes	No	No
Search	No	Yes	No	No
Reconnaissance	No	Yes	No	No
Obstacles, Breaching and Demolitions	No	Yes	No	No
SAR DIVER Rescue	Yes	No	Yes	Yes
SATURATION DIVERS	Yes	No	No	No
CIVILIAN DIVERS				
Ship Repair	Yes	No	No	No
Harbour Repair	Yes	No	No	No
NATO UNCLASSIFIED				

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**CRABE**
Manufacturer	AQUALUNG
Type	**Semi-closed circuit**
Gas mixture	Trimix ($23\%O_2/36\%N_2/41\%He$)
Maximum Depth	80 m
Minimum Depth	45 m
Decompression Tables	In-water O_2
Maximum bottom time	10 min at 80 m
Total time of decompression for maximum depth profile	30 min in-water
Personnel Number of divers	2
Minimum support team	5
RCC Requirement	RCC on site
Boats:	
Support vessel	Diving tender or MCMV
Dive platform	Inflatable craft
Support	Transport boat
NATO UNCLASSIFIED	

ANNEX 7G

GERMANY (DEU)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY
AIR-SCUBA DIVATOR MIL/PTU	31 m*	31 m*
NITROX SCUBA DIVEX STEALTH EOD M DRAEGER LAR 5 advanced DRAEGER LAR 7 kombi	54 m 24 m 24 m	Nil Nil Nil
HE/0_2 SCUBA	Nil	Nil
TRIMIX SCUBA	Nil	Nil
OXYGEN-SCUBA DRAEGER LAR 5 advanced DRAEGER LAR 7 kombi	7 m* 7 m	Nil Nil
AIR-SURFACE SUPPLIED DIVATOR MIL/PTU with DP 1 MIL/LVO DM 220	40 m 50 m*	40 m 50 m*
HE 02 SURFACE SUPPLY	Nil	Nil
SATURATION DIVING	Nil	Nil
NATO UNCLASSIFIED		

Draeger LAR 5 adv and Draeger LAR 7 kombi are capable for Nitrox Scuba and Oxygen scuba

***** Deeper excursions i.a.w national publications

Summary of Diving Activities

	NAVY	ARMY
AIR SCUBA/SHIP'S DIVERS		
Harbour Force Protection	Yes	Yes
Underwater Search	Yes	Yes
Ship Repair/Maintenance	Yes	Yes
SALVAGE DIVERS		
Salvage Tasks	Yes	Yes
Repair Tasks	Yes	Yes
Investigation/Non CM Task	Yes	Yes
Submarine Rescue	Yes	No
CLEARANCE/EOD DIVERS		
Clearance Search and Investigation	Yes	No
Ordnance Removal Underwater/Ashore	Yes	No
COMBAT SWIMMERS/COMBATANT DIVERS		
Assault	Yes	No
Clearance/Demolition	Yes	No
ENGINEER DIVER		
Construction and Repair	No	Yes
Search	No	Yes
Reconnaissance	No	Yes
Obstacles, Breaching and Demolitions	No	Yes
SAR DIVER		
Rescue	No	No
SATURATION DIVERS	No	No
CIVILIAN DIVERS*		
Underwater search	No	No
	No	No
NATO UNCLASSIFIED		

***** Civilian Divers (Federal Office of Defence Technology and Procurement (BWB)) are being tasked mainly for test/trail diving activities

ANNEX 7H

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND (GBR)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY
AIR-SCUBA (All types)	30 m	30 m
NITROX SCUBA (All types)	Nil	Nil
HE/0_2 SCUBA CDLSE	60 m	Nil
TRIMIX SCUBA	Nil	Nil
OXYGEN-SCUBA SOBA	6 m*	Nil
AIR-SURFACE SUPPLIED KMB Mk 17K Divator Mk 2(AGA)	 50 m 30 m (ESDS)	 50 m Nil
HE 02 SURFACE SUPPLY	Nil	Nil
SATURATION DIVING	Nil	Nil
NATO UNCLASSIFIED		

* Brief excursions to 13 m are permitted i.a.w National Diving Orders

Summary of Diving Activities

	NAVY	ARMY
AIR SCUBA/SHIP'S DIVERS		
Harbour Force Protection	Yes	No
Underwater Search	Yes	Yes
Ship Repair/Maintenance	Yes	Yes
SALVAGE DIVERS		
Salvage Tasks	Yes	Yes
Repair Tasks	Yes	Yes
Investigation/Non CM Task	Yes	Yes
Submarine Rescue	Yes	No
CLEARANCE/EOD DIVERS		
Clearance Search and Investigation	Yes	No
Ordnance Removal Underwater/Ashore	Yes	Yes
COMBAT SWIMMERS/COMBATANT DIVERS		
Assault	Yes	No
Clearance/Demolition	Yes	No
ENGINEER DIVER		
Construction and Repair	No	Yes
Search	No	Yes
Reconnaissance	No	Yes
Obstacles, Breaching and Demolitions	No	Yes
SAR DIVER		
Rescue	No	No
SATURATION DIVERS	No	No
CIVILIAN DIVERS		
Ship Repair	Yes	
Harbour Repair	Yes	
NATO UNCLASSIFIED		

