# Open Water Diver

We are going to do some exercises to acquire practice in the use of tables. At the same time, we will give some useful safety tips. We recommend that you print the tables that we offer you in image format or that you have them active on the screen, to follow the exercises with us, using a paper, drawing the sketches and filling in the data as we find it. You will see how doing it, it seems easier.
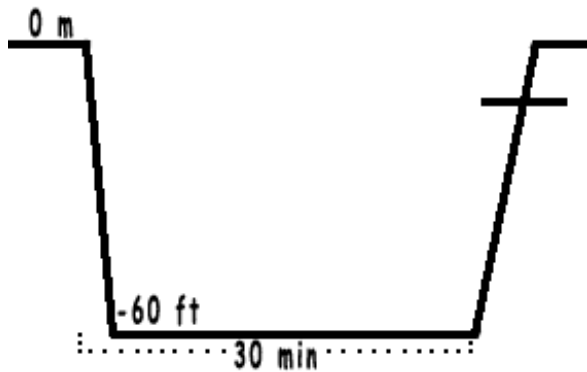


Let's calculate a simple dive to 60 feet of depth for 30 minutes. The first thing is to make our dive sketch with the data that we already know: Surface line, both at the entrance and the exit, inclined line (it took a while) for the descent, straight line indicating the bottom at 60 feet which is the maximum depth we said we will reach, inclined line that indicates the ascent to the safety or decompression stop (we still do not know which), a small horizontal line that indicates a time to stop, a sloping line that indicates the ascent to the surface and the surface line after the dive. We have indicated that from the moment we start the dive until we begin the direct ascent, 30 minutes will pass, which is our bottom time.

Now we look in the decompression table (table A) our dive. We went to the column on the left to find the depth of 60 feet. We see that they show, then in their file, we look for the 30 minutes, we see that they show and have the decompression code "S". This means that it is not necessary to do mandatory decompression stops, but it is highly recommended to do a safety stop, which as the table indicates, is of 3 minutes at 15 feet. In addition, we see that our dive is in the column of the letter D, which is our group in case we want to do a successive dive. We already have all the data requested, so we write them in our sketch. We have also indicated that we must take two minutes to reach the safety stop and then use two minutes to climb from the safety stop to the surface.
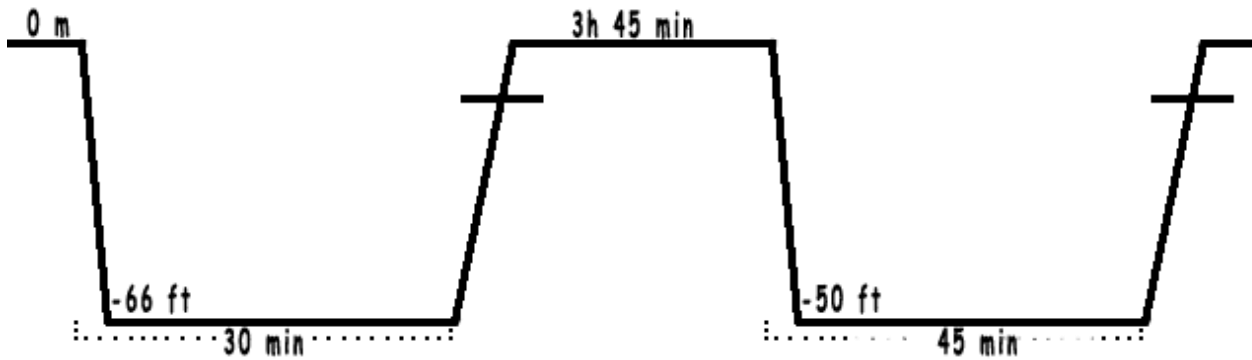


Table A:

