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Diving at diminished atmospheric pressure: air decompression tables for different altitudes

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Böni, M., R. Schibli, P. Nussberger, and A.A. Bühlmann. 1976. Diving at diminished atmospheric pressure: air-decompression tables for different altitudes. Undersea Biomed. Res. 3(3):189–204.—Fifty subjects performed 106 simulated dives at a final ambient pressure of 0.7 at. (3000 m above sea level). One hundred and forty-three subjects performed 278 actual controlled dives at altitudes 900–1700 m above sea level. From the experience of these dives, air-decompression tables for altitudes 0–3200 m above sea level were calculated. Tables up to 2000 m above sea level were tested on humans under wet conditions.

decompression
altitude diving
hypobaric diving

Decompression sickness is primarily the result of bubble formation in blood and tissue because of insufficient decompression. The ratio between the pressure of the inert gases in blood and tissues and the ambient pressure is the determining factor for a safe decompression. It is possible to calculate the saturation and desaturation of inert gases in the tissues on the basis of the equalization of inert gas pressure in blood and tissues and inert gas pressure in the inhaled gas (Bühlmann 1975). Neglecting the quantity of dissolved gas in the tissues simplifies the calculation for decompression. The values for a tolerated ratio between the pressure of the inert gases in blood and tissues and the ambient pressure can only be determined empirically. These ratios, the tolerated *supersaturation factors*, vary for different tissues.

For the same tissue the supersaturation factors decrease with increasing inert gas pressure (Bühlmann 1975). The saturation speed of the different tissues is indicated by the corresponding half-time. For example, if a tissue with a half-time of 80 min for N_2 and a P_{N_2} of 1.60 technical atmospheres (at.) were leading for decompression, it would be possible to surface without the risk of a decompression accident with an atmospheric pressure at the surface of 1.0 at. (1 at. = 735.5 mm Hg). Under these conditions the supersaturation ratio for this tissue is 1.60.

Atmospheric pressure decreases with altitude. Therefore, surfacing with the same tolerated supersaturation ratio at diminished atmospheric pressure would only be possible with a lower inert gas pressure in the same tissue. Hence, the decompression times for dives at diminished atmospheric pressure need to be lengthened in comparison with those at sea level.

Example:

Altitude (above sea level)	300 m	3000m
Atmospheric pressure at surface	1.0 at.	0.7 at.
P_{N_2} in the leading tissue	1.60 at.	1.60 at.
Supersaturation ratio for the leading tissue	1.60	2.28

Until 1971 there were no tested decompression tables available for different altitudes. For diving in mountain lakes it was usually recommended to extend decompression times used for analagous dives at sea level (Marine Nationale 1967).

METHODS OF CALCULATION

In 1970 decompression profiles for several dives at diminished atmospheric pressure were calculated at the Laboratory for Hyperbaric Medicine, Department of Internal Medicine, University of Zurich. Previous diving experiments at sea level were taken into consideration, in particular those including tolerated supersaturation factors of 14 N_2 half-times from 5 to 635 min (Bühlmann 1967, 1975). Because our experience showed the supersaturation factors in Table 1 are safe for surfacing, they constitute the basis for calculating the decompression times. These factors are lower than those in the tables of the US Navy (1963) and of the Royal Navy, and considerably lower than those in the French G.E.R.S. tables.

TABLE 1
Nitrogen half-times and supersaturation factors

Half-time for N_2 (min)	5	15	25	40	50–80	120–240	280–635
Supersaturation factor	2.30	2.05	1.85	1.75	1.66	1.58	1.50

Using these calculations, 106 simulated dives were performed by 50 different subjects at a final ambient pressure of 0.7 at. (3000 m above sea level). Figure 1 is an example of a profile for a simulated repetitive dive. The data collected from these experiments performed near the border line of sufficient decompression provided the basis for the calculation of provisional tables. To maintain the same ratio between P_{N_2} in the leading tissue and the $P_{ambient}$ at altitudes above 700 m as at sea level, we determined that the two final decompression stops in these tables should be at a depth of 4 and 2 m, respectively.

At the beginning of a dive the initial P_{N_2} in all tissues of a diver is assumed to be 0.8 at. In addition we determined the *no-decompression times* for each altitude.

