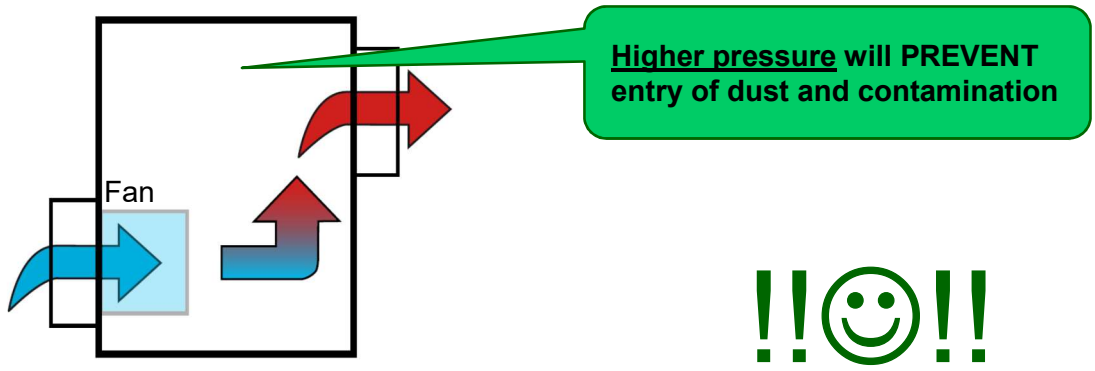
ENCLOSURE COOLING AND PROTECTION

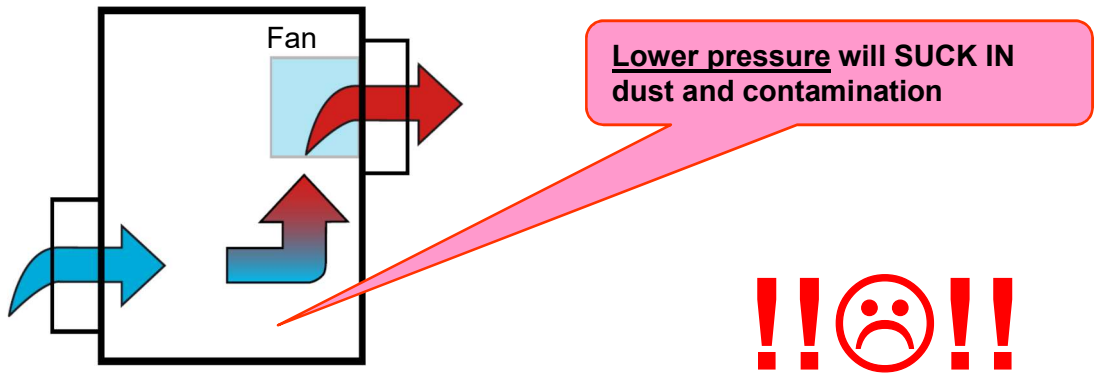
There are several important requirements:

- To prevent the temperature in the electrical enclosure from exceeding the critical level for power electronics of 40 °C
- To prevent dust and contamination for entering the enclosure.
- To prevent rain and moisture from entering the enclosure
- To prevent water condensation by ensuring that the temperature of the enclosure does not decrease below about 5 °C (only relevant for installations used in cold climates)

- **Cooling using filter fans and exhaust filters**
  This is the method usually most appropriate for refrigeration equipment. The following arrangement is recommended:
  - **Correct:**
    Always use the filter fan to propel the cool ambient air into enclosure. This ensures that slight positive pressure builds up inside the electronic cabinet in comparison to the ambience and that only air filtered by the filter fans flows into the enclosure. The air propelled into the cabinet displaces the warm air which exits through the exhaust filter. The exhaust filter should be mounted as high as possible in the enclosure



  - **Not correct:**
    If the air is drawn out of the electronic cabinet by suction power, unfiltered air will enter through poor seals and cable entries.
    This will result in DIRT AND CONTAMINATION inside the enclosure (see following photographs)



These recommendations are taken from the website of Pfannenberg (www.pfannenberg.com) a leading global company in the cooling of electrical enclosures.

- **Air filters**
  Recommendations:
  - Both the filter fan air entry and filter exhaust must be fitted with the air filters recommended by the fan manufacturer
  - The filters must be cleaned at regular intervals depending on the level of dust and contamination at the place of installation
  - The use of a thermostat to control the fan will reduce dust build-up in the filter and increase the time between maintenance intervals.

- **Thermostat**
  Recommendation:
  - Install a Thermostat to only run the fan when the temperature inside the enclosure is greater that about 30 °C
  - This will also reduce the running time of the fan and the build-up of dust and contamination on the air filters

- **Outdoor installation**
  Precautions must be taken to prevent rain or moisture from entering the enclosure.
  The following photograph is an example of such protection

Examples from the Pfannenberg company.

- **Low temperature operation in cold climates**
  Recommendations:
  - Install a temperature-controlled heater (available from most suppliers of electrical enclosures)
  - If necessary also install a hygrostat humidity sensing device to activate the heater at a high humidity and low temperature.

- **Photographs of electrical enclosures with incorrect cooling and inadequate protection.**

Unacceptable dirt build-up in enclosure

Dirt on all switchgear, Open hole in base

Fan blowing in wrong direction, dirt build up.

Dirt in enclosure contaminating ***FrigoPack***

Photographs of an outdoor electrical enclosure without rain protection

Missing rain or moisture protection at air entry to an outdoor electrical enclosure.