

Verneutstyr og funksjon i kaldt klima?

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Resymé av foredrag

Personal protection equipment – function in cold climate.

Respiratory protection devices

Statoil has completed a study for testing the performance of respiratory protection devices in cold climate. The aims of the study were to check if the protection factor of different respirator masks was influenced by the temperature during use and if the user experience was influenced by the temperature during use. Further, the test was designed to address which of the respirators performed best at low temperature (if any difference occurred), and if ice formation or water condensation in- or outside the mask was an issue.

Three different respiratory devices, half-face mask and full-face mask with negative pressure and full-face mask with fan assistance, have been tested at the temperatures +20, +5, -10 and -25°C. The tests were carried out in a climate chamber at the vendor facility (IFKAN) with fully controlled environmental conditions. The performance involved three test persons representing different facial dimensions (anthropometric data), who performed standardized tasks inside the climate chamber in accordance with a procedure (EN 136: 1998). The fit testing was performed using aerosol of salt particles, in order to use non-toxic test compounds. The particle concentration was monitored inside and outside the respirators simultaneously with a particle counter, and the activities were documented on video. The test subjects filled out a questionnaire regarding their user experiences.

The results show that in general, the full-face mask with fan assistance had good protection factor during all the tests, had no condensation on sight glass, and its performance was not affected by temperature. However, the user friendliness was low when cold air was sweeping against unprotected face skin, it was uncomfortable at +5°C, and it was unbearable at -10°C. The half-face and full-face masks had acceptable protection factor, but introduced other effects like affected by anthropometric variance and affected by handling. Further, the full-face mask had low visibility below +5°C due to condensation. Clearly, the fan assisted respiratory protection device was the most robust device. However, there is a need to look into how to pre-heat the air to improve the user friendliness before a recommendation of use in cold climate.

Ear muffs

As part of the project “Noise in the petroleum industry” administered by the Norwegian oil and gas association, SINTEF has carried out measurements of noise attenuation for an ear muff when used in combination with balaclavas. The [full report](#) (in Norwegian) is available for free. The conclusion was that a bad fitted balaclava reduced the noise attenuation (from the ear muff) with 15-20 dB. Balaclavas with few seams, and of a thin and tight-fitting material, functioned well and gave a reduction of noise attenuation of ca 4-5 dB.

Recommendation

The common PPE applied in the petroleum industry is in general not tested for application in cold climate by the vendor. Some dedicated tests for respirator filters, and the respirators themselves are performed by the industry, as well as ear muff in combination with balaclava. There is a knowledge gap regarding protection effect from typical PPE when they are applied together in cold climate, i.e. protection effect when used by a worker in full winter clothing, gloves, helmet, safety glasses (or similar), hearing protection and respiratory protection.