

A Table shewing, to what degree Air is compressible in Sea-water, at the depth of any number of feet from 1. to 33. feet or  $5\frac{1}{2}$  fathom, and thence for any number of  $5\frac{1}{2}$  fathoms, or 33. feet, to  $324\frac{1}{2}$  fathoms or 1947 feet-

Some Members of the *Royal Society* did with two different sorts of Instruments make divers Experiments for finding the *Proportions* of the *Compression of Air under Water*, in the Month of *July*, at *Sheernefs*, in the mouth of the River of *Medway*, at the time of high water, where the depth was then about 19 Fathom, and the proportion of the weight of the Salt-water to that of the same quantity of Fresh water, taken out of the river *Thames*, was as 41 to 42.

One of the Instruments was a Glass-bottle, that held a quart of water, having a bras ring fastned to the mouth of it, with a valve or flap, that open'd inward, so well fitted, that the bottle being filled more or less with water, none dropp'd out though forcibly shaken. This, let down 33 foot into the water the mouth downwards, and after a little stay drawn up, was found to be so very near half full of water, at several trials, that it was thought fit to state the *Compression of Air* at that depth to that measure, which at other depths was found to hold the proportions set down in the Table.

The Quantity of the *Compression* was known by weighing the Bottle with the water in it, after that a forcible depression of the Flap had made way for the eruption of the Comprest Air (which kept it up even when the bottle was placed with the mouth upwards,) and then filling the bottle full of the same water, and weighing it again; and lastly by weighing the bottle after the water was all let forth; the weight whereof being deducted, the first quantity of water weighed just half as much as the second, or so near it that the fraction was not considerable: Whence it was concluded, that the Quantity of the Air, that filled the bottle before it was immersed in the water, was, at the depth of 33 feet, comprest into half the space it took up before, and so proportionably at other depths.

This was confirm'd by repeated Experiments made with the other Instrument; which was a Cylinder of Glass, some two foot long, close at one end, and having the other end drawn

drawn small with a lamp, and turn'd down a little way, after the manner expressed in *Fig. 1.* This Cylinder was immerfed perpendicularly with the crooked end uppermoft; by which, as it funk in the water, the preffure thereof did gradually force in fo much water as thruft out the Air proportionable to every depth, till the Cylinder was fo far immers'd, that the hole of the crooked part of it was juft 33 feet under water; and then it being drawn up, by meafuring from the bottom of the Cylinder to the height of the hole in the crooked part by a pair of Compaffes, the water was found to fill the Cylinder fo near the half, that, the motion of the fuperfice of the water, (which then was very fmooth) and the minutenefs of the difference being confider'd, it was thought fit to ftate it to juft half; according to which, confirm'd by the Trials at other depths, the enfuing *Table* was computed.

The Proportion of the *Weight* of Salt-water to that of Fresh, was found by weighing fome Ounces of both in a bottle whereof the weight was exactly known, and which was made with fo fmall a neck, that the addition or diminution of one fingle drop in it was difcernible.

The *Table* is on thefe grounds computed upon the fuppos'd Perpendicular immerfion of a Cylinder of 60 inches, clofe at one end, and having the open end downwards. The *firft* Column fhews the feveral depths in Feet and parts of Feet. The *fecond*, in half Fathoms and whole Fathoms; a Fathom being fix Englifh feet. The *third*, the proportionable parts of Compression of any Quantity of Air at the feveral depths in the *firft* 2 Columns. The *fourth* hath thefe proportions to a Cylinder of 60 inches, expreffed in Inches and parts of Inches: which may eafily be further calculated to any other depth defired.

And that thefe Trials may not be thought to have been made out of meer Curiofity, they will, by confidering and practical men, be found Ufeful for thofe, who have occafion to dive for recovering things loft in water, forasmuch as by thofe Experiments they may afore hand know, to what depth they may, when they funk in the *Diving Bell* or other fit Instruments, endure the Compression of the Air for refpiration; as alfo, how they may furnifh themfelves with Air in a fit veflel for fupply.

