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| <b>Title</b>          | IMDG Code 2016 / SUPPLEMENT / IMO/ILO/UNECE Guidelines for Packing Cargo Transport Units / ANNEX 1 |
| <b>Effective Date</b> | 1-1-2012                                                                                           |
| <b>Invalid from</b>   | 1-1-2014                                                                                           |
| <b>Note</b>           | Incorporating Amendment 35-10                                                                      |

## ANNEX 1

### Condensation

1 Cargoes in transit may be affected by the conditions to which they are subjected. These conditions may include changes in temperature and humidity and particularly cyclic changes that may be encountered. An understanding of condensation phenomena is desirable because condensation may lead to such damage as rust, discoloration, dislodging of labels, collapse of fibreboard packages or mould formation.

2 Solar radiation can produce air temperatures under the inner surfaces of a CTU which are significantly higher than external air temperatures. The combination of these effects can result in a range of day and night cyclic temperature variations in the air adjacent to the inner surfaces of a CTU which is greater than the corresponding range of temperatures just outside.

3 Cargoes closest to the walls or roof will be more affected by external temperature variations than those in the centre of a CTU. If the possible extent of temperature variations or their full significance is not known, advice should be obtained from specialists.

4 Under the circumstances described, condensation may occur either on the surface of the cargo (cargo sweat) or on the inside surfaces of a CTU (container sweat) either during transport or when the unit is opened for discharge.

5 The main factors leading to condensation inside a CTU are:

- .1 sources of moisture inside the unit which, depending on ambient temperature conditions, will affect the moisture content of the atmosphere in the unit;
- .2 a difference between the temperature of the atmosphere within the unit and the surface temperature of either the cargo or the inner surfaces of the unit itself; and
- .3 changes in the temperature of the outer surface of the unit which affect the two factors above.

6 Warming the air in a CTU causes it to absorb moisture from packagings or any other source. Cooling the air below its dewpoint\* causes condensation.

\* The dewpoint is the temperature at which air saturated with moisture at the prevailing atmospheric pressure will start to shed moisture by condensation.

7 If, after high humidity has been established inside a CTU, the outside of the unit is cooled, then the temperature of the unit surface may fall below the dewpoint of the air inside it. Under these circumstances moisture will form on the inner surfaces of the unit. After forming under the roof, the moisture may drop onto the cargo. Cyclical repetition of cargo or container sweat phenomena can result in a greater degree of damage.

8 Condensation can also occur immediately after a CTU is opened if the air inside the unit is humid and the outside air is relatively cool. Such conditions can produce a fog and even precipitation but, because this phenomenon usually occurs only once, it seldom results in serious damage.

9 The risk of damage and dangerous situations\* can be minimized if the moisture content of the packaging and securing materials is kept low.

\* For example, when dangerous cargoes of class 4.3 (dangerous when wet) are packed in a container.