CALCULATIONS FOR GAS CONSUMPTION AND GAS REQUIRED

Calculating the gas consumption enables the diver to plan his dive more efficiently and ensures that sufficient gas for a normal dive is always available (not allowing for a catastrophic gas loss). There are two methods of achieving a workable gas consumption rate (all calculations made assuming the use of a 12ltr tank):

1. Find a comfortable depth say 20m, note the bar in the tank, say 200bar; swim for a set time at depth, say 10 minutes; and then note the bar in the tank again, say 160bar. Putting these readings into a formula enables the gas consumption to be calculated.
2. Before the dive starts note the bar in the tank, say 200bar; undertake the dive and note the time down to nearest minute say 45 minutes; calculate the average depth of the dive, say 15m; note the bar in the tank at completion, say 70bar. Putting these readings into a formula enables the gas consumption to be calculated.

Calculations

Case 1 – 20m in bar = 2+1 = 3, bar used 200-160 = 40bar, time = 10mins, tank size 12ltr. Formula = (bar used / depth in bar / time) x (tank size). Therefore (40 / 3 / 10) x (12) = 16 Surface Litres per Minute (SLP)

Case 2 – Average depth 15m in bar = 1.5+1 = 2.5, bar used 200-70 = 130bar, time = 45mins, tank size 12ltr. Formula = (bar used / average depth in bar / time) x (tank size). Therefore (130 / 2.5 / 45) x (12) = 14 Surface Litres per Minute (SLP)

If these calculations are carried out over a range of dives and conditions then a profile of the diver's gas consumption can be obtained. This profile can be used when planning dives where for safety i.e. decompression dives sufficient gas must be carried to ensure 'deco requirements' are met.

IMPORTANT – The gas calculations above do not take into consideration exertion or stress during a dive when extra demand may be made on the divers gas consumption.

Having established a gas consumption profile the information can be used in planning dives. By knowing the SLP it is possible to work out the gas that requires to be carried to complete any dive. To do this calculation properly the dive requires to be broken down in to it segments:

- Surface to depth (this can be easily added to the deepest bottom time to make the calculation easier)
- Bottom time and depth
- Depth to next depth (if multi-level) or 1st decompression stop or deep stop (again this can be added to the deepest bottom time for ease of calculation as it builds in a margin of safety)
- Next depth or 1st deco stop or deep stop + ascent time to next depth or 2nd deco stop or deep stop
- Next depth or 2nd deco stop or deep stop + ascent time to next depth or 3rd deco stop or deep stop
- Repeated until surface

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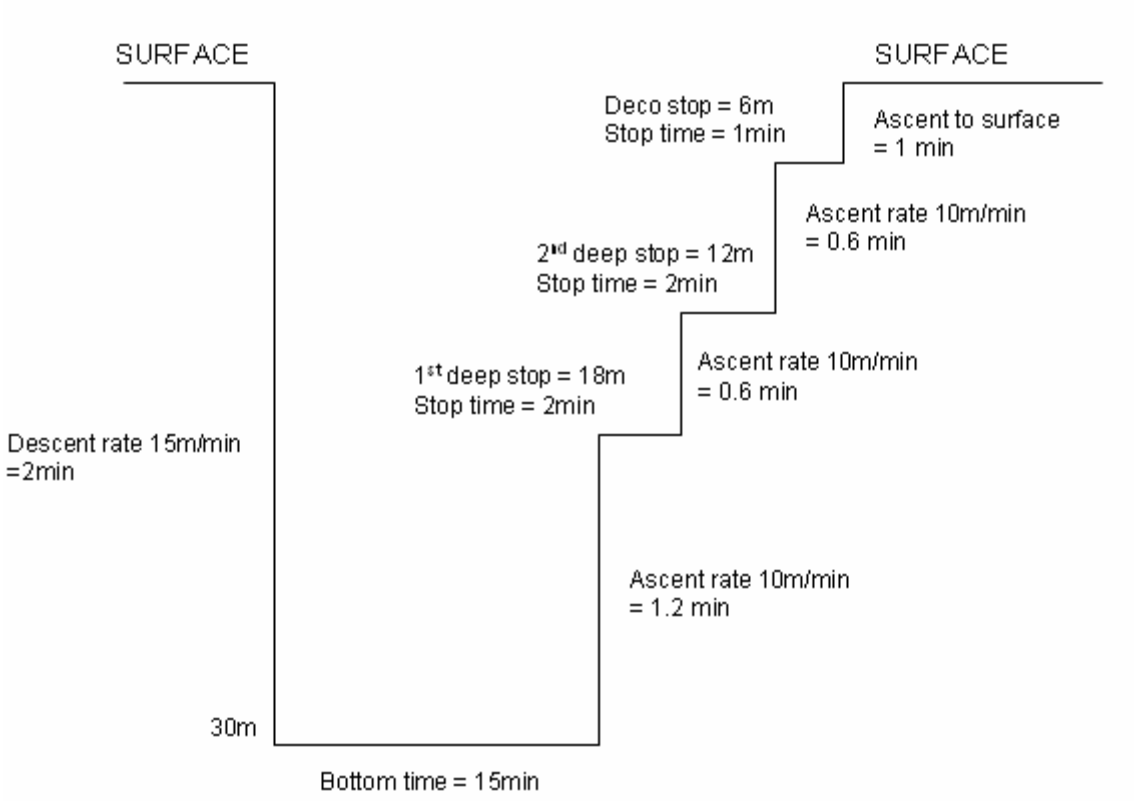
Example:



Formula for Calculations = SLP x depth in bar x time

For above example

1. SLP assumed is 16 / Depth =30m which is 3+1 bar = 4 / Surface to depth + Bottom time + Bottom to 1st Deep Stop (2min + 15min+1.2min) =18.2min.
   Calculated = 16 x 4 x 18.2 = 1165 litres of gas
2. SLP assumed is 16 / Depth = 18m which is 1.8+1 bar = 2.8 / Deep stop + ascent to next Deep Stop (2min + 0.6min) =2.6min.
   Calculated = 16 x 2.8 x 2.6 = 117 litres of gas
3. SLP assumed is 16 / Depth = 12m which is 1.2+1 bar = 2.2 / Deep stop + ascent to Deco Stop (2min + 0.6min) =2.6min.
   Calculated = 16 x 2.2 x 2.6 = 92 litres of gas
4. SLP assumed is 16 / Depth = 6m which is 0.6+1 bar = 1.6 / Deco Stop + ascent to Surface (1min + 1min) =2min.
   Calculated = 16 x 1.6 x 2 = 52 litres of gas

Total gas required = (1165 + 117 + 92 + 52) = 1426 litres

Assuming a 12ltr tank pressured to 200bar = 2400 litres (12 x 200)

Excess gas over requirement on dive is 2400-1426 = 974 litres

For safety the One Third Rule can be applied, meaning that you allow for an extra third in case of emergency. Therefore on above example the amount calculated is multiplied by 1.5 which then means required gas is 1426 x 1.5 = 2130 litres. The dive can still be completed on a 12 litre tank surfacing with more than 50 bars in the tank.