How the U.S. Navy Tests a BC

Setting a de facto standard with Scubapro

In our November issue, we reported on our personal tests with buoyancy compensators (BCs) and how they float you on the surface — face in the water or face out of the water. This month we got our hands on the U.S. Navy's report describing tests performed on a Scubapro BC. Their test protocol is likely to become a de facto standard, at least for the time being, because there are no other standardized BC test procedures used in this country. The results of such tests will undoubtedly be used to sell BCs by manufacturers who pass, and will be pooh-poohed as irrelevant by those who fail.

The regulator testing procedures of the Navy Experimental Diving Unit (NEDU) in Panama City, Florida, virtually turned the dive industry on its head. Although NEDU made it abundantly clear that they didn't really give a damn about recreational divers — the regulator tests were intended to assess gear for military use — the stigma of receiving lower ratings forced regulator manufacturers to redesign their products. Despite all the furor about its relevance to recreational divers, the advertising advantages of a Class A rating were obvious. As a result, regulators in general are a lot easier breathing than they were before NEDU took the bull by the horns.

Test Procedures

Assuming that NEDU continues to test BCs the same way they did this time with the Scubapro Military Classic, here's how they'll work it.

■ Lift capacity was assessed at 60, 130, and 190 fsw by inflating the power inflator, then measuring buoyancy with a mechanical spring scale. To ensure that it was all the way full, the BC was fed air until the overpressure valve vented, then checked for leaks. Minimum lift capacity to pass the test was 10 pounds.

■ Lift capacity was also assessed at 60, 130, and 190 fsw by popping the built-in CO_2 inflator (are you old enough to remember those?) supplied on military-model BCs. At 60 feet, a twin-cartridge inflator was used (two 38-gram cartridges). At 130 feet, lift was tested with a twin-cartridge inflator and with paired twin-cartridge inflators (four 38-gram cartridges). At 190 feet, only the double-twin setup was used. Minimum lift capacity to pass the test was again 10 pounds.

■ Divers took the BC on ocean dives to a maximum depth of 130 feet and rated it subjectively in terms of performance, fit, and function on a 1 ("extremely poor") to 6 ("excellent") scale. Nine divers tested the BC with a single tank, and seven divers used double 80s. Subjective ratings included overall comfort, mobility, doffing and donning, attaining neutral buoyancy, location of controls, ease of operation, and an overall rating that presumably took all the other factors into account.

■ Surface floating attitude — head-up or head-down position — was assessed by asking divers to go as limp as possible (this may be tough for a navy diver), simulating unconsciousness in a pool. Divers either lay prone or hung vertically with their heads downward on the bottom of the pool. For all 200 trials (100 with single 80s and 100 with doubles), they wore weight belts that were 20 pounds heavier than normally required. Half the tests were done prone, and half head down vertically. Other divers approached these "victims," inflated their BCs until they were neutrally buoyant, and ditched their weight belts. When the victims floated to the surface, their positions were observed. As you might guess, face up passed and face down failed.

How Did Scubapro Do?

The Scubapro BC tested just fine at all depths. Fully blown up, it had about 50 pounds of positive buoyancy at all three depths. Two CO_2 cartridges were enough to give it at least 10 pounds of lift at 60 feet and 130 feet, but it took four cartridges to do the trick at 190 feet. Fifteen of the 16 divers who took it on ocean dives gave it good to excellent subjective ratings, except for one guy wearing doubles who had a hard time doffing and donning it and didn't seem to be very comfortable with it or its operating controls. You'll probably be seeing some Scubapro ads this year mentioning the successful tests.

How Did the Navy Do?

This is a touchy subject. The last time I thumped the Navy for its archaic attitude toward BCs, somebody at NEDU took me to task for having an out-of-date version of the *USN Diving Manual*, and I had to roll over because he was right. Anyway, I wasn't chastened enough to avoid taking a few shots from the standpoint of the recreational diver. Yeah, yeah, I know that NEDU's mission doesn't include keeping us in mind, but we use BCs, too.