ACTUAL DIVES AT DIFFERENT ALTITUDES

Between 1971 and 1975 a total of 278 actual controlled dives by 143 different subjects were performed at altitudes of 900 to 1700 m above sea level (Table 2). Of these 278 dives, 184 were repetitive dives. All these dives were performed by male nonprofessional divers and, in most

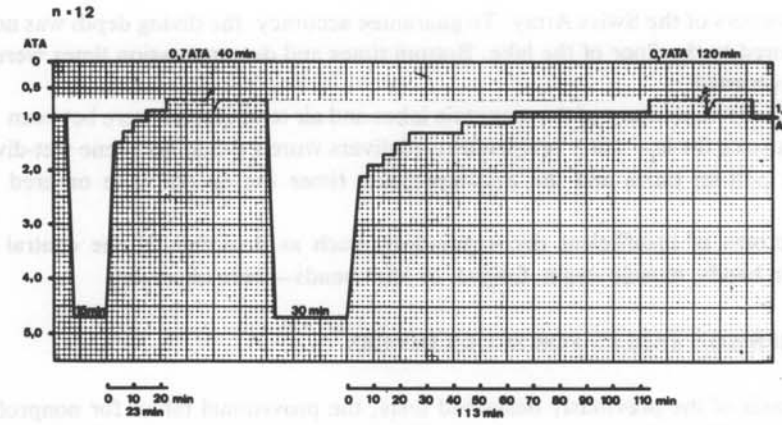

Fig. 1. Diving profile of simulated dives at a depth of 40 m with air breathing. Bottom time, 15 min at a total ambient pressure of 4.7 ATA. Decompression within 23 min up to 0.7 ATA. Second dive after 40 min. Bottom time 30 min including descending time at 4.7 ATA. Decompression time 113 min back to 0.7 ATA, corresponding to 3000 m above sea level. Return to normal atmospheric pressure after 2 hours. Twelve subjects. (From Bühlmann, Schibli, and Gehring 1973)

TABLE 2
Repetitive and nonrepetitive wet dives at altitude

	Number of dives	Depth meters	Atmospheric pressure at.	Total pressure at.	Bottom time min	Decompression time min	Time interval min
Nonrepetitive	4	16	0.85	2.45	15	5	
	4	20	0.85	2.85	25	8	
	18	24	0.85	3.25	15	9	
	2	25	0.85	3.35	40	30	
	4	25	0.85	3.35	10	6	
	22	30	0.85	3.85	12	12	
	18	20	0.8	2.8	20	5	
	2	23	0.8	3.1	20	11	
	14	30	0.85	3.85	15	17	
	6	30	0.85	3.85	15	10	
Total	94						
Repetitive	23	20	0.85	2.85	30	12	65
	23	30	0.85	3.85	10	21	
	3	20	0.85	2.85	30	12	167
	3	10	0.85	1.85	80	4	
	22	20	0.85	2.85	17	6	60
	22	18	0.85	2.65	12	12	
	20	15	0.85	2.35	15	3	45
	20	18	0.85	2.65	15	6	
	24	20	0.85	2.85	10	3	10
	24	15	0.85	2.35	15	3	
Total	184						

cases, by soldiers of the Swiss Army. To guarantee accuracy, the diving depth was noted on a cable anchored to the floor of the lake. Bottom times and decompression times were exactly timed and recorded.

Both surface temperature of the mountain lakes and air temperature were between 15°C and 20°C. Because of the low water temperature all divers wore a 6-mm neoprene wet-diving suit. During the bottom times and the decompression times the divers were ordered to swim around.

No symptoms of insufficient decompression—such as disorders of the central nervous system, skin bends, muscle strain, fatigue, or joint bends—were observed.

DECOMPRESSION TABLES FOR SCUBA DIVERS

On the basis of the previously described tests, the provisional tables for nonprofessional divers were modified. Compared to the simulated dives (Bühlmann et al. 1973), the decompression times in the following tables (*see* Appendix to this article) were lengthened to provide more security because depth gauges usually used by sport divers do not allow precise depth measurement.

A scuba diver is handicapped by a limited air supply and by heat loss and, thus, he is primarily interested in brief bottom times, particularly at increased depths. For that reason the modified tables are calculated for a maximum diving time of approximately 3 hours. The maximum ascending speed from the bottom to the first decompression stop is 10 m/min. As experience shows, this is a safe continuous decompression for saturated tissues to prevent bubble formation. With each dive, including *no-decompression time* dives, a decompression stop of at least 3 min is necessary. For the 0–700 m table, this stop is at a depth of 3 m; for the 701–3200 m tables, at a depth of 2 m.