| Depth | | | | Dive |
|---|---|---|---|---|
| 20 ft | 30 | 60 | 90 | 120 |
| 30 ft | 30 | 45 | 60 | 90 |
| 40 ft | 22 (S) | 30 (S) | 40 (S) | 60 (S) |
| 50 ft | 18 (S) | 25 (S) | 30 (S) | 40 (S) |
| 60 ft | 14 (S) | 20 (S) | 25 (S) | 30 (S) |
| 70 ft | 12 (S) | 15 (S) | 20 (S) | 25 (S) |
| 80 ft | 10 (S) | 13 (S) | 15 (S) | 20 (S) |
| 90 ft | 9 (S) | 12 (S) | 15 (S) | 20 (S) |
| 100 ft | 7 (S) | 10 (S) | 12 (S) | 15 (S) 8 (1) |
| 110 ft | 6 (S) | 10 (S) | 12 (S) | 15 (1) |
| 120 ft | 6 (S) | 8 (S) | 10 (S) | 12 (1) |
| 130 ft | 5 (S) | 8 (S) | 10 (1) | 13 (2) |
| 140 ft | 5 (S) | 7 (S) | 9 (1) | 11 (2) |
| RNG | A | B | C | D |
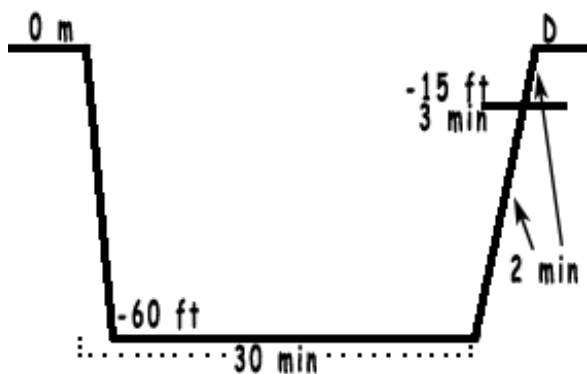


As we see it is very simple. If instead of 30 minutes, our dive lasted 60 minutes, consulting the tables we would see that we would have to do a mandatory decompression stop, in the water, at 10 feet deep for 5 minutes (we see that we get into the red zone of the table). This dive would be totally inadvisable.

Let's now do an example of successive dives. We go down to 66 feet deep for 30 minutes, 3 hours and 45 minutes after leaving the surface, we want to go down to 50 feet for 45 minutes. The first thing is to draw the sketch with the data that we already know to later fill it with the data we find out. As we have already indicated, it is the simplest way to do it and it reduces errors.

Now it is necessary to go to the tables looking for data to put in the sketch. We go to table A to find our first dive. In the left column we look for our 66 feet. As they do not appear, we have to go to the 70 feet row. In this row we look for our 30 minutes, which do not appear either so we have to go to the next higher time, which is 35 minutes. We

| | A | B | C | D | | E |
|---|---|---|---|---|---|---|
| 70 ft | 12 (S) | 15 (S) | 20 (S) | 25 (S) | | 35 (S) |
| 80 ft | 10 (S) | 13 (S) | 15 (S) | 20 (S) | | 25 (S) |
| 90 ft | 9 (S) | 12 (S) | 15 (S) | 20 (S) | | 23 (1) |
| 100 ft | 7 (S) | 10 (S) | 12 (S) | 15 (S) | 18 (1) | 21 (2) |
| 110 ft | 6 (S) | 10 (S) | 12 (S) | 15 (1) | | 18 (2) |
| 120 ft | 6 (S) | 8 (S) | 10 (S) | 12 (1) | | 15 (2) |
| 130 ft | 5 (S) | 8 (S) | 10 (1) | 13 (2) | | |
| 140 ft | 5 (S) | 7 (S) | 9 (1) | 11 (2) | | |
| RNG | A | B | C | D | | E |

see that our decompression code is "S" and it places us in the yellow zone of the table (caution), then we do not have to do mandatory decompression, but we do have a safety stop of 3 minutes at 15 feet. We also see that our dive is in the column of the E, then we pass all this data to our sketch.
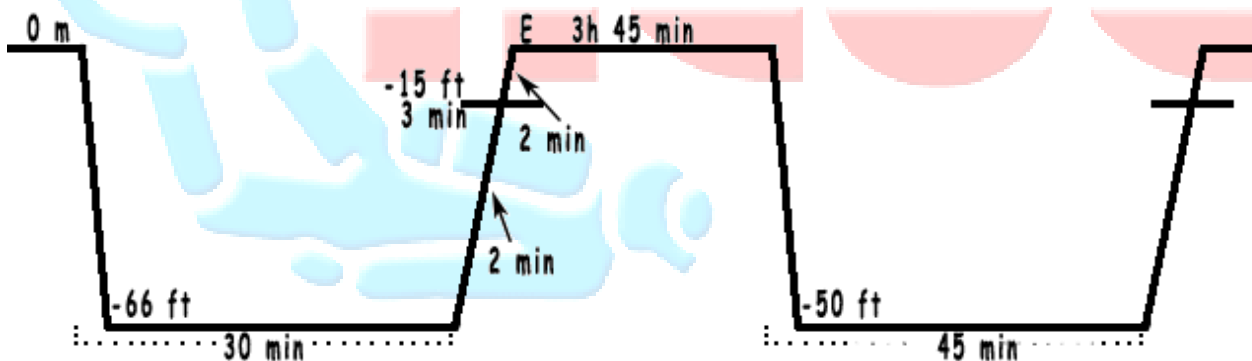