## The TABLE it self.

Depth in water.		Air Compress.		Depth in water.		Air Compress.	
In Feet.	In Fath.	to parts.	to Inches.	In Feet.	In Fath.	to parts.	to Inch.
1	0	$\frac{33}{34}$	$58\frac{4}{17}$	24	4	$\frac{33}{37}$	$34\frac{42}{17}$
2	0	$\frac{33}{35}$	$56\frac{1}{7}$	25	0	$\frac{33}{38}$	$34\frac{4}{29}$
3	$\frac{1}{2}$	$\frac{33}{35}$	55	26	0	$\frac{33}{39}$	$33\frac{31}{19}$
4	0	$\frac{33}{37}$	$53\frac{19}{17}$	27	4	$\frac{33}{60}$	33
5	0	$\frac{33}{38}$	$52\frac{2}{19}$	28	0	$\frac{33}{64}$	$32\frac{28}{61}$
6	1	$\frac{33}{39}$	$50\frac{10}{13}$	29	0	$\frac{33}{62}$	$31\frac{26}{21}$
7	0	$\frac{33}{40}$	$49\frac{1}{2}$	30	5	$\frac{33}{63}$	$31\frac{3}{7}$
8	0	$\frac{33}{41}$	$48\frac{2}{41}$	31	0	$\frac{33}{64}$	$30\frac{15}{16}$
8 $\frac{1}{4}$	0	$\frac{4}{5}$	48	32	0	$\frac{33}{65}$	$30\frac{30}{65}$
9	$1\frac{1}{2}$	$\frac{33}{42}$	$47\frac{4}{7}$	33	$5\frac{1}{2}$	$\frac{3}{2}$	30
10	0	$\frac{33}{43}$	$46\frac{2}{43}$	66	11	$\frac{3}{3}$	20
11	0	$\frac{33}{44}$	45	99	$16\frac{1}{2}$	$\frac{1}{4}$	15
12	2	$\frac{33}{45}$	44	132	22	$\frac{1}{5}$	12
13	0	$\frac{33}{46}$	$43\frac{1}{3}$	165	$27\frac{1}{2}$	$\frac{1}{6}$	10
14	0	$\frac{33}{47}$	$42\frac{6}{47}$	198	33	$\frac{1}{7}$	$8\frac{4}{7}$
15	$2\frac{1}{2}$	$\frac{33}{48}$	$41\frac{1}{5}$	231	$38\frac{1}{2}$	$\frac{1}{8}$	$7\frac{1}{2}$
16	0	$\frac{33}{47}$	$40\frac{20}{49}$	264	44	$\frac{1}{9}$	$6\frac{4}{6}$
16 $\frac{1}{2}$	0	$\frac{2}{3}$	40	297	$49\frac{1}{2}$	$\frac{1}{10}$	6
17	0	$\frac{33}{50}$	$39\frac{3}{5}$	330	55	$\frac{1}{11}$	$5\frac{8}{11}$
18	3	$\frac{33}{51}$	$38\frac{12}{51}$	363	$60\frac{1}{2}$	$\frac{1}{12}$	5
19	0	$\frac{33}{52}$	$38\frac{1}{13}$	396	66	$\frac{1}{13}$	$4\frac{8}{13}$
20	0	$\frac{33}{53}$	$37\frac{10}{53}$	429	$71\frac{1}{2}$	$\frac{1}{14}$	$4\frac{2}{7}$
21	$3\frac{1}{4}$	$\frac{33}{54}$	$36\frac{2}{9}$	462	77	$\frac{1}{15}$	4
22	0	$\frac{33}{55}$	36	495	$82\frac{1}{2}$	$\frac{1}{16}$	$3\frac{3}{4}$
23	0	$\frac{33}{56}$	$35\frac{5}{14}$	528	88	$\frac{1}{17}$	$3\frac{9}{17}$

