Air velocity temperature correction

The normal air velocity v_n m/s given by the user is the normal operation air velocity.
A positive value stands for a supply system velocity at the left end of the duct system. A negative value stands for an extract system velocity also at the left end of the duct system.

This value can be corrected to a minor extent due to fire exposure combined with different fan control such fixed pressure or fixed speed. If the ventilation is forced during fire exposure, then the forced velocity should be used as normal air velocity v_n m/s. Fixed flow (velocity) needs no correction.

The two systems and the two control methods gives four cases to be corrected. All corrections turns out to be handled with the same formula for a correction factor f_T – as shown in ***figure 1*** (next page) determined by the average duct air temperature T_a °C during fire exposure and the normal duct left air temperature T_i °C, which is equal to the normal temperature except for an extract system with fixed speed when the actual main extract temperature at the left end should be used.

The correction factor goes from 0.5 to 2.2 depending on the temperatures T_a °C and T_i°C.

$$f_T = [T_a + 273)/(T_i + 273)]^{0.5} \quad (-) \quad (1)$$

$$v_c = f_T \, v_n \quad (m/s) \quad (2)$$

Notice that the average duct air temperature Ta °C stands for the total ventilation system and not just the part described in the FEDS calculation. Notice also that the air velocity does not change when all temperatures are equal Ta = Ti. The air velocity could also decrease if the main extract temperature Ti is larger than the average air duct temperature Ta.

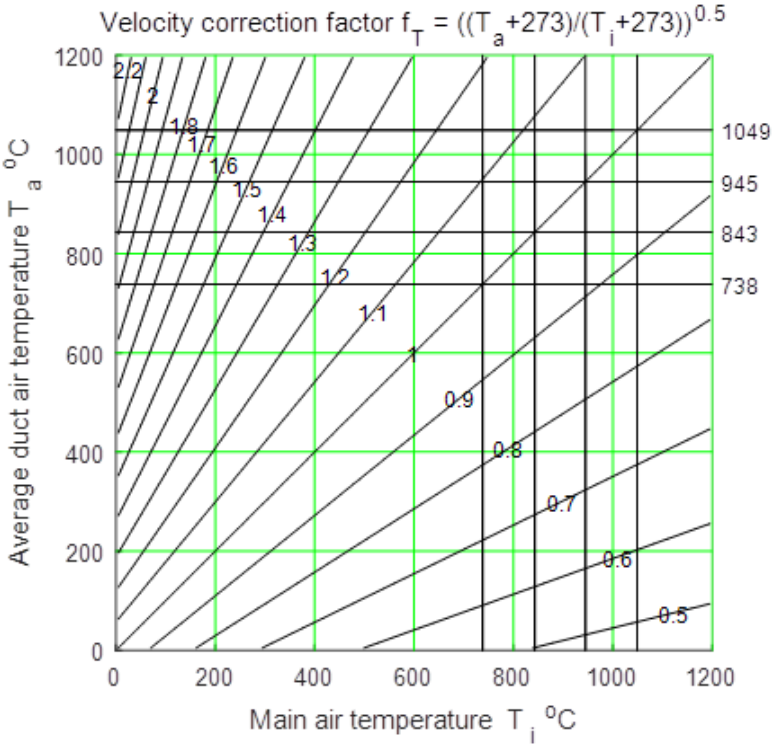

Figure 1 Velocity correction factor f_T - as a function of T_a °C and T_i°C.