Now we need to know what happens with our residual nitrogen, represented by the letter E, after being 3 hours and 45 minutes at the surface. For that, w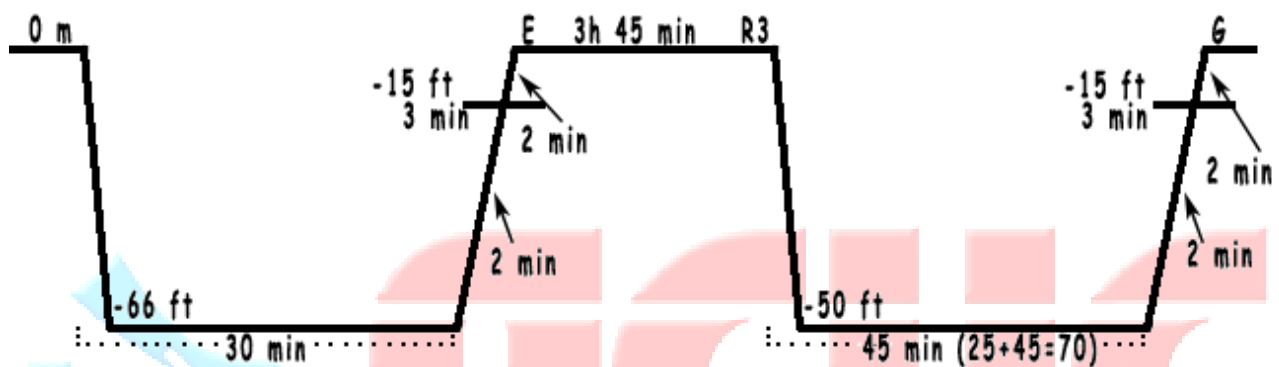e go to table B, in the row above we look for our letter E, in the column on the left we look for the time interval in which 3 hours 45 minutes are included, we cross them and we see that our E code becomes the R3 code. As we already have the data, we write it in our sketch, at the beginning of the second dive.

**Table B: Surface Inte**

| RNG > SIT | A | B | C | D | E |
|---|---|---|---|---|---|
| 0:15-0:29 | R4 | R5 | R6 | R8 | R9 |
| 0:30-0:59 | R2 | R3 | R4 | R5 | R6 |
| 1:00-1:29 | R1 | R2 | R3 | R4 | R5 |
| 1:30-1:59 | R1 | R2 | R2 | R3 | R4 |
| 2:00-2:59 | R1 | R2 | R2 | R3 | R3 |
| 3:00-3:59 | R1 | R1 | R2 | R2 | R3 |

With this data, we go to table C to see the penalty time we have due to the previous dive, discounting the nitrogen accumulation lost during the surface interval, in order to calculate the second dive. As the dive will be 50 feet deep, we look for the 50 feet in the first row above (Real Depth) and look for our new R3 code in the left column.

We go across the R3 row and down the 50 ft column and where they meet we find that the first number (green column), gives us a maximum time of 50 minutes so as not to enter into decompression and the second figure (yellow column) gives us a penalty time of 25 minutes to add to the real time of the dive, data which we take to table A. We already know that we do

| RD→ SIG↓ | 20 ft | | 30 ft | | 40 ft | | 50 ft | |
|---|---|---|---|---|---|---|---|---|
| R1 | 665 | 55 | 272 | 28 | 136 | 14 | 60 | 15 |
| R2 | 600 | 120 | 250 | 50 | 125 | 25 | 55 | 20 |
| R3 | 554 | 166 | 230 | 70 | 115 | 35 | 50 | 25 |

**Table C:** Maximum N...

not have to do decompression stop in the water, because we have a maximum of 50 minutes and we will be 45 minutes only, but we have a safety stop of 3 minutes at 15 feet. In any case, we add the penalty time (25 minutes) to our real bottom time (45 minutes) and it gives us a total time of 70 minutes. With this data we go to table A and we see that at 50 feet for 70 minutes (we go to 75 minutes as there are no 70 minutes), we do not have to do mandatory decompression stops, but we do have a safety stop, finishing this dive in the column of the letter G, which is our code in case we want to do a third successive dive. We pass all the data to our sketch (NOTE, you should pass each item of data to the sketch as you find it).