Summary of Self-Contained Mixed Gas Breathing Equipment's

Equipment Name	**MCMEODLSE (CDLSE)**
Manufacturer	DIVEX
Type	Closed Circuit/Open Circuit Bailout
Gas mixture	20/80 O_2/He
Maximum depth (m/ft)	60 m
Decompression Tables	In Water He/O_2-O_2
Maximum bottom time	20 min @ 42 m 9 min @ 60 m
Total time of decompression for maximum depth profile	None 15 min in-water
Personnel Number of divers	1 or 2
Minimum support team	3
RCC Requirement	RCC for dives deeper than 42 m, or dives requiring more than 20 minutes decompression
Boats:	
Support vessel	Diving Tender/MCMV
Dive platform	Inflatable Craft (MIB)
Support	Diving Tender
NATO UNCLASSIFIED	

ANNEX 7I

GREECE (GRC)

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	NAVY	ARMY	AIR FORCE
AIR-SCUBA (All types)	58 m (190 ft)	40 m (131 ft)	40 m (131 ft)
NITROX SCUBA Draeger LAR-VII Combi	24 m (79 ft)	Nil	Nil
HE/02 SCUBA	60 m (196 ft)	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil
OXYGEN-SCUBA Draeger LAR-VII Draeger LAR- VI Draeger LAR- 5000	6 m (20 ft) *	6 m (20 ft) *	Nil
AIR-SURFACE SUPPLIED KM 37	40 m (131 ft)	Nil	Nil
HE 02 SURFACE SUPPLY	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil
NATO UNCLASSIFIED			

***** Deeper excursions i.a.w national publications

Summary of Diving Activities

	NAVY	ARMY	AIR FORCE
AIR SCUBA/SHIP'S DIVERS			
Harbour Force Protection	Yes	No	No
Underwater Search	Yes	No	No
Ship Repair/Maintenance	Yes	No	No
SALVAGE DIVERS			
Salvage Tasks	Yes	No	No
Repair Tasks	Yes	No	Yes
Investigation/Non MCM Task	Yes	No	No
Submarine Rescue	Yes	No	No
CLEARANCE/EOD DIVERS			
Clearance Search and Investigation	Yes	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No
COMBAT SWIMMERS/COMBATANT DIVERS			
Assault	Yes	Yes	No
Clearance/Demolition	Yes	Yes	No
ENGINEER DIVER			
Construction and Repair	Yes	No	Yes
Search	Yes	No	No
Reconnaissance	Yes	No	No
Obstacles, Breaching and Demolitions	Yes	Yes	No
SAR DIVER			
Rescue	Yes	No	Yes
SATURATION DIVERS	No	No	No
CIVILIAN DIVERS			
Ship Repair	Nil	Nil	Nil
Harbour Repair	Nil	Nil	Nil
NATO UNCLASSIFIED			

ANNEX 7J

ITALY (ITA)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY/ MILITARY POLICE	AIR FORCE	COAST GUARD
AIR-SCUBA (Cressi Sub Various types)	60 m	40 m	40 m	40 m
NITROX SCUBA Carlton Viper SC Drager LAR VII Combi	54 m 24 m	Nil	Nil	Nil
HE/0_2 SCUBA Carlton Viper Plus	81 m	Nil	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil	Nil
OXYGEN-SCUBA OMG CAIMANO Mk2 /Mk 4 Drager LAR V/LAR VII	12 m	12 m	Nil	Nil
AIR-SURFACE SUPPLIED MKB 18 KM SL 17B KM 37	60 m	Nil	Nil	Nil
HE 02 SURFACE SUPPLY MKB 18 KM SL 17B KM 37	150 m*	Nil	Nil	Nil
SATURATION DIVING MKB 18 KM SL 17B KM 37	250 m	Nil	Nil	Nil
NATO UNCLASSIFIED				

* Bounce Diving Technique by means of SDC (Submersible Decompression Chamber) only.

