

The Problem of Sweat



Introduction

The Club continues to encounter claims associated with cargo damage caused by the presence of condensation, known as sweat, forming inside cargo holds either on the cargo itself or the vessel's structure. Central to the understanding of the problem of sweat is the concept of the dew point. This is the temperature to which a given sample of air must be cooled for saturation to occur with the result that water vapour in the air condenses.

Ship Sweat

Ship sweat is formed when the air within the hold is cooled beneath its dew point by the hold steelwork. This could occur, for example, when a vessel loads in a warm climate and proceeds to a colder climate, as the seawater and external temperature cool, the steelwork may be eventually cooled beneath the dew point of the warm moist air in the hold, causing sweat on the hold surfaces. The sweat may affect the cargo by direct contact on the hold bulkheads, by contact on the tanktop where sweat has accumulated after running down the hold bulkheads to the bottom of the hold. Sweat may also drip onto the cargo from above having formed on the underdeck structure and the underside of the hatchcovers. To minimise the possibility of ship sweat damage to cargo dunnage must be properly used to keep the cargo off the tanktop and away from hold sides and structural members. Where appropriate cargo should be covered with waterproof sheeting to protect it from sweat dripping from above.

Cargo Sweat

Cargo sweat occurs when warm moist air is introduced into a hold and is cooled below its

dew point by the cargo such that condensation forms, this could occur, for example, when a vessel is on passage from a cold climate to a warmer climate and the holds are ventilated with warm moist air being introduced into the holds. The warm moist air is cooled below its dew point by the colder cargo, causing condensation to form on the surface of the cargo.

To Ventilate or not to Ventilate

The decision on whether or not to ventilate will require careful consideration by the Master and officers. The basic principle is to keep the dew point of the air within the hold below the temperature of the hold structure and the cargo to stop the formation of ship and cargo sweat. The vessel should closely monitor the hold air dew point, the atmosphere dew point and the sea temperature, with recordings being taken on a regular basis.

The dew point of the atmosphere can be ascertained by use of the wet and dry thermometers in the Stevenson Screen on the windward bridge wing and reference to a dew point table. Entry to holds should be undertaken in line with the requirements of the vessels Safety Management System with safe enclosed space entry procedures used as necessary. The dew point of the hold air temperature can be found by use of a whirling psychrometer which is a handheld device containing both a wet and dry thermometer. The psychrometer is spun by hand until the temperature of the wet bulb stops decreasing and is stable, several successive readings should be taken until the readings are consistent. Then the wet and dry temperatures are used to ascertain the dew point using a dew point table.

To ensure that accurate wet bulb temperatures are obtained the muslin wick covering the wet bulb must be wet, the reservoir must be kept topped up with distilled water and the muslin wick covering the wet bulb changed weekly. In some instances it may not be possible to enter the hold to obtain wet and dry temperatures, if this is the case, so far as possible, wet and dry readings should be taken from the exhaust trunking. These records should be carefully logged along with details of ventilation undertaken, if any, as they may assist in defending a cargo claim if it can be shown the

vessel has been diligent and adhered to best ventilation practice during the voyage.

General Rules

When heading from cold to warm climates, it is best to not ventilate the hold, as the introduction of warmer air from outside could cause sweat to form on the colder cargo. It is recommended that there is no ventilation and the temperature of the air within the hold allowed to warm slowly as the vessel proceeds into warmer climes.

When heading from warm to cold climates, best practice is to ventilate and introduce the cooler air to the hold, therefore reducing the risk of the warmer moist air within the hold being cooled below its dew point by the ships structure which is being progressively cooled by the colder seas and air temperatures.

These premises form the basis of the dew point rule which is that if the dew point of the air within the hold is higher than the dew point of the atmosphere, then ventilate. If the dew point of the air within the hold is lower than that of the atmosphere, then do not ventilate.

In some instances it may not be possible to take readings within the holds. In this case the 'Three Degree Rule' can be used; during loading regular cargo temperatures should be recorded. Whilst on passage if the atmosphere dry bulb temperature is at least 3°C cooler than the average temperature of the cargo when loaded then ventilate the hold, if the temperature of the atmosphere is less than 3°C cooler than the average temperature of the cargo when loaded, the do not ventilate the hold.

For further information on this or other Loss Prevention topics please contact the Loss Prevention Department, Steamship Insurance Management Services Ltd.

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