Well, we hope that the use of decompression tables is becoming clearer. Let's reinforce with a new example: We are going to propose a dive to 66 feet of depth during 30 minutes and, two hours after leaving, we will start a second dive to 60 feet of depth during 40 minutes. As always, the first thing is to make the sketch with the data we have.
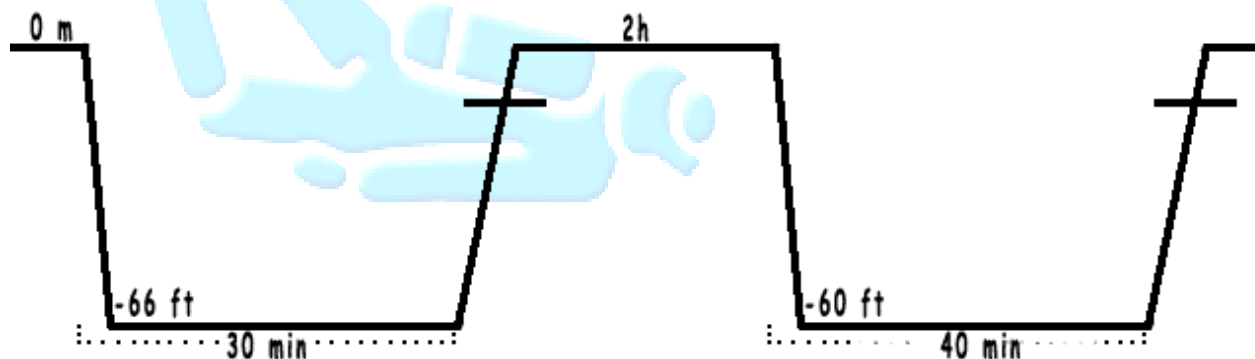


First, we look in table A for the data of our first dive to know how we should ascend:

We see that our dive is within the safety curve but in the limit (yellow), since 66 feet do not show we have to go to 70 feet.

As in the row of the 70 feet there are not 30 minutes, we have to go to 35 minutes. Our decompression code is S then no need to do mandatory

| | | | | | |
|---|---|---|---|---|---|
| 70 ft | 12 (S) | 15 (S) | 20 (S) | 25 (S) | 35 (S) |
| 80 ft | 10 (S) | 13 (S) | 15 (S) | 20 (S) | 25 (S) |
| 90 ft | 9 (S) | 12 (S) | 15 (S) | 20 (S) | 23 (1) |
| 100 ft | 7 (S) | 10 (S) | 12 (S) | 15 (S) 18 (1) | 21 (2) |
| 110 ft | 6 (S) | 10 (S) | 12 (S) | 15 (1) | 18 (2) |
| 120 ft | 6 (S) | 8 (S) | 10 (S) | 12 (1) | 15 (2) |
| 130 ft | 5 (S) | 8 (S) | 10 (1) | 13 (2) | |
| 140 ft | 5 (S) | 7 (S) | 9 (1) | 11 (2) | |
| RNG | A | B | C | D | E |

decompression stops, but we do a safety stop. Our exit **R**esidual **N**itrogen **G**roup (RNG) is E. We pass all these data to our sketch. Do it in yours, since we will only show the final sketch.

We know that we have come out with the letter E and we will be two hours on the surface, so Table B allows us to know what code our E becomes after two hours of **S**urface **I**nterval **T**ime (SIT). We look in table B for the two hours in the column on the left and in its row, we look for the

**Table B: Surface Inte**

| RNG ><br>SIT | A | B | C | D | E |
|---|---|---|---|---|---|
| 0:15-0:29 | R4 | R5 | R6 | R8 | R9 |
| 0:30-0:59 | R2 | R3 | R4 | R5 | R6 |
| 1:00-1:29 | R1 | R2 | R3 | R4 | R5 |
| 1:30-1:59 | R1 | R2 | R2 | R3 | R4 |
| 2:00-2:59 | R1 | R2 | R2 | R3 | R3 |

data that is in the column of the letter E. We see that it is R3, what this means is that because we have been two hours on the surface, our code E has become a **S**urface **I**nterval **G**roup (SIG) of R3. We write it down in our sketch and now, with this new code, we go to table C to see what penalty time we have to apply, that is, what time we have to add to the real bottom time of our second dive to be able to go to table A.

**Table C:** Maximum No Descom and Nit

| RD→<br>SIG↓ | 20 ft | | 30 ft | | 40 ft | | 50 ft | | 60 ft | |
|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 665 | 55 | 272 | 28 | 136 | 14 | 60 | 15 | 40 | 10 |
| R2 | 600 | 120 | 250 | 50 | 125 | 25 | 55 | 20 | 35 | 15 |
| R3 | 554 | 166 | 230 | 70 | 115 | 35 | 50 | 25 | 31 | 19 |

As we can see, in green it indicates a maximum no decompression time of 31 minutes, which means that if we want to dive for 40 minutes, we must do mandatory decompression stops.