Summary of Diving Activities

	NAVY	ARMY/ MILITARY POLICE	AIR FORCE	COAST GUARD
AIR SCUBA/SHIP'S DIVERS				
Harbour Force Protection	Yes	No	No	No
Underwater Search	Yes	Yes	No	Yes
Ship Repair/Maintenance	Yes	No	No	No
SALVAGE DIVERS				
Salvage Tasks	Yes	No	No	No
Repair Tasks	Yes	No	No	No
Investigation/Non CM Task	Yes	Yes	No	Yes
Submarine Rescue	Yes	No	No	No
CLEARANCE/EOD DIVERS				
Clearance Search and Investigation	Yes	No	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS				
Assault	Yes	Yes	No	No
Clearance/Demolition	Yes	No	No	No
ENGINEER DIVER				
Construction and Repair	No	Yes	No	No
Search	No	Yes	No	No
Reconnaissance	No	Yes	No	No
Obstacles, Breaching and Demolitions	No	Yes	No	No
SAR DIVER				
Rescue	No	No	Yes	Yes
SATURATION DIVERS	Yes	No	No	No
CIVILIAN DIVERS				
Ship Repair	Yes	No	No	No
Harbour Repair	Yes	No	No	No
NATO UNCLASSIFIED				

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**VIPER SC**	**VIPER PLUS**
Manufacturer	Carleton Technologies	Carleton Technologies
Type	Semi-Closed Circuit	Semi-Closed Circuit
Gas mixture	N_2/O_2	He/O_2
Maximum depth (m/ft)	54 m	81 m
Decompression Tables	In Water Air Tables (US Navy Standard Air Rev 5)	In Water Heliox/ O_2 Tables (CF 9/10/11 Version 2)
Maximum bottom time	20 min at 54 m*	10 min at 81 m
Total time of decompression for maximum depth profile	29 min	55 m
	* = if DECO gas directly from rig (External Breathing System (EBS) not available)	Note. DECO in water External Breathing System compulsory
Personnel Number of divers	1 or 2	2
Minimum support team	5	11 (ad-interim regulation)
RCC Requirement	RCC on site for diving deeper than 40 m	RCC on site for diving deeper than 18 m (ad-interim regulation)
Boats:		
Support vessel	Not necessary for diving shallower than 40 m (see above)	Various, with RCC on board for diving deeper than 18 m
Dive platform	Rubber boat	Large rubber boat
Support	Safety hi-speed boat (Not necessary if available ship/boat on site with RCC as support vessel)	Safety hi-speed boat
NATO UNCLASSIFIED		

ANNEX 7K

LITHUANIA (LTU)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY
AIR-SCUBA (All types)	50 m	50m
NITROX SCUBA (All types)	55 m	Nil
HE/0_2 SCUBA SIVA +	Nil	Nil
TRIMIX SCUBA	Nil	Nil
OXYGEN-SCUBA Draeger LAR 7	7 m	Nil
AIR-SURFACE SUPPLIED Heliox 18bB	Nil	Nil
HE 02 SURFACE SUPPLY	Nil	Nil
SATURATION DIVING	Nil	Nil
NATO UNCLASSIFIED		

Summary of Diving Activities

	NAVY	ARMY
AIR SCUBA/SHIP'S DIVERS		
Harbour Force Protection	Yes	No
Underwater Search	Yes	Yes
Ship Repair/Maintenance	No	No
SALVAGE DIVERS		
Salvage Tasks	No	No
Repair Tasks	No	No
Investigation/Non MCM Task	No	No
Submarine Rescue	No	No
CLEARANCE/EOD DIVERS		
Clearance Search and Investigation	Yes	Yes
Ordnance Removal Underwater/Ashore	Yes	No
COMBAT SWIMMERS/COMBATANT DIVERS		
Assault	Yes	No
Clearance/Demolition	No	Yes
ENGINEER DIVER		
Construction and Repair	No	No
Search	No	Yes
Reconnaissance	No	Yes
Obstacles, Breaching and Demolitions	No	Yes
SAR DIVER Rescue	No	No
SATURATION DIVERS	No	No
CIVILIAN DIVERS		
Ship Repair	No	No
Harbour Repair	No	No

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**DC 55**
Manufacturer	La Sprirotechnique I.C
Type	Semi Closed Circuit
Gas mixture	4 Oxy Nitrogen Mixtures
Maximum depth (m/ft)	55 m (180 ft)
Decompression Tables	
Maximum bottom time	
Total time of decompression for maximum depth profile	NA
Personnel	
Number of divers	2
Minimum support team	2
RCC Requirement	-
Boats:	
Support vessel	MCMV
Dive platform	Small inflatable boat
Support	-
NATO UNCLASSIFIED	

ANNEX 7L

NETHERLANDS (NLD)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY	MARINE CORPS	AIR FORCE
AIR-SCUBA (All types)	60 m	60 m	30 m	9 m
NITROX SCUBA ISMIX & Draeger LAR 5024	54 m	Nil	24 m	Nil
HE/0_2 SCUBA ISMIX (Deep)	81 m	Nil	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil	Nil
OXYGEN-SCUBA Draeger LAR 5010	Nil	7 m (*)	7 m (*)	Nil
AIR-SURFACE SUPPLIED Heliox 18B, Superlite 27, SS 87 & IS-DP1	60 m	60 m	Nil	Nil
HE 02 SURFACE SUPPLY	Nil	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil	Nil
NATO UNCLASSIFIED				

* Single excursion 14 m.

