



Trial under pressure Arcomed Volumed 7000 pump

Date: April 11 2024

1. Volumetric pump: Arcomed Volumed 7000

2. S/N: 71316005 and 71316004

3. Procedures used: A complete inspection of the pumps were carried out by the Hôtel-Dieu de Lévis Biomed Dept prior of its usage. The pump were verified and declared compliant for use in a hyperbaric environment. Contrary to the manufacturer's recommendations, we did not connect the pumps with an internal 12VDC connection. Quite simply because, we didn't have any available inside the hyperbaric chamber. So, we have decided to use the internal battery power for the duration of the trial. We made sure that the batteries were fully charged before its pressurisation. According to the manufacturer, the batteries have a duration between 3 and 6 hours.

We pressurized the pumps to various depth from 45 ft, 60 ft and 100 feet to simulate various treatment protocol. Each treatment protocol have a different duration, it varies between 2 hours up to 7h42 min. The goal was to verify the battery duration and the functionality of the pumps under pressure. The flow settings were between 20 ml to 200 ml/hour. An NaCl solution was used during the trial. Continuous monitoring of the pumps performance was done during the trials.

4. Results: The pump performed without any issues for 5h30 min until the battery died. We did not encounter any issues with the pump during these pressure tests.

After the simulation we carried out a full visual inspection was performed. Upon completion of the inspection no damages to casing was noticed nor the did any mechanical breakage were observed.

5. Modification made to the volume pumps: No specific modifications were made to the pumps. The pumps are certified, designed and manufactured to be operated in a hyperbaric environment.

6. Conclusion and recommendations: The Arcomed Volumed 7000 pumps met all of our requirements to perform under pressure during an ICU hyperbaric treatment. They

functioned as designed and the batteries are meeting our requirements. The pump menu is rather easy to operate and the functionalities are simple and efficient. We strongly recommend those volume pumps for use in a hyperbaric environment.

The pumps provided did not have a language menu thus, we weren't able to switch to a French menu. This was not really an issue for this trial, since most drugs have an international nomenclature. But it would be mandatory to have a French menu available for the one delivered to Québec. Also, the flow preprogrammed in the pumps were in ml/hr. We were not able to switch to a more standard concentration like mgr/kg/min. Again, this had no effect on the result of the trial but for those pumps that will be delivered to Québec it would be a useful option to have since our hospital function with those units.

A handwritten signature in black ink, appearing to read 'Jocelyn Boisvert', is written over a horizontal line.

Jocelyn Boisvert CHT
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Hyperbaric Department