In case a diver travels to a mountain lake very fast (for example, by helicopter) he can immediately dive safely, without first adapting to the decreased atmospheric pressure, because the calculation of the decompression of each altitude table assumes that all tissues have a P_{N_2} of 0.8 at. at the beginning of the dive. Adapting to altitude decreases the P_{N_2} in tissues and provides additional security.

Repetitive System

The calculations for repetitive dives are based on a half-time for N_2 of 80 min. Each dive is designated by a letter, which represents a definite P_{N_2}. In a repetitive dive this inert gas pressure in the tissue must be taken into consideration. For calculating repetitive dives we assume that the diver is at least in Group A after each dive, including *no-decompression time* dives. If the corresponding P_{N_2} for Group A is not reached, it has to be approximated to Group A.

Surface interval tables represent the desaturation during the surface interval. Repetitive time tables give the number of minutes, or residual nitrogen time, to be added to the actual bottom time of the repetitive dive, in order to establish decompression for the residual nitrogen.

Additional Decrease of Atmospheric Pressure after Surfacing

Since the fast tissues become desaturated rapidly with decreasing atmospheric pressure, the P_{N_2} in these tissues is already lower than 0.8 at. at the beginning of a dive. Because the

relatively fast tissues are predominant in scuba diving, it is possible to ascend to a higher altitude. For example, only 15 min after surfacing in a mountain lake it is perfectly safe to cross a mountain pass which is up to 500 m higher than the level of the lake. For the same reasons, alterations in barometric pressure caused by weather changes are of no significance in the use of these tables.

The decompression tables presented here are valid without adaptation at altitude; this means that they are valid for an initial P_{N_2} of 0.8 at. in all tissues (i.e. in case of reaching a mountain lake from sea level in some minutes by helicopter). After an adaptation time of more than 12 hours, the P_{N_2} in the tissues with half-times for N_2 up to 120 min are practically equilibrated with P_{IN_2}. After adaptation at altitudes higher than 1500 m it is possible to use the decompression table of the next lower altitude-range with the same security (Table 3).

TABLE 3
Adaptation: more than 12 hours at altitude

Altitude above sea level	701–1500	1501–2000	2001–2500	2501–3200
No-decompression limits	701–1500	701–1500	1501–2000	2001–2500
Decompression table and repetitive system	701–1500	701–1500	1501–2000	2001–2500
P_{N_2} (tissue) at.	0.66	0.61	0.57	0.53

APPENDIX

Ten *Standard Air-Decompression Schedules* are presented as an appendix to this article. The schedules include decompression tables, maximum ascent-rate tables, surface-interval tables, and repetitive timetables for altitudes 0–3200 m above sea level. Schedules up to 2000 m above sea level were tested on humans under wet conditions.

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Böni, M., R. Schibli, P. Nussberger, and A.A. Bühlmann. 1976. La plongée à des pressions atmosphéric diminuée: tables pour la décompression en air à des altitudes diverses. Undersea Biomed. Res. 3(3):189–204.—Cinquant sujets ont participé à 106 plongées fictives à une pression ambiente de 0, 7 at. (3000 msw au dessus du niveau de la mer). Cent quarante-trois sujets ont fait 278 plongées réelées côntrolées à des altitudes entre 900 et 1700 msw au dessus du niveau de la mer. De ces expèriences de plongée les tables pour la décompression en air pour des altitudes 0–3000 msw au dessus du niveau de la mer ont été calculées. Les tables pour des décompression jusqu'a 2000 msw au dessus du niveau de la mer ont été testé chez les sujets humains dans les conditions de plongée réellé.

décompression
plongée à altitude
plongée hypobare

SCHEDULE 1*

DECOMPRESSION - TABLE 0 - 700 m ABOVE SEA LEVEL

Depth m	Bottom-time min	DECO - stops m 15	12	9	6	3	Repet. group
15	90					5	J
	120					10	K
	150					15	L
20	50					4	H
	60					7	J
	75					18	K
	90					23	K
	105				3	31	K
25	30					5	G
	40					8	H
	50					12	J
	60					20	K
	75				3	30	K
	90				10	38	L
30	25					5	G
	30					9	H
	35					12	J
	40				5	14	J
	50				5	25	K
	60			6	8	32	K
	75			7	15	42	L
	90			8	25	52	L
35	20					5	G
	25					9	H
	30					12	J
	35				5	17	J
	40				7	30	J
	50			3	10	35	K
	60			7	15	45	K
	75			10	15	62	L
40	15				2	5	G
	20				2	10	H
	25				3	12	J
	30			2	5	20	J
	35			2	10	30	K
	40			5	15	35	K
	50		2	7	20	40	K
	60		2	10	25	50	L