Summary of Diving Activities

	NAVY	ARMY	MARINE CORPS	AIR FORCE
AIR SCUBA/SHIP'S DIVERS				
Harbour Force Protection	Yes	No	Yes	No
Underwater Search	Yes	Yes	Yes	No
Ship Repair/Maintenance	Yes	No	No	No
SALVAGE DIVERS				
Salvage Tasks	Yes	Yes	No	No
Repair Tasks	Yes	Yes	No	No
Investigation/Non MCM Task	Yes	Yes	No	No
Submarine Rescue	Yes	No	No	No
CLEARANCE/EOD DIVERS				
Clearance Search and Investigation	Yes	No	No	No
Ordnance Removal Underwater/Ashore	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS				
Assault	No	Yes	Yes	No
Clearance/Demolition	No	Yes	Yes	No
ENGINEER DIVER				
Construction and Repair	Yes	Yes	No	No
Search	Yes	Yes	No	No
Reconnaissance	Yes	Yes	No	No
Obstacles, Breaching and Demolitions	Yes	Yes	No	No
SAR DIVER Rescue	Yes	Yes	Yes	Yes
SATURATION DIVERS	No	No	No	No
CIVILIAN DIVERS				
Ship Repair	No	No	No	No
Harbour Repair	No	No	No	No
NATO UNCLASSIFIED				

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	LAR 5024	ISMIX	ISMIX (Deep
Manufacturer	Draeger	Interspiro	Interspiro
Type	Semi-closed circuit	Semi-closed circuit	Semi-closed circuit
Gas mixture	N_2/O_2 (B-mix)	N_2/O_2 (B/C/D-mix)	He/O_2
Maximum depth (m)	24 m	54 m	81 m
Decompression Tables	DRDC (DCIEM) in water deco and/or surface-ox	DRDC (DCIEM) In water deco and/or surface-ox	DRDC (DCIEM) In water deco and/or surface-ox
Maximum bottom time	80 min at 24 m	30 min at 54 m	20 min at 81 m
Total time of decompression for maximum depth profile	46 min (in water) 47 min (surface-ox)	85 min (in water) 78 min (surface-ox)	127 min (surface-ox)
Personnel Number of divers	≤ 8	≤ 2	≤ 2
Minimum support team	2	2	4
RCC Requirement	RCC on site > 15 m (non covert ops)	RCC on site > 15 m	
Boats:			
Support vessel	shore base or ship base	MCMV, Diving Tender or COOP	MCMV, Diving Tender or COOP
Dive platform	small inflatable boat (non covert ops)	small inflatable boat	large inflatable boat
Support	safety hi-speed boat (non covert ops)	safety hi-speed boat	safety hi-speed boat

NATO UNCLASSIFIED

ANNEX 7M

NORWAY (NOR)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	ARMY	NAVY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR-SCUBA (All types)	39 m	39 m	Nil	Nil	39 m
NITROX SCUBA Siel OMG, Caimano MK 4 Avon, MCM 100	 24 m Nil	 24 m 45 m	Nil	Nil	Nil
HE/0_2 SCUBA Avon, MCM 100	 Nil	 90 m	Nil	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil	Nil	Nil
OXYGEN-SCUBA Siel OMG, Caimano MK4	7 m	7 m	-	-	-
AIR-SURFACE SUPPLIED KMB 18, KM 27/37/77 Divator Mk 2, DP-1	 Nil 39 m	 50m 50 m	 Nil Nil	 Nil Nil	 Nil 39 m
HE 02 SURFACE SUPPLY	Nil	Nil	Nil	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil	Nil	Nil
NATO UNCLASSIFIED					

Table H-2. Summary of Diving Activities

	ARMY	NAVY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR SCUBA/SHIP'S DIVERS					
Harbour Force Protection	Yes	Yes	No	No	Yes
Underwater Search	Yes	Yes	No	No	Yes
Ship Repair/Maintenance	Yes	Yes	No	No	Yes
SALVAGE DIVERS					
Salvage Tasks	Yes	Yes	No	No	Yes
Repair Tasks	Yes	Yes	No	No	Yes
Investigation/Non MCM Task	Yes	Yes	No	No	Yes
Submarine Rescue	No	Yes	No	No	No
CLEARANCE/EOD DIVERS					
Clearance Search and Investigation	No	Yes	No	No	No
Ordnance Removal Underwater/Ashore	No	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS					
Assault	Yes	Yes	No	No	No
Clearance/Demolition	No	Yes	No	No	No
ENGINEER DIVER					
Construction and Repair	Yes	No	No	No	No
Search	Yes	No	No	No	No
Reconnaissance	Yes	No	No	No	No
Obstacles, Breaching and Demolitions	Yes	No	No	No	No
SAR DIVER					
Rescue	No	No	No	No	No
SATURATION DIVERS	No	No	No	No	No
CIVILIAN DIVERS					
Ship Repair	No	No	No	No	No
Harbour Repair	No	No	No	No	No
NATO UNCLASSIFIED					

