

WET/DRY SUITS: WRIST SEAL PRESSURE HAS NO INFLUENCE ON FINGER
TEMPERATURE

Erik J.G. van de Linde

Institute for Perception TNO, The Netherlands

Address for reprints:

P.O. BOX 23

3769 ZG SOESTERBERG, The Netherlands

Effective thermal protection of immersion suits and dry diving suits will deteriorate with the ingress of small amounts of water. To avoid this, manufacturers pay specific attention to closures and seals. Neck, ankle and wrist seals must exert pressure on the body to prevent leakage. This pressure is usually in the range of a few kPa (20 - 40 cm H₂O). Divers and other who experience the combination of cold water and tight wrist seals ascribe their loss of dexterity to cold hands resulting from obstruction of peripheral blood flow by the wrist seals. More than once wrist seals were cut too wide for this reason, thus ruining the whole suit.

The relationship between wrist seal pressure and finger temperature was investigated in a short experiment. Six subjects, all divers, immersed their hand for 30 minutes in an 8°C water bath with a wrist cuff inflated at pressures of 0,4, 8 and 12 kPa. Temperature was measured at the pad of the immersed middle finger. There were no significant temperature differences between the four pressures, although the fingers felt increasingly numb with pressure. Although wrist cuff pressure was not high enough to obstruct arterial blood flow, venous return was restricted.

As a result of this, venous pooling occurred. It is hypothesized that this increased the stiffness of the tissues, leading to the subjective feeling of numbness. This may explain the field experience of loss of dexterity with tight wrist seals. Thus, although within the pressure range that can be found in existing suits there is no significant influence on finger temperature, the demand for low seal pressure still stands.