Depth m	Bottom-time min	DECO - stops m 18	15	12	9	6	3	Repet. group
45	10						4	F
	15					2	6	G
	20					3	11	H
	25					5	20	J
	30				3	10	30	K
	35				5	10	35	K
	40			2	5	15	45	K
	50		2	5	10	20	55	L
	60		2	5	20	25	60	-
50	10						5	F
	15					3	8	H
	20					5	17	J
	25				3	10	27	J
	30				5	10	35	K
	40		2	5	12	15	50	K
	50		2	10	15	20	60	L
	60		3	12	20	30	70	-
55	10				1	2	5	F
	15				1	4	11	F
	20			1	4	8	24	G
	25			2	7	10	32	J
	30		1	3	9	13	38	K
	40	1	5	8	17	18	58	K
60	10				2	3	5	H
	15				3	5	15	J
	20			2	6	10	29	J
	25		2	2	10	10	35	K
	30		2	4	12	15	40	L
65	10			1	2	3	6	H
	15			1	3	8	18	J
	20		1	2	6	13	33	J
	25		2	4	10	13	40	K
	30	1	2	8	14	18	46	L
70	10			2	3	4	6	H
	15			2	3	10	20	J
	20		2	3	5	15	35	J
	25	2	2	5	10	15	43	K
	30	2	3	10	15	20	50	L

Max. ascent rate 10m/min

	No decompression limits (0 - 700 m)								
m	9	12	15	18	20	25	30	35	40
min		200	75	50	30	25	20	15	10
	Each dive must include a decompression stop of 3 min at 3 m								

*Tested on humans in dry and wet conditions.

SCHEDULE 1* (contd.)

REPETITIVE SYSTEM 0 - 700 m ABOVE SEA LEVEL

SURFACE INTERVAL TABLE (min)

Repetitive group at the beginning of surface interval \ Repetitive group at the end of the surface interval	L	K	J	H	G	F	E	D	C	B	A	"O"
L	14	30	47	68	94	127	149	174	206	255	440	
K	16	34	55	80	113	135	160	194	240	426		
J	18	39	65	98	119	145	180	225	409			
H	22	47	80	101	127	160	206	394				
G	26	59	80	106	139	186	372					
F	34	55	80	113	160	346						
E	22	47	80	127	312							
D	26	59	106	292								
C	34	80	266									
B	47	233										
A	186											

REPETITIVE TIMETABLE (min)

Depth m	Repetitive - group	6	9	12	15	20	25	30	35	40	45	50	55	60	65	70
	L			300	160	96	69	55	45	39	34	30	27	25	23	21
	K		>400	250	127	80	59	47	39	34	29	26	24	22	20	18
	J		400	150	101	67	50	40	33	29	25	23	21	19	17	16
	H		200	113	80	55	42	34	27	25	22	19	17	16	15	14
	G	>200	135	85	63	44	34	27	22	20	18	16	14	13	12	11
	F	200	108	61	47	34	26	22	17	16	14	13	12	11	10	9
	E	113	61	42	34	25	19	16	13	12	11	9	8	8	7	7
	D	85	48	34	27	20	16	13	10	10	9	8	7	7	6	6
	C	61	37	26	22	16	13	10	8	8	7	6	6	5	5	5
	B	43	26	19	16	12	9	8	6	6	5	5	4	4	4	4
	A	26	17	12	10	8	6	6	4	4	3	3	3	3	3	3

*Tested on humans in dry and wet conditions.