Depth

Depth in water.		Air Compress.		Depth in water.		Air Compress.	
In Feet.	In Fath.	to parts.	Inch.	In Feet.	In Fath.	to parts.	Inches.
561	93 $\frac{1}{2}$	$\frac{1}{18}$	3 $\frac{1}{3}$	1353	225 $\frac{1}{2}$	$\frac{1}{42}$	1 $\frac{3}{7}$
594	99	$\frac{1}{19}$	3 $\frac{3}{19}$	1386	231	$\frac{1}{43}$	1 $\frac{7}{43}$
627	104 $\frac{1}{2}$	$\frac{1}{20}$	3	1419	236 $\frac{1}{2}$	$\frac{1}{44}$	1 $\frac{4}{11}$
660	110	$\frac{1}{21}$	2 $\frac{6}{7}$	1452	242	$\frac{1}{45}$	1 $\frac{1}{3}$
693	115 $\frac{1}{2}$	$\frac{1}{22}$	2 $\frac{8}{11}$	1485	247 $\frac{1}{2}$	$\frac{1}{46}$	1 $\frac{7}{23}$
726	121	$\frac{1}{23}$	2 $\frac{14}{23}$	1518	253	$\frac{1}{47}$	1 $\frac{13}{47}$
759	126 $\frac{1}{2}$	$\frac{1}{24}$	2 $\frac{1}{2}$	1551	258 $\frac{1}{2}$	$\frac{1}{48}$	1 $\frac{1}{4}$
792	132	$\frac{1}{25}$	2 $\frac{2}{5}$	1584	264	$\frac{1}{49}$	1 $\frac{11}{49}$
825	137 $\frac{1}{2}$	$\frac{1}{26}$	2 $\frac{4}{13}$	1617	269 $\frac{1}{2}$	$\frac{1}{50}$	1 $\frac{1}{5}$
858	143	$\frac{1}{27}$	2 $\frac{2}{9}$	1650	275	$\frac{1}{51}$	1 $\frac{9}{51}$
891	148 $\frac{1}{2}$	$\frac{1}{28}$	2 $\frac{1}{7}$	1683	280 $\frac{1}{2}$	$\frac{1}{52}$	1 $\frac{2}{13}$
924	154	$\frac{1}{29}$	2 $\frac{2}{29}$	1716	286	$\frac{1}{53}$	1 $\frac{7}{53}$
957	159 $\frac{1}{2}$	$\frac{1}{30}$	2	1749	291 $\frac{1}{2}$	$\frac{1}{54}$	1 $\frac{1}{9}$
990	165	$\frac{1}{31}$	1 $\frac{29}{31}$	1782	297	$\frac{1}{55}$	1 $\frac{1}{11}$
1023	170 $\frac{1}{2}$	$\frac{1}{32}$	1 $\frac{9}{16}$	1815	302 $\frac{1}{2}$	$\frac{1}{56}$	1 $\frac{1}{14}$
1056	176	$\frac{1}{33}$	1 $\frac{9}{11}$	1848	308	$\frac{1}{57}$	1 $\frac{49}{57}$
1089	181 $\frac{1}{2}$	$\frac{1}{34}$	1 $\frac{13}{17}$	1881	313 $\frac{1}{2}$	$\frac{1}{58}$	1 $\frac{1}{29}$
1122	187	$\frac{1}{35}$	1 $\frac{5}{7}$	1914	319	$\frac{1}{59}$	1 $\frac{1}{19}$
1155	192 $\frac{1}{2}$	$\frac{1}{36}$	1 $\frac{2}{3}$	1947	324 $\frac{1}{2}$	$\frac{1}{60}$	1
1188	198	$\frac{1}{37}$	1 $\frac{23}{37}$				
1221	203 $\frac{1}{2}$	$\frac{1}{38}$	1 $\frac{11}{19}$				
1254	209	$\frac{1}{39}$	1 $\frac{7}{13}$				
1287	214 $\frac{1}{2}$	$\frac{1}{40}$	1 $\frac{1}{2}$				
1320	220	$\frac{1}{41}$	1 $\frac{19}{41}$				