Table H-3. Summary of Self-Contained Mixed Gas Breathing Equipment

Equipment Name Manufacturer Type Gas mixture	**MCM 100** AVON Electronically Closed Circuit/ Open Circuit Bailout Nitrox, Heliox/ Nitrox Nato D, Trimix 18/42/40
Maximum depth (m/ft)	90 m
Decompression Tables Maximum bottom time non deco Maximun in-water decompression time	Norwegian Navy Dive Tables 6 min @ 78 m 60 min
Personnel Number of divers Minimum support team	1 or 2 2
RCC Requirement	RCC on site for dives requiring more than 30 minutes decompression. RCC within 60 minutes for dives requiring decompression 10-30 minutes
Boats: Support vessel Dive platform Support	 Diving Tender/MCMV Inflatable Craft (MIB) Diving Tender
NATO UNCLASSIFIED	

Equipment Name	**CAIMANO MK4 PRO TWIN**
Manufacturer	SIEL OMG
Type	Semi Closed Circuit/ Closed Circuit
Gas mixture	Nato B/Oxygen
Maximum depth (m/ft)	24 m/7 m
Decompression Tables	Norwegian Navy Dive Tables
Maximum bottom time non deco	85 min @ 24 m 240 min @ 7m
Maximun in-water decompression time	35 min
Personnel Number of divers	Any
Minimum support team	2
RCC Requirement	RCC for dives requiring more than 16 minutes decompression
Boats:	
Support vessel	Diving Tender/MCMV
Dive platform	Inflatable Craft (MIB)
Support	Diving Tender
NATO UNCLASSIFIED	

ANNEX 7N

POLAND (POL)

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	NAVY	ARMY
AIR-SCUBA (All types)	50 m	50 m
NITROX SCUBA (All types)	50 m	50 m
HE/0_2 SCUBA	Nil	Nil
TRIMIX SCUBA	Nil	Nil
OXYGEN-SCUBA OXY-NG	Nil	7 m *
AIR-SURFACE SUPPLIED KM 37 Interspiro DP-1	50 m **	50 m
O_2/He/N_2 SURFACE SUPPLY	90 m	Nil
SATURATION DIVING	Nil	Nil
NATO UNCLASSIFIED		

***** *15 m for single excursion*

*** 60 m for KM 37 with Diving Bell*

Summary of Diving Activities

	NAVY	ARMY
AIR SCUBA/SHIP'S DIVERS		
Harbour Force Protection	Yes	No
Underwater Search	Yes	Yes
Ship Repair/Maintenance	Yes	No
SALVAGE DIVERS		
Salvage Tasks	Yes	Yes
Repair Tasks	Yes	Yes
Investigation/Non CM Task	Yes	Yes
Submarine Rescue	Yes	No
CLEARANCE/EOD DIVERS		
Clearance Search and Investigation	Yes	No
Ordnance Removal Underwater/Ashore	Yes	No
COMBAT SWIMMERS/ COMBATANT DIVERS		
Assault	No	Yes
Clearance/Demolition	No	Yes
ENGINEER DIVER		
Construction and Repair	Yes	Yes
Search	Yes	Yes
Reconnaissance	Yes	Yes
Obstacles, Breaching and Demolitions	Yes	Yes
SAR DIVER		
Rescue	Nil	Nil
SATURATION DIVERS	Yes	No
CIVILIAN DIVERS		
Ship Repair	Nil	Nil
Harbour Repair	Nil	Nil
NATO UNCLASSIFIED		

ANNEX 7O

PORTUGAL (PRT)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY	MARINE CORPS
AIR-SCUBA (All types)	45 m	Nil	Nil
NITROX SCUBA (All types)	54 m	Nil	Nil
HE/0_2 SCUBA			
Carleton Viper Plus	81 m	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil
OXYGEN-SCUBA			
Draeger LAR 5000	8 m	Nil	Nil
Draeger LAR 6.1		Nil	8 m
AIR-SURFACE SUPPLIED			
KM SL 27 (Helmet)	54 m	Nil	Nil
KM 28 (Band Mask)	54 m	Nil	Nil
OTS Guardian (Full Face)	54 m	Nil	Nil
HE 02 SURFACE SUPPLY			
KM 37	Nil	Nil	Nil
SATURATION DIVING			
KM 37	Nil	Nil	Nil
NATO UNCLASSIFIED			