SCHEDULE 2*

DECOMPRESSION - TABLE 701 - 1500 m ABOVE SEA LEVEL

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
12	120						5	H
15	40						5	F
	75						8	H
	90						13	H
	105						16	J
	120						19	J
20	20						4	E
	25						6	F
	30					2	8	F
	40					3	9	G
	50					5	11	H
	60					5	19	H
	75					8	25	J
	90					12	25	J
	105					15	30	-
	120					20	37	-
25	15					1	5	D
	25					4	8	F
	30				3	4	9	G
	35				4	5	13	G
	40				5	5	17	H
	50				5	7	23	H
	60				7	12	25	J
	75				10	15	30	J
	90				15	17	38	-
30	10					1	3	D
	15					3	6	E
	20					5	9	F
	25				3	5	10	G
	30				6	6	12	G
	35				7	7	18	H
	40			3	10	10	23	H
	50			5	10	15	25	J
	60			6	15	15	31	J

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
35	10					2	3	D
	15				3	5	8	F
	20			2	5	5	11	G
	25			3	7	7	13	H
	30			4	8	8	16	H
	35			5	8	8	22	H
	40		2	5	10	10	25	J
	50		3	6	12	15	32	J
40	5					1	3	C
	10				2	2	6	E
	15			3	3	5	9	F
	20			4	5	6	12	G
	25		3	5	7	8	16	H
	30		3	6	8	10	20	J
	35		4	8	8	11	25	J
	40		6	8	9	17	32	J
45	5					2	3	C
	10				3	4	8	F
	15		2	3	5	5	12	G
	20		3	4	6	8	15	H
	25	1	4	6	6	10	19	H
	30	2	5	7	10	16	28	J
50	5				1	3	4	D
	10			3	4	5	10	F
	15	1	3	5	6	6	15	G
	20	3	3	6	6	10	18	H
	25	3	4	8	10	10	25	J
	30	6	6	8	13	18	35	J
55	10		2	4	5	6	12	F
	15	1	3	5	7	7	17	G
	20	4	5	6	7	10	24	H
60	10	1	3	4	6	6	13	G
	15	2	3	4	8	8	18	G
	20	5	6	6	8	10	30	H

Max. ascent rate 10m/min

	No decompression limits (701 - 1500 m)							
m	9	12	15	18	20	25	30	35
min	720	90	30	20	15	10	5	4
	Each dive must include a decompression stop of 3 min at 2 m							

*Tested on humans in wet conditions.

SCHEDULE 2* (contd.)

REPETITIVE SYSTEM 2501 - 3200 m ABOVE SEA LEVEL

SURFACE INTERVAL TABLE (min)

Repetitive group at the beginning of surface interval \ Repetitive group at the end of the surface interval	F	E	D	C	B	A	"O"
F	22	34	47	63	80	127	
E		13	26	42	59	106	
D			14	29	47	94	
C				16	34	80	
B					18	65	
A						47	

REPETITIVE TIMETABLE (min)

Depth m		6	8	10	12	15	20	25	30	35	40	45	50
Repetitive - group	F	-	>160	145	94	63	41	30	24	20	17	15	13
	E	-	160	89	63	44	29	22	18	15	13	11	10
	D	-	113	69	50	35	24	18	15	12	11	9	8
	C	206	80	51	38	27	19	14	12	10	9	8	7
	B	113	55	36	27	20	14	11	9	7	7	6	5
	A	63	35	23	18	13	9	7	6	5	4	4	3

*Tested on humans in wet conditions.

SCHEDULE 3*

DECOMPRESSION - TABLE 1501 - 2000 m ABOVE SEA LEVEL

Depth m	Bottom-time min	DECO - stops 16	13	10	7	4	2	Repet. group
12	60						4	H
	90						7	H
	120						12	H
15	30						4	E
	40						6	E
	50						7	F
	60						8	F
	75					1	12	G
	90					3	16	H
	105					3	20	H
20	15						5	C
	20						7	D
	25					2	7	E
	30					2	10	F
	40					3	12	G
	50					5	18	H
	60					6	24	H
25	10						5	C
	15					2	6	D
	20					4	8	E
	25					6	10	F
	30				3	6	12	F
	40				5	7	20	G
	50				7	10	25	H
	60				8	15	25	H
30	5						4	C
	10					1	5	D
	15					4	7	E
	20				2	4	10	F
	25				4	6	11	G

Depth m	Bottom-time min	DECO - stops 16	13	10	7	4	2	Repet. group
30	30				6	8	16	G
	40			3	10	12	25	H
	50			3	12	15	30	H
	60			6	15	20	35	H
35	5						4	C
	10					2	5	E
	15				4	5	10	F
	20			1	6	6	14	F
	25			3	7	8	17	G
	30			4	8	10	20	G
	40		2	7	10	15	30	H
	50		3	8	12	20	40	H
40	5					2	4	C
	10				2	3	8	D
	15			3	5	5	11	F
	20			4	6	7	14	G
	25		3	5	8	8	20	H
	30		3	6	10	11	25	H
	40		6	8	11	18	40	H
45	5					3	4	C
	10			1	3	4	9	E
	15		2	4	5	5	14	G
	20		3	5	7	8	19	G
	25	1	4	6	8	10	25	H
	30	2	5	7	10	17	35	H
50	5					2	3	6	D
	10		1	3	4	5	12	F
	15	1	3	6	6	7	18	G
	20	3	4	6	8	10	23	H
	25	3	5	8	10	12	28	H