Of course, this dive is totally inadvisable, but let's see how we would have to do the ascent in the case of doing it. For that, we have to take the 19-minute data in the yellow column, which is the so-called nitrogen penalty time. Those 19 minutes we have to add them to the time we really are going to be in the bottom, which we said is going to be 40 minutes, which gives us a total of 40 + 19 = 59 minutes, which is the time we should look in table A, to the depth of 60 feet that we are going to dive. As the 59 minutes do not show, we have to go to the next higher, which is 60 minutes and we see that the decompression code is 1.

| | A | B | C | D | | E | F | G |
|---|---|---|---|---|---|---|---|---|
| 60 ft | 14 (S) | 20 (S) | 25 (S) | 30 (S) | | 40 (S) | 50 (S) | 60 (1) |
| 70 ft | 12 (S) | 15 (S) | 20 (S) | 25 (S) | | 35 (S) | 40 (1) | 50 (2) |
| 80 ft | 10 (S) | 13 (S) | 15 (S) | 20 (S) | | 25 (S) | 29 (1) | 35 (2) |
| 90 ft | 9 (S) | 12 (S) | 15 (S) | 20 (S) | | 23 (1) | 27 (2) | 35 (5) |
| 100 ft | 7 (S) | 10 (S) | 12 (S) | 15 (S) | 18 (1) | 21 (2) | 25 (5) | 29 (5) |
| 110 ft | 6 (S) | 10 (S) | 12 (S) | 15 (1) | | 18 (2) | 22 (5) | 26 (6) |
| 120 ft | 6 (S) | 8 (S) | 10 (S) | 12 (1) | | 15 (2) | 19 (5) | 25 (6) |
| 130 ft | 5 (S) | 8 (S) | 10 (1) | 13 (2) | | | 16 (5) | 21 (6) |
| 140 ft | 5 (S) | 7 (S) | 9 (1) | 11 (2) | | | 14 (5) | 18 (6) |
| RNG | A | B | C | D | | E | F | G |
| Deco code | (S) | | (1) | | | (2) | | (3) |
| Minutes: | 3 | | 5 | | | 10 | | 15 |
| Deco depth | 15 ft | | 10 ft | | | 10 ft | | 10 ft |

Below, in the column of code 1, we see that it indicates a decompression stop of 5 minutes at 10 feet of depth; we have to use 2 minutes to go up to the decompression stop, to stay at 10 feet deep during 5 minutes and after 5 minutes, go up to the surface using one minute for the ascent. Also, in the table we can see that we exit this second dive with the letter G in case we wanted to calculate a third successive dive. This example is only to see the use of the tables, since this dive would be inadvisable. Let's transfer all the data to our sketch and see the final result.
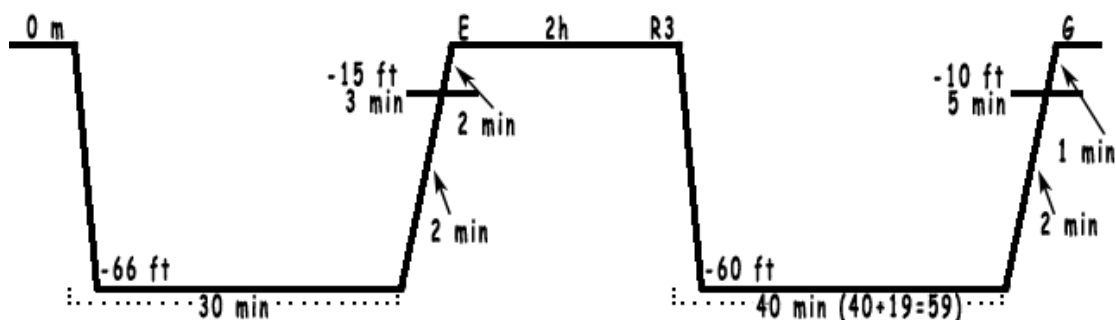
We hope that yours looks the same. Let's go with another example: We're going to do a dive to 66 feet deep for 30 minutes, we exit the water, change equipment and 12 minutes later we do a second dive to 50 feet deep for 30 minutes too. Well, the first thing is to draw our sketch with the data we know and then fill it with the new data as we find it.
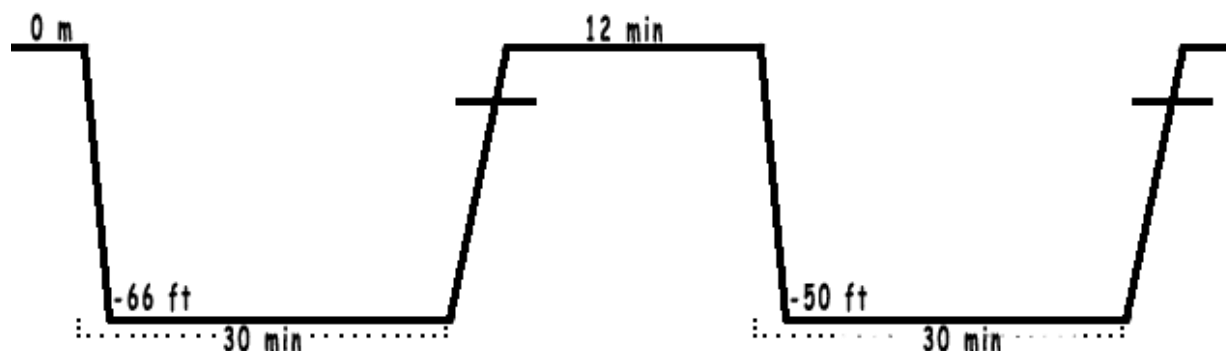