Table H-2. Summary of Diving Activities

	NAVY	ARMY	MARINE CORPS
AIR SCUBA/SHIP'S DIVERS			
Harbour Force Protection	Yes	Nil	Nil
Underwater Search	Yes	Nil	Nil
Ship Repair/Maintenance	Yes	Nil	Nil
SALVAGE DIVERS			
Salvage Tasks	Yes	Nil	Nil
Repair Tasks	Yes	Nil	Nil
Investigation/Non MCM Task	Yes	Nil	Nil
Submarine Rescue	Yes	Nil	Nil
CLEARANCE/EOD DIVERS			
Clearance Search and Investigation	Yes	Nil	Nil
Ordnance Removal Underwater/Ashore	Yes	Nil	Nil
COMBAT SWIMMERS/COMBATANT DIVERS			
Assault	Yes	Nil	Nil
Clearance/Demolition	Yes	Nil	Nil
ENGINEER DIVER			
Construction and Repair	Yes	Nil	Nil
Search	Yes	Nil	Nil
Reconnaissance	Yes	Nil	Nil
Obstacles, Breaching and Demolitions	Yes	Nil	Nil
SAR DIVER			
Rescue	Yes	Nil	Nil
SATURATION DIVERS	No	Nil	Nil
CIVILIAN DIVERS			
Ship Repair	No	Nil	Nil
Harbour Repair	No	Nil	Nil
NATO UNCLASSIFIED			

Table H-3. Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**CARLETON VIPER PLUS**
Manufacturer	CARLETON TECNOLOGIES
Type	Semi-Closed Circuit/Open Circuit Bailout
Gas mixture	O_2/He (Self-mix 1.6 PPO2)
Maximum depth (m/ft)	81 m
Decompression Tables	In Water He/O_2-O_2 Surface Deco He/ O_2
Maximum bottom time	20 min @ 54 m 10 min @ 81 m
Total time of decompression for maximum depth profile	55 min in-water Deco 64 min O2 Surface Deco
Personnel	
Number of divers	1 or 2
Minimum support team	4
RCC Requirement	RCC for dives deeper than 40 m
Boats:	
Support vessel	MCCS/MCMV/MCD
Dive platform	RHIB/ Dinghy
Support	Diving Tender
NATO UNCLASSIFIED	

ANNEX 7P

SPAIN (ESP)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY	ARMY	AIR FORCE
AIR-SCUBA All types)	50 m	50 m	50 m
NITROX SCUBA All types)	60 m	55 m	Nil
HE/0_2 SCUBA (All types)	Nil	Nil	Nil
TRIMIX SCUBA All types)	80 m	Nil	Nil
OXYGEN-SCUBA Draeger LARS VI Aqualung Frog, Code	 7m Nil	 Nil 7 m	Nil
AIR-SURFACE SUPPLIED KM SL 27, KM SL 37 DP-1 + Divator Mk 2(AGA), KMB 28	 58 m 58 m	 50 m 50 m	 Nil Nil
HE 02 SURFACE SUPPLY KM SL 27	90 m	Nil	Nil
SATURATION DIVING	Nil	Nil	Nil
NATO UNCLASSIFIED			

Summary of Diving Activities

	NAVY	ARMY	AIR FORCE
AIR SCUBA/SHIP'S DIVERS			
Harbour Force Protection	Yes	No	No
Underwater Search	Yes	No	No
Ship Repair/Maintenance	Yes	No	No
SALVAGE DIVERS			
Salvage Tasks	Yes	Yes	No
Repair Tasks	Yes	Yes	No
Investigation/Non CM Task	Yes	No	No
Submarine Rescue	Yes	No	No
CLEARANCE/EOD DIVERS			
Clearance Search and Investigation	Yes	Yes	No
Ordnance Removal Underwater/Ashore	Yes	Yes	No
COMBAT SWIMMERS/COMBATANT DIVERS			
Assault	Yes	Yes	No
Clearance/Demolition	Yes	Yes	No
ENGINEER DIVER			
Construction and Repair	No	Yes	No
Search	No	Yes	No
Reconnaissance	No	Yes	No
Obstacles, Breaching and Demolitions	No	Yes	No
SAR DIVER			
Rescue	Yes	No	Yes
SATURATION DIVERS	No	No	No
CIVILIAN DIVERS			
Ship Repair	No	No	No
Harbour Repair	No	No	No
NATO UNCLASSIFIED			

Note. *According to the Spanish army task distribution Navy divers usually operate at sea, while Army and Air Force divers usually operate in rivers and lakes.*