Max. ascent rate 10m/min

	No decompression limits (1501 - 2000 m)						
m	9	12	15	18	20	25	30
min	360	50	25	15	10	6	4
	Each dive must include a decompression stop of 3 min at 2 m						

*Tested on humans in wet conditions.

SCHEDULE 3* (contd.)

REPETITIVE SYSTEM 1501 - 2000 m ABOVE SEA LEVEL

SURFACE INTERVAL TABLE (min)

Repetitive group at the beginning of surface interval	Repetitive group at the end of the surface interval							
	H	G	F	E	D	C	B	A	"O"
H	17	37	60	74	90	108	130	191
G		20	44	58	75	93	116	179
F			24	39	55	73	96	160
E				15	31	49	72	136
D					17	35	58	113
C						19	42	106
B							23	88
A								65

REPETITIVE TIMETABLE (min)

Repetitive - group	Depth m: 6	8	10	12	15	20	25	30	35	40	45	50
H	-	-	361	168	103	63	46	37	30	25	23	20
G	-	>224	184	119	77	50	37	30	25	21	19	17
F	>437	224	118	83	57	39	29	23	19	17	15	13
E	437	119	75	57	41	28	21	17	14	12	11	9
D	194	89	58	45	33	23	17	14	12	10	9	8
C	122	65	45	36	25	18	14	11	9	8	7	6
B	78	45	32	25	19	13	10	8	7	6	5	5
A	46	28	21	16	12	9	7	6	5	4	3	3

*Tested on humans in wet conditions.

SCHEDULE 4

DECOMPRESSION - TABLE 2001 - 2500 m ABOVE SEA LEVEL

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
12	50						4	E
	60						6	F
	75						8	F
	90					2	10	F
	120					5	15	G
15	20						4	C
	25						5	D
	30						6	D
	40						9	E
	50						12	F
	60						14	F
	75					2	18	G
	90					5	22	G
20	10						4	B
	15						7	C
	20						10	D
	25					2	10	E
	30					3	12	E
	40					5	16	F
	50					6	20	F
	60					8	26	G
25	5						4	B
	10						6	C
	15					3	8	D
	20					5	10	E
	25				1	7	10	F
	30				3	7	18	F
	40				5	10	30	F
	50				8	15	30	G
	60				8	20	35	G

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
30	5					1	5	B
	10					3	7	C
	15					5	9	E
	20				3	7	10	F
	25				6	9	18	F
	30				8	10	25	F
	40			3	12	15	33	G
	50			5	15	20	38	G
35	5					2	4	B
	10				1	3	6	D
	15				4	5	13	E
	20			2	6	7	15	F
	25			3	8	9	24	F
	30			5	8	10	30	G
	40		3	7	10	18	45	G
40	5					3	5	B
	10				2	4	9	D
	15			3	5	6	13	F
	20			4	7	8	17	F
	25		2	5	9	10	25	G
	30		3	6	11	15	32	G
45	5				1	3	7	C
	10			1	3	6	10	E
	15		2	4	5	8	15	F
	20		3	5	8	10	25	G
	25	1	4	6	10	12	30	G
50	5				2	4	8	C
	10		1	3	4	6	14	E
	15	1	3	6	7	9	21	F
	20	3	4	6	9	12	28	G

Max. ascent rate 10m/min

	No decompression limits (2001 - 2500 m)				
m	9	12	15	18	20
min	240	40	15	7	5
	Each dive must include a decompression stop of 3 min at 2 m				

SCHEDULE 4* (contd.)