We go to table A to see how our ascent should be from the first dive. Now we are not going to show the graphic, because it coincides with the previous example, so we invite you to see the previous graphic again. As we see, it is not necessary to do decompression stops in the water, but do a safety stop, for 3 minutes at 15 feet, we must use two minutes to go up to 15 feet and after the stop, two minutes to go up from 15 feet to the surface, where we arrived with the letter E.

We go to table B to see what our letter E becomes after 12 minutes of SIT and we find ourselves with the surprise that there are not those twelve minutes. The minimum surface time for a successive dive in this table starts after 15 minutes (see graphic in the margin), therefore, what we want to do, is not a successive dive but a continuous dive.

In this case we no longer need to consult table B or table C, since to calculate a continuous dive, we only need table A. The time of the second dive is the sum of the bottom times of the two dives and the depth, is the maximum depth reached in either of the two. The sum of the times is 60 minutes (30 min in the first dive plus 30 min in the

| RNG > |
| --- |
| SIT |
| 0:15-0:29 |
| 0:30-0:59 |
| 1:00-1:29 |
| 1:30-1:59 |
| 2:00-2:59 |
| 3:00-3:59 |
| 4:00-5:59 |
| 6:00-8:59 |
| 9:00-11:59 |
| 12:00-14:59 |
| 15:00-18:00 |

second dive) and the depth is 66 feet, since it is the maximum reached in the two dives (the depth of the first dive). In table A we look for the depth of 66 feet and the time of 60 minutes. As 66 feet does not appear in the column of depths of the left, we have to go to 70 feet. We follow the row of 70 feet to look for our 60 minutes and find the data is outside the safety curve, in red, which indicates a decompression code (5) and our exit letter is H.

| | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 70 ft | 12 (S) | 15 (S) | 20 (S) | 25 (S) | 35 (S) | 40 (1) | 50 (2) | 60 (5) | 63 (5) | 66 (6) | |
| 80 ft | 10 (S) | 13 (S) | 15 (S) | 20 (S) | 25 (S) | 29 (1) | 35 (2) | 48 (5) | 52 (6) | | |
| 90 ft | 9 (S) | 12 (S) | 15 (S) | 20 (S) | 23 (1) | 27 (2) | 35 (5) | 40 (6) | 43 (6) | | |
| 100 ft | 7 (S) | 10 (S) | 12 (S) | 15 (S) | 18 (1) | 21 (2) | 25 (5) | 29 (5) | 36 (6) | | |
| 110 ft | 6 (S) | 10 (S) | 12 (S) | 15 (1) | 18 (2) | 22 (5) | 26 (6) | 30 (6) | | | |
| 120 ft | 6 (S) | 8 (S) | 10 (S) | 12 (1) | 15 (2) | 19 (5) | 25 (6) | | | | |
| 130 ft | 5 (S) | 8 (S) | 10 (1) | 13 (2) | | 16 (5) | 21 (6) | | | | |
| 140 ft | 5 (S) | 7 (S) | 9 (1) | 11 (2) | | 14 (5) | 18 (6) | | | | |
| RNG | A | B | C | D | E | F | G | H | I | J | |
| Deco code | (S) | | (1) | | (2) | | (3) | | (4) | | (5) |
| Minutes: | 3 | | 5 | | 10 | | 15 | | 20 | | 5 | 10 |
| Deco depth | 15 ft | | 10 ft | | 10 ft | | 10 ft | | 10 ft | | 20 ft | 10 ft |