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**CRABE**	**CRABE**
Manufacturer	AQUALUNG	AQUALUNG
Type	**Semi-closed circuit**	**Semi-closed circuit**
Gas mixture	Trimix ($23\%O_2/36\%N_2/41\%He$)	Nitrox (30%, 40%, 50% and 60%O2)
Maximum Depth	80 m	60 m
Minimum Depth	55 m	-
Decompression Tables	In-water O_2	In-water O_2
Maximum bottom time	10 min at 80 m	25 min at 60 m
Total time of decompression for maximum depth profile	30 min in-water	39 min in-water
Personnel Number of divers	2	2
Minimum support team	5	4
RCC Requirement	RCC on site	RCC within: 5 min. for 30% O2 dives. 60 min. for 40% O2 dives. 3 h. for 50% O2 dives. 6 h. for 60% O2 dives.
Boats:		
Support vessel	Diving tender or MCMV	Diving tender or MCMV
Dive platform	Inflatable craft	Inflatable craft
Support	Transport boat	Transport boat
NATO UNCLASSIFIED		

ANNEX 7Q

SLOVENIA (SVN)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	NAVY
AIR-SCUBA (All types)	60 m
NITROX SCUBA (All types)	55 m
HE/0_2 SCUBA	Nil
TRIMIX SCUBA	Nil
OXYGEN-SCUBA	Nil
AIR-SURFACE SUPPLIED KM 37	60 m
HE 02 SURFACE SUPPLY	Nil
SATURATION DIVING	Nil
NATO UNCLASSIFIED	

Summary of Diving Activities

	NAVY
AIR SCUBA/SHIP'S DIVERS	
Harbour Force Protection	Yes
Underwater Search	Yes
Ship Repair/Maintenance	Yes
SALVAGE DIVERS	
Salvage Tasks	Yes
Repair Tasks	Yes
Investigation/Non CM Task	Yes
Submarine Rescue	No
CLEARANCE/EOD DIVERS	
Clearance Search and Investigation	Yes
Ordnance Removal Underwater/Ashore	Yes
COMBAT SWIMMERS/COMBATANT DIVERS	
Assault	No
Clearance/Demolition	No
ENGINEER DIVER	
Construction and Repair	No
Search	No
Reconnaissance	No
Obstacles, Breaching and Demolitions	No
SAR DIVER Rescue	No
SATURATION DIVERS	No
CIVILIAN DIVERS	
Ship Repair	Yes
Harbour Repair	Yes
NATO UNCLASSIFIED	

ANNEX 7R

TURKEY (TUR)

Diving Apparatus and Depth Capabilities.

DIVING APPARATUS	ARMY	NAVY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR-SCUBA (All types)	130ft	130ft	-	130ft	130ft
NITROX SCUBA (All types)	-	177ft	-	-	-
HE/0_2 SCUBA					
Carleton, Viper-E	-	265ft	-	-	-
TRIMIX SCUBA					
Open Circuit System	-	260ft	-	-	-
OXYGEN-SCUBA					
Draeger LAR 5	-	50ft	-	-	-
AIR-SURFACE SUPPLIED					
KM 37	-	190ft	-	-	-
KM 17	-	190ft	-	-	-
Divator Mk 2(AGA)	-	60ft	-	-	-
HE 02 SURFACE SUPPLY					
KM 37	-	300ft	-	-	-
KM 17	-	300ft	-	-	-
SATURATION DIVING	-	-	-	-	-
NATO UNCLASSIFIED					

Summary of Diving Activities

	ARMY	NAVY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR SCUBA/SHIP'S DIVERS					
Harbour Force Protection	No	Yes	No	No	Yes
Underwater Search	No	Yes	No	No	Yes
Ship Repair/Maintenance	No	Yes	No	No	Yes
SALVAGE DIVERS					
Salvage Tasks	No	Yes	No	No	No
Repair Tasks	No	Yes	No	No	No
Investigation/Non MCM Task	No	Yes	No	No	No
Submarine Rescue	No	Yes	No	No	No
CLEARANCE/EOD DIVERS					
Clearance Search and Investigation	No	Yes	No	No	No
Ordnance Removal Underwater/Ashore	No	Yes	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS					
Assault	No	Yes	No	No	No
Clearance/Demolition	No	Yes	No	No	No
ENGINEER DIVER					
Construction and Repair	No	No	No	No	No
Search	No	No	No	No	No
Reconnaissance	No	No	No	No	No
Obstacles, Breaching and Demolitions	No	No	No	No	No
SAR DIVER					
Rescue	No	Yes	No	Yes	Yes
SATURATION DIVERS	No	No	No	No	No
CIVILIAN DIVERS					
Ship Repair	No	No	No	No	No
Harbour Repair	No	No	No	No	No
NATO UNCLASSIFIED					