REPETITIVE SYSTEM 2001 - 2500 m ABOVE SEA LEVEL

SURFACE INTERVAL TABLE (min)

Repetitive group at the beginning of surface interval	Repetitive group at the end of the surface interval							
	H	G	F	E	D	C	B	A	"O"
H	17	36	58	72	87	104	124	180
G		19	42	55	70	88	108	163
F			23	36	51	69	89	146
E				14	29	46	66	121
D					15	33	53	109
C						18	38	94
B							21	27
A								57

REPETITIVE TIMETABLE (min)

Repetitive group	Depth m	6	8	10	12	15	20	25	30	35	40	45	50
H		-	-	>206	180	106	65	47	37	31	26	23	20
G		-	>280	206	124	80	51	38	30	25	22	19	17
F		-	280	127	87	59	39	29	23	20	17	15	13
E		>258	132	80	58	42	28	22	17	15	13	11	10
D		258	97	63	46	34	23	18	14	12	10	9	8
C		145	70	47	36	26	18	14	11	10	8	7	7
B		89	48	34	26	19	13	10	9	7	6	6	5
A		51	30	22	17	13	9	7	6	5	4	4	3

SCHEDULE 5*

DECOMPRESSION - TABLE 2501 - 3200 m ABOVE SEA LEVEL

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
12	40						5	D
	50						8	D
	60						10	E
	75						14	F
	90					2	18	F
15	15						4	B
	20						6	C
	25						8	D
	30						10	D
	40						14	E
	50						18	E
	60						20	F
	75					2	26	F
	90					6	32	F
20	10						5	B
	15						8	C
	20					2	10	D
	25					2	12	D
	30					3	14	E
	40				1	7	18	E
	50				1	10	24	F
	60				2	12	30	F
25	5						5	B
	10						8	C
	15					3	10	D
	20				1	5	13	D
	25				3	7	18	E
	30				4	10	23	F
	40				6	12	35	F
	50				8	15	40	F

Depth m	Bottom-time min	DECO - stops m 16	13	10	7	4	2	Repet. group
30	5					2	6	B
	10					3	9	C
	15				1	5	12	D
	20				3	8	13	E
	25			2	5	12	20	F
	30			3	9	12	30	F
	40			4	12	16	40	F
	50			6	15	22	50	F
35	5				1	3	6	B
	10				1	4	9	D
	15			1	2	6	14	E
	20			2	6	9	18	F
	25			3	9	13	25	F
	30		1	5	10	15	33	F
	40		3	7	12	22	50	F
40	5				1	3	8	B
	10				2	5	10	D
	15			3	5	7	15	E
	20		1	4	8	10	22	F
	25		3	5	11	14	30	F
	30		3	8	14	18	35	F
45	5				2	3	9	C
	10			1	3	6	12	D
	15		2	4	6	10	18	E
	20	1	2	6	10	14	32	F
	25	1	4	8	12	17	38	F
50	5			1	2	3	10	C
	10		1	3	5	8	14	E
	15	1	3	6	8	12	22	F
	20	3	4	7	11	16	34	F

Max. ascent rate 10 m/min

No decompression limits (2501 - 3200 m)				
m	9	12	15	18
min	150	30	10	5
Each dive must include a decompression stop of 3 min at 2 m				

*These tables have been tested under dry conditions.

SCHEDULE 5* (contd.)

REPETITIVE SYSTEM 701 - 1500 m ABOVE SEA LEVEL

SURFACE INTERVAL TABLE (min)

Repetitive group at the beginning of surface interval \ Repetitive group at the end of the surface interval	J	H	G	F	E	D	C	B	A	"O"
J	17	35	59	87	105	125	150	183	265	
H		19	42	71	89	109	134	166	250	
G			23	52	69	90	115	147	230	
F				29	46	67	92	124	207	
E					18	39	64	96	178	
D						21	46	78	161	
C							25	58	141	
B								33	115	
A									81	

REPETITIVE TIMETABLE (min)

Depth m		6	8	10	12	15	20	25	30	35	40	45	50	55	60
Repetitive - group	J			320	171	120	73	53	43	35	30	26	23	21	19
	H		>225	190	125	93	60	44	35	30	25	22	20	18	16
	G	>330	225	130	92	71	47	35	29	24	21	18	16	15	13
	F	330	132	90	67	53	36	27	23	19	16	14	12	11	10
	E	142	83	59	46	37	26	20	16	14	12	11	9	8	7
	D	103	64	47	37	30	21	16	13	11	10	9	7	7	6
	C	73	48	36	28	23	16	12	10	9	8	7	6	6	5
	B	51	34	26	21	17	12	9	8	7	6	5	5	4	4
	A	32	21	16	13	11	8	6	5	5	4	4	3	2	2

*These tables have been tested under dry conditions.

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