We go to the bottom row on a white background, to see what decompression code 5 means and we see that it forces us to do 2 decompression stops; the first at 20 feet deep for 5 minutes and the second at 10 feet deep for 10 minutes. From the 50 feet to the first stop we have to take 1 minute; we must remain at 20 feet for 5 minutes; from 20 feet to 10 feet we have to take 1 minute; we have to remain at 10 feet for 10 minutes, after which we can go to the surface but take a minute to ascend. Let's see the full graphic.
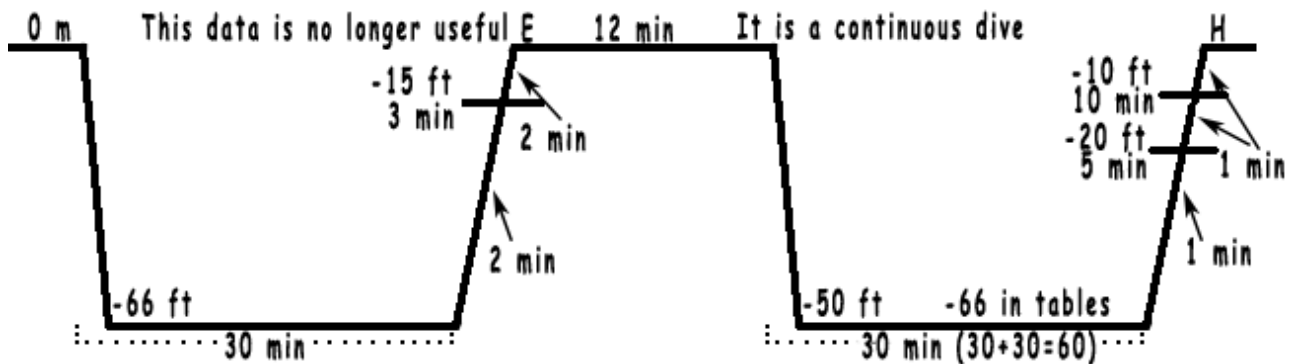
As we can see, we have very easily entered decompression and also an important decompression, with 2 stages of decompression. This is one of the reasons why continuous dives are not recommended and it is important to leave a wide margin on the surface before doing the next dive. This example is useful to learn the use of the tables, but this dive is not recommended at all.

Let's see another example but using the tables in a different way: we want to do two dives of 30 minutes each and we do not want to enter into mandatory decompression in any of the two. We go to table A, to see what is the maximum depth in which we can be for 30 minutes without entering into mandatory decompression and we see that it is 70 feet, so we already know the maximum depth of the first dive: between 60 and 70 feet. Let's make the assumption that we go down to 66 feet for 30 minutes. A safety standard is that the second dive should be to a shallower depth than the first, we will consider the second dive to be to a maximum depth of 56 feet.
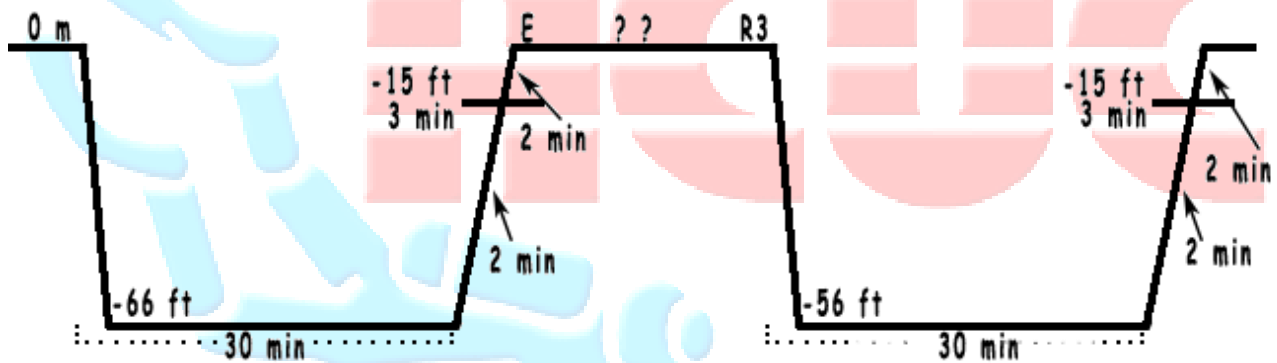


To 70 feet for 35 minutes, which is our dive in the tables, we see that we have the code (S) then we do not need decompression stops in the water, but only a safety stop at 15 feet for 3 minutes, you must use 2 minutes to go up from 66 feet to 15 feet and then 2 minutes to go up from 15 feet to the surface, where we arrive with the letter E. We put it on our chart. We also put the depth and time of the second dive because it is a known fact; we still need to know the surface interval so that, in fact, only the safety stop of 3 minutes to 15 feet is necessary in our next dive.

