TH7 Englische Originaltexte zu den Leserbriefen von Peter Jackson und Jeroen Gompelman

Peter Jackson:

The first stage is certainly unusual and the design of the valve appears to be an attempt to achieve several aims at the same time.
Firstly, the elastic sleeve acts a seal around the piston, eliminating the need for o-rings, which would require lubrication and would introduce some friction to the mechanism.
Secondly, the sleeve acts as a spring, providing the force to close the valve.
Thirdly, it is an attempt to balance the piston, making it free from changes in closing force due to changes in supply pressure. However, I do not think that it can fully achieve this aim, as supply pressure will be transmitted through the elastic material to act upon the piston, assisting the closing force. Because of this, the higher the supply pressure, the higher will be the closing force, so the valve cannot be truly balanced.
The use of an elastic material to act as a spring has a number of other problems. Most importantly, the properties of the material will be affected by changes in temperature. As we know, the expansion of air through the valve, especially at high flow rates, can cause considerable loss of heat, in turn causing significant loss of elasticity and increased hysteresis. This is particularly true of harder elastomers. Frozen elastic is not very effective!
The coefficient of linear expansion of elastic materials appears to be quite high, so it is possible that, if the temperature falls far enough, the sleeve may no longer apply sufficient force to the close the piston properly.
It is an ingenious design and, I assume, one that actually works OK in practice, but I would be interested to know how well it works under hard working conditions in very cold water.

Jeroen Gompelman:

The explanations are correct; however most of the involved people and designers are not among us anymore.
We have to think as if we were in the 50's with no background of diving and without the knowledge which we have today. And I am sure they did not know enough about material characteristics in that time. It was a try and error phase, maybe they were on the good way to create the best.
What I have read in Dutch books from that time is that the plastic sleeve around the hp piston is for soft closing the valve and acts as a spring, but the size/diameter of the hp seat is double of the size as we have today.
2 forces will add up to each other as we can see in the drawing so the hp seat is floating during use.
The next factor is that they will achieve a higher flow through the orifice and minimum force on the hp seat, by this principle. And with no force on the seat, they had achieved a service free regulator for long periods of time.
The next step was to eliminate the force of supply pressure so that the medium pressure stayed constant no matter whether the supply pressure was at 10 or 200 bar. This is why the input pressure was set at 4 bar. If we want to know for sure, the egg should be tested in an ANSTI machine to check all conditions.
www.ansti.com goo.gl/C2Cmhf
Has someone access to such a test environment?