

## Duration of Bell Lockouts

DMAC 20 Rev. I – November 1997

*Supersedes DMAC 20, which is now withdrawn*

### 1 Background

In 1990, DMAC was asked to consider the physiological aspects related to the length of time divers may be asked to work outside a diving bell. As a result, guidance note DMAC 20 was published in June 1990. This revision supersedes DMAC 20 which is now withdrawn.

There is now considerable operational experience concerning longer lockout times for divers, and it is therefore considered appropriate that DMAC updates the guidance. However, there is no new physiological information which would allow finite limits to be set.

The physical fitness of the diver and the exertion required of him will probably be the main factors which have to be considered when deciding on the length of a lockout from a diving bell. However, the depth of the dive, hydration, nutrition, thermal balance, level of work load, and other factors should also be considered.

In the North Sea, the normal practice is to limit the lockout time of a diver to four hours during any one bell dive or, when using three man bell runs, to allow six hour lockouts with the individual diver acting as the bell man on each third dive and thus remaining dry. In other parts of the world these times are often considerably longer.

### 2 Hydration

Prior to starting any bell dive, the divers should be fully hydrated and have drunk sufficient fluid. Consideration should be given to the hydration level of any diver in the hours or days before the dive.

A diver breathing helium oxygen mixtures and being supplied with active heating will dehydrate. In normal circumstances, this will not reach a level at which any physiological change will occur and a feeling of thirst is the only symptom. However, in some cases fluid loss of up to 5% of body weight after four hours has been recorded.

If the diver is in the water for a prolonged period or there are other unusual factors then consideration will need to be given to rehydration by the diver returning to the bell for a drink during the course of the lockout. In general, this will not be necessary if the lockout does not exceed four hours however the diver should be offered the opportunity to return to the bell for fluid during any bell lock out exceeding two hours.

### 3 Nutrition

It is important that divers living in saturation remain adequately nourished. Towards this end their food intake should be considered on a daily basis and as much food of suitable quality made available to them as they request. Assuming the diver has been adequately nourished prior to a bell dive then lack of food should not be a problem during the dive. However, divers should not consume a heavy meal within the two hours preceding a dive.

Some divers, as a matter of personal preference, may wish to return to the bell during a dive for food. This can often be combined with taking on fluid or some other reason for returning to the bell and should not be discouraged.

## 4 Thermal Balance

It is important that the diver is provided with a suitable and adjustable means of heating such that his temperature can be kept within comfortable upper and lower limits. At greater depths (typically below 150 msw) it is also necessary that the diver's inspired gas can be heated to a suitable temperature.

*If kept in thermal balance, there is no limit, simply due to heat or cold, to the time a diver can lock out from a diving bell.*

## 5 Physical Fitness/Work Undertaken

The standards of strength and fitness vary considerably among divers and the abilities of each diver should be established and understood by the diving supervisor. Asking a diver to undertake a physically demanding task over a prolonged period can result in severe fatigue – which the diver himself may be reluctant to report or may not even recognise.

Similarly the work to be undertaken needs to be considered by the diving supervisor. Mid-water work requiring considerable finning will be much more fatiguing than the same task carried out on the bottom. Similarly the moving of sandbags is obviously more physically demanding than visual inspection work.

When deciding the duration of a lockout all of these factors need to be considered and while a fit diver carrying out light work on the seabed may be able to lock out for longer than four hours, a diver carrying out heavy construction work mid water may need to be limited in his lockout to less than four hours.

## 6 Conclusion

Definite time limits for lockouts can not normally be given based on any physiological parameters. Fatigue is the main controlling factor and the final decision on the length of an individual lockout will need to be made by the diver and supervisor, taking in to account such circumstances as the diver's fitness, strength, work being undertaken, work history on previous days, etc.

Diver safety must always be paramount and it must be remembered that a diver must always have the necessary reserves of strength and stamina to rescue himself or a colleague in an emergency.