Now we know that we are going to descend to a maximum depth of 56 feet during 30 minutes, so we must find out what is the minimum Surface Interval Time to be able to do that dive without going into mandatory decompression stops.

For that, we go directly to table C, we look in the top row for the 56 feet, but as they do not show we go to 60 feet and, in the green column of the left, we look for our time of 30 minutes. It does not exist so we go to the next higher. We find that we have 31 minutes before entering into mandatory

| RD→ SIG↓ | 20 ft | | 30 ft | | 40 ft | | 50 ft | | 60 ft | |
|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 665 | 55 | 272 | 28 | 136 | 14 | 60 | 15 | 40 | 10 |
| R2 | 600 | 120 | 250 | 50 | 125 | 25 | 55 | 20 | 35 | 15 |
| R3 | 554 | 166 | 230 | 70 | 115 | 35 | 50 | 25 | 31 | 19 |

decompression stops in the row corresponding to the code R3, then we already know that this has to be our maximum Surface Interval Group to enter the second dive. We put it on our graphic.

| RNG ><br>SIT | A | B | C | D | E |
|---|---|---|---|---|---|
| 0:15-0:29 | R4 | R5 | R6 | R8 | R9 |
| 0:30-0:59 | R2 | R3 | R4 | R5 | R6 |
| 1:00-1:29 | R1 | R2 | R3 | R4 | R5 |
| 1:30-1:59 | R1 | R2 | R2 | R3 | R4 |
| 2:00-2:59 | R1 | R2 | R2 | R3 | R3 |

**Table B: Surface Inte**

Now, in table B, we look in the first row for our exit Residual Nitrogen Group E from the first dive and go down in its column until we find the first R3 code. We find it and see that it is in the row of times corresponding to an interval between 2 hours and 2 hours 59 minutes. Now we know our minimum surface interval: 2 hours. If we are 2 hours or more at the surface after the first dive, we will not need to do mandatory decompression stops in the second dive. Let's see the graph completed assuming those two hours minimum on the surface.
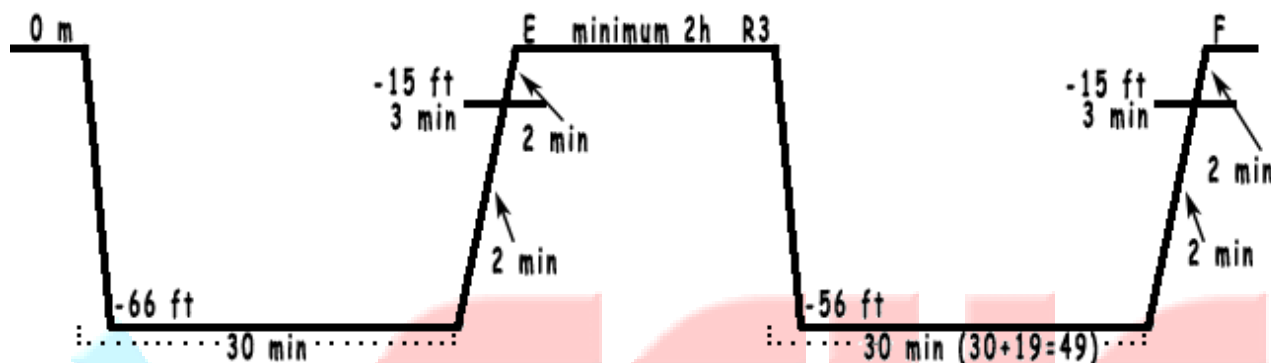


As we can see, we can manage the tables to obtain the data we need at each moment. With the latter, we end the examples, which hopefully have served to understand and use the decompression tables with ease.

In the next topic we propose exercises without giving any solutions, so that you solve them and, in the following, we show you those same exercises already solved so you can check if you have made an error. We also include two image files, one with table A, called TablaA_Imp.jpg and another with tables B and C, called TablaBC_imp.jpg. These files can be printed if you find it more convenient to solve the problems raised or have them on screen for consultation during the exercises. If you wish, you can also acquire, through your instructor or directly, through our website ACUC Products these laminated tables, which are therefore submersible.

It is very important that you do all the exercises on your own, without consulting the file with the solutions, to make sure that you can do them all, since in the theory exam you will have to solve decompression problems. The theme 6_5 that we offer you with the solutions, is for you to check by yourself if you have made an error in any exercise. Remember that for any questions you may have, you can always consult your instructor, through the contact means that he must have provided you, or even ACUC directly if for any reason you cannot contact your instructor.