Summary of Self-Contained Mixed Gas Breathing Equipment

Equipment Name	**CRABE**
Manufacturer	AQUALUNG
Type	Semi-closed circuit
Gas mixture	Trimix (23%O_2/36%N_2/41%He)
Maximum Depth	80 m
Minimum Depth	45 m
Decompression Tables	In Water O_2
Maximum bottom time	10 min @ 80 m
Total time of decompression for maximum depth profile	30 min in-water
Personnel Number of divers	2
Minimum support team	5
RCC Requirement	RCC on site
Boats:	
Support vessel	Diving Tender or MCMV
Dive platform	Inflatable Craft (MIB)
Support	Transport Boat
NATO UNCLASSIFIED	

ANNEX 7S

UNITED STATES OF AMERICA (USA)

Diving Apparatus and Depth Capabilities

DIVING APPARATUS	NAVY	ARMY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR-SCUBA (All types)	190 ft (58 m)	190 ft (58 m)	190 ft (58 m)	190 ft (58 m)	190 ft (58 m)
NITROX SCUBA All types)	140 ft (43 m)	Nil	140 ft (43 m)	Nil	Nil
HE/0_2 SCUBA Carlton Mk 16 Mod 0	200 ft (61 m)	Nil	Nil	Nil	Nil
Carlton Mk 16 Mod 1	300 ft (91 m)	Nil	Nil	Nil	Nil
TRIMIX SCUBA	Nil	Nil	Nil	Nil	Nil
OXYGEN-SCUBA Draeger LAR 5	-	-	-	-	-
AIR-SURFACE SUPPLIED KM 37	190 ft (56 m)	190 ft (56 m)	Nil	Nil	Nil
EXO	190 ft (56 m)	190 ft (56 m)	Nil	Nil	Nil
Divator Mk 2(AGA)	60 ft (18 m)	Nil	Nil	Nil	Nil
HE 02 SURFACE SUPPLY KM 37	300 ft (91 m)	Nil	Nil	Nil	Nil
SATURATION DIVING KM 37	1000 ft (305 m)	Nil	Nil	Nil	Nil
NATO UNCLASSIFIED					

Summary of Diving Activities

	NAVY	ARMY	MARINE CORPS	AIR FORCE	COAST GUARD
AIR SCUBA/SHIP'S DIVERS					
Harbour Force Protection	Yes	Yes	Yes	No	Yes
Underwater Search	Yes	Yes	Yes	No	Yes
Ship Repair/Maintenance	Yes	Yes	No	No	Yes
SALVAGE DIVERS					
Salvage Tasks	Yes	Yes	No	No	No
Repair Tasks	Yes	Yes	No	No	No
Investigation/Non CM Task	Yes	Yes	No	No	No
Submarine Rescue	Yes	No	No	No	No
CLEARANCE/EOD DIVERS					
Clearance Search and Investigation	Yes	No	No	No	No
Ordnance Removal	Yes	No	No	No	No
Underwater/Ashore	Yes	No	No	No	No
COMBAT SWIMMERS/COMBATANT DIVERS					
Assault	Yes	Yes	Yes	Yes	No
Clearance/Demolition	Yes	Yes	Yes	Yes	No
ENGINEER DIVER					
Construction and Repair	Yes	Yes	No	No	No
Search	Yes	Yes	No	No	No
Reconnaissance	Yes	Yes	No	No	No
Obstacles, Breaching and Demolitions	Yes	Yes	No	No	No
SAR DIVER					
Rescue	No	No	No	Yes	No
SATURATION DIVERS	Yes	No	No	No	No
CIVILIAN DIVERS					
Ship Repair	Yes	No	No	No	No
Harbour Repair	Yes	Yes	No	No	No
NATO UNCLASSIFIED					

Summary of Self-Contained Mixed Gas Breathing Equipments

Equipment Name	**UBA MK16**	**VIPER**
Manufacturer	Carleton Technologies	Carlton Technologies
Type	Closed Circuit	Semi Closed Circuit
Gas mixture	He/O_2 and N_2/O_2	N_2/O_2
Maximum depth (msw/fsw)	**Mod 0** He/O_2 (certified) 60 m (197 ft) and N_2/O_2 (certified) 45 m (148 ft) **Mod 1** He/O_2 91 m N_2/O_2 45m Target: 90 m (295 ft)	54 m (178 ft)
Decompression Tables	In-water He/O_2	In Water D
Maximum bottom time	Target: 20 min at 90 m (297 ft)	100 min
Total time of decompression for maximum depth profile	Approximately 5 hours in-water	
Personnel		
Number of divers	2	4
Minimum support team	8	4
RCC Requirement	RCC on site for diving deeper than 40 m (130 ft)	
Boats:		
Support vessel	-	Diving Tender
Dive platform	Dive platform for diving deeper than 40 m (130 ft)	Inflatable craft
Support		Transport boat
NATO UNCLASSIFIED		

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