

STATUS AND PROBLEMS OF WORK AT COLD STORAGE IN JAPAN

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Cold storages are the popular working place of artificial cold environments in Japan. The factory number of cold storages increases and the capacity becomes bigger with year. Worker in cold storage wears cold-protective clothing. Nevertheless body temperature of worker drops, thermal sensation becomes severe and task performance becomes worse. There are near 4,000 cold storages in Japan by reports of Assoc. Refrig. Warehouse and Asssoc. Refrig. Ind. and about 80 percent storages of them are kept at a temperature below -20°C . The capacity became recently bigger and the average capacity of a factory is near $6,000\text{m}^3$. The total stock in commercial cold storages increased year by year: 12.5 million ton in 1987. The chief items of the stock in storage were marine products, livestock products, frozen food and agricultural products. The cold storages at -50 or -60°C are used for storage of Tuna for Sashimi in Japan. Although cold exposure time in one entrance into the cold storage is shorter, physiological load of the worker is severe.

To investigate the work environments and working conditions, the several surveys with questionnaires were done to cold storages. We made the survey with mailing questionnaire in this year to the cold storage which had over $3,000\text{m}^3$ capacity a factory. The mailing number was about 1,700 and valid rate of answer was 31 percent. The worker number was 50 and below in 90 percent of the factories. There are the methods of loading and unloading by folk lift, handling and/or automatic machine system; about 80, 30, and a few percent respectively. There were the resting room in over 90 percent of the factories, which were heated in all season or winter season.

The most popular total time in cold storages was less than 30 min. in a day at a temperature -40°C and below and between 2 and 4 hours at a temperature -39 to -20°C . The most popular frequency of entrance into cold storage was between 10 and 19 times in a day at -20°C and below cold storages. The most popular work time in one entrance into cold storage was less than 5 min. and shorter at a temperature -40°C and below and between 5 and 9 min. and between 10 and 29 min. at a temperature -39 to -20°C . These status are difference with the kind of jobs or temperature level. in

cold storage.

Cold-protective clothing is important to worker in cold storage. which is to prevent general cooling of the body. i.e.. to maintain body temperature. and local cooling of peripheral hotly parts, especially the hands and feet. Great individual variations in energy expenditure existed. and therefore different needs for clothing insulation existed. The clothing supplied by the company were heavy insulating vest. shoes. trousers. gloves. helmet, and so on.

Cold is regarded by the workers in this kind of work as one of the main causes of accidents, illness and different types of complaints. Working in cold storage is sever especially at -40°C and below cold storages. Workers in cold storage complain more frequent in summer than in winter. because there are big temperature difference between the inside and outside of cold storage in summer. Workers in cold storage would be laid aside by lumbago, bronchitis, neuralgia and so on. Incidence of lumbago was near 60 percent at -40°C and below cold storage.

Although cold exposure time per one entrance in cold storage worker usually short: almost less than 5 minutes, and the workers entered frequently to the cold storage, the peripheral parts of Lhe body become gradually cold. Working group in ISO is proposing IREQ (Required Clothing Insulafion) as an analytical index of cold stress. ACGIH made the threshold limiting values for work done ,in cold environments. But, at -43°C and below ambient temperature and no noticeable wind. work should cease except in the case of an emergency.

There are cold storage workers under even more sever working conditions than this. ~~W~~ have to propose a certain threshold limiting values for these workers in sever cold and the worker for longer time in the mild cold environments.

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