

ABSTRACT

IMPROVED FUMIGATION OF PARTICULATE COMMODITIES

When fumigating a bulk particulate commodity stored in a top-vented vertical silo (10) by slowly passing a gas containing a low concentration of a gaseous fumigant through the bulk mass, differences between the temperature, T_g , in the bulk mass (11) and the ambient temperature, T_a , outside the silo cause a "chimney effect" within the silo, and possible unwanted dilution of the fumigant. The chimney effect also occurs in other top-vented storage structures containing particulate commodities. To overcome the chimney effect, the fumigant-containing gas is supplied through a duct (18) to the base of the storage structure at a flow rate Q_f (in $\text{m}^3 \text{sec}^{-1}$) determined by the relationship

$$Q_f = \frac{g \times P_a}{R \times R_a} \times A \times \left| \frac{1}{T_a} - \frac{1}{T_g} \right|$$

where g is the acceleration due to gravity (approximately 9.8 m sec^{-2}); P_a is the atmospheric pressure expressed in Pascals; R_a is the gas constant for air ($= 287 \text{ J kg}^{-1} \text{ K}^{-1}$); T_a is in K; T_g is also in K; R is a resistance factor (in Pascals sec m^{-2}) which depends upon the nature of the commodity in the storage structure; and A is the horizontal cross-sectional area of the storage structure, in square metres. This technique can also be used to maintain effective fumigation of a plurality of storage structures in a storage facility, from a single source of gaseous fumigant.

Figure 1 of the drawings should accompany the abstract when published.

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