

LETTER TO DIVING EQUIPMENT MANUFACTURERS ABOUT INSTRUCTION MANUALS

PREAMBLE

Instruction manuals are mandatory for most diving equipment. Whether as a result of regulatory obligations relating to these instructions or in the event of a diving accident, their contents may now be used as a basis for analyzing the liability of hirers, lenders or users.

Consequently, the increasing judicialization of our societies requires special attention to their drafting.

While some manufacturers have already recognized this and revised their instructions accordingly, it is clear that such an approach is not widespread.

MAIN DRIFTS OBSERVED

The reading of the various instructions (regulators, cylinders, waistcoats, computers, etc.) shows, according to the manufacturers and the ranges of equipment, the following four drifts:

1. Confusion between certification test conditions (e.g. 50 m) and limits of use. **Test conditions are not limits of use.**
2. A drift from (legitimate) instructions aimed at legally protecting manufacturers to bans on users that are irrelevant.
3. A lack of information about the algorithms programmed into dive computers.
4. Standard settings in some dive computers that are not justified.

PROPOSAL N°1

Delete, in all notices (regulators, cylinders, waistcoats, rebreathers, etc.) instructions such as "Their use is prohibited beyond a depth of x meters". Replace this wording with the following: "This equipment has received the CE examination certificate following the tests required by the XXXXX standard at a maximum depth of XX meters".

PROPOSAL N°2

Delete prohibitions such as "It is forbidden to dive beyond X m with this equipment" or "It is forbidden, with this computer, to make stops". In particular, recreational diving is not limited to 40m in air anywhere in the world. Many countries and organizations, pioneers of diving, routinely allow air diving beyond this limit, without increased accidents. It is a matter of culture and training. The same is true for mandatory stop dives.

PROPOSAL N°3

Restrict the content of instruction manuals to the strict regulatory framework that governs them: maintenance of equipment in operational conditions (MOC) or safety conditions (MSC). Encroaching on the field of training ("Don't do this", "Only dive in such and such a condition") is not within the competence of manufacturers, who have no legitimacy in the field of training (leave it to the certification bodies). To take a trivial image, the instructions for coffee machines do not encroach on the medical or societal domain and do not allow themselves instructions such as: "Do not consume Arabica", "Use fair trade coffee", "Do not drink more than 3 cups of coffee per day", etc. This is what some dive computer manuals do when they think they are allowed to explain how you should dive. This is not the responsibility of a manufacturer.

PROPOSAL N°4

Decompression algorithms, are normally implemented as black boxes. However, almost all computers in Europe use the A. A. Bühlmann algorithm. Consequently, all parameters (model coefficients + physiologic or technical) must be disclosed.

PROPOSAL N°5A

In the absence of being able to justify **the choice of gradient factor (GF) values, these should be set as standard to 100/100 (or 90/90)**, in accordance with the Bühlmann ZH-L16C parameter set.

PROPOSAL N°5B

If dive computer manufacturers will or cannot disclose algorithms/parameters due to the regulation concerning company-secrets (e.g. Directive EU 2016/943), they should instead agree on standardized and open benchmarks (like the crash tests for automobiles).

PROPOSAL N°6

A. A. Bühlmann's safety margins (for e.g. increased P_{inert} at start of dive, $Depth * 1,03 + 1 m$) and, as well the standardized water density from the DIN /EN 13319 should be incorporated into all computers.

PROPOSAL N°7

Dive Computer Manufacturers should adopt a quicker software-development path (agile) and implement modern, proven knowledge from diving physiology much more quicker.

PROPOSAL N°8

All dive computers should feature their log-files as directly compatible to DAN or comparable databases.



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