Here's a minor but curious point: Why did NEDU bother to test total buoyancy at more than one depth? Obviously, it couldn't change as long as there was enough air to blow the BC up all the way. Beats me. The laws of physics *do* apply to the rest of us. . . .

A more important question is why NEDU used 10 pounds as the minimum acceptable lift. Ten pounds of lift may not be enough even to offset wetsuit compression on a deep coldwater dive. A flooded drysuit may leave a diver with 40 pounds or more of negative buoyancy, and 10 pounds isn't going to get him off the bottom. Of course, he *should* drop his weights, and there's no doubt in my mind that Navy divers are better trained than recreational divers, so perhaps they always do what they should in an emergency. If there's going to be a number for minimum acceptable lift, why not make it large enough to really do some good, just in case that weight belt is tangled in place, or there's some other mass of metal to overcome, and there isn't a buddy on hand to help out?

I'm also puzzled by the protocol for testing surface floating attitude. Why did NEDU's divers start with 20 more pounds of lead than normal? Using so much lead requires the BC to be at least 40% full (20/50 pounds) just to achieve neutral buoyancy and start the ascent. The report doesn't say how deep the pool is, but the expansion from the bottom of a typical pool to the surface would probably add another 5 or more pounds of lift. Since half the divers were wearing doubles — which adds another 10 pounds, plus another couple of pounds for the yoke and hardware — they probably surfaced with at least 30 pounds of lift in their BCs, and no lead.

Is that what you might expect to have happen to you in a typical emergency, such as losing consciousness on the bottom? If your buddy saw what was happening and had his act together, he could drop your lead and inflate your BC, controlling your ascent on the way up. It wouldn't matter whether your BC could turn you face up on its own, because your buddy would take care of that for you when you both got to the surface.

If you didn't have a buddy on hand, would you have the presence of mind to drop your own lead and put some lift in your BC as the world was turning grey? If so, it could be very comforting to pass out knowing that you'd be sunny side up when you got to the top.

The value of having a BC turn a diver face up on the surface is unquestionable, but I do question the NEDU protocol for putting divers there without weights. It might be more realistic to test a BC's ability to rotate an unconscious diver wearing full gear face up. When bodies are retrieved from diving accidents, they usually have their lead on.

The Bottom Line

In Depth congratulates NEDU for tackling the difficult task of testing BCs in a meaningful way, and Scubapro for passing with flying colors. We hope that the Navy will keep the recreational diving community in mind, even though that's not its primary mission. There are literally millions more of us than there are Navy divers, and the test information that NEDU generates is virtually certain to be used by manufacturers to design and sell BCs to the rest of us.

Delmar Mesa
(I am the Octopus)

* Navy Experimental Diving Unit (NEDU) in Panama City, Florida, Technical Report 8-94, April 1994, *Procedure for the Manned Evaluation of Commercially Available Buoyancy Compensators*

Way to Go, Scubapro

The Scubapro vest, the precursor to every BC on the market today, is close to celebrating its 20th birthday. Until it appeared, we divers were stuck with the clumsy horsecollar BC, with a ridiculous crotch strap to keep it from floating up like a helium balloon.

The Scubapro vest I bought in 1982 served me faithfully until this summer, when I inflated it to ensure that it still held air before I carted it off to the Caribbean. Well, it didn't. I found an odd tear in the pocket and two razor-like slashes in the bladder.

A clerk at my dive store sent it off to Scubapro to get a price for repair. "I don't think they'll fix this," he said. "You're probably looking at a new one." Good, I mused. I needed an excuse to buy a lighter and less cumbersome model for my travels.

Ten days later, he called to tell me that under their guarantee Scubapro had replaced it with a new one for $10. Since my dive shop doesn't know me as Ben Davison, there was no favoritism, I'm certain — just a guarantee so good that I'll need to find another excuse to replace it.

The holes? I think a wayward rat or mouse found its way into my garage, smelled the innards of a small shell I stashed in the pocket, and chewed himself a hole.

Anyhow, thanks, Scubapro, for standing behind your product, no questions asked.

Ben Davison