

# TROPICALIZING SCREW AIR Compressor Package Utility

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## ABSTRACT:-

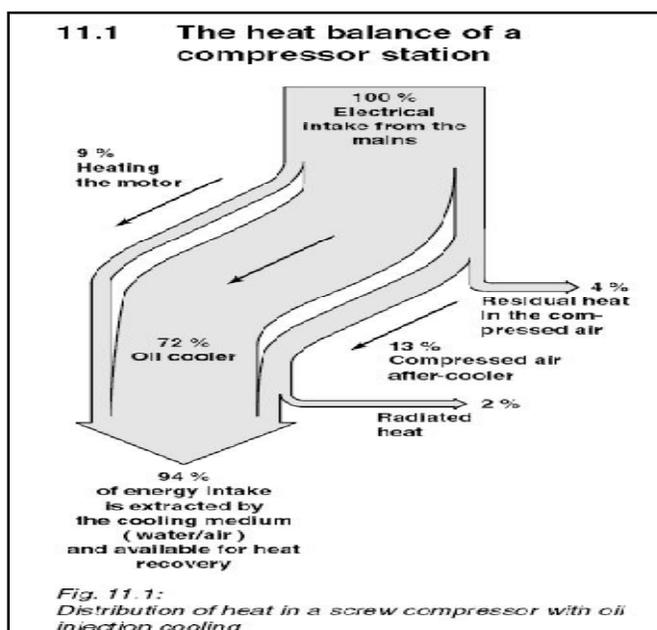
The Industry Screw air compressor utility is not tropicalized to suit our Indian conditions, till date. The existing screw air compressor packages in India are more suited to cold climates. The compressor and its sub systems are put to Accelerated Ageing process due to the localized heat retained inside the hood. Listed below, are the ways to tropicalize the compressor hood.

The HOC i.e. the Heat of Compression liberating from the air compressor element is as such, heating up the compressor element inside and outside in tropical country like India. The heat exchangers fitted horizontally, in the air exhaust path, act as barrier to air flow from hood to the outside from top of hood. For any heat exchanger to function better, it is always preferred to use outside ambient air as cooling media and not the boxed up hotter caged dusty inside air in the hood.

The compressor OEM and the user industry gave priority to cool the discharge air at the package outlet. But instead of using ambient 30 °C air, they are using hotter inside air to cool the compressor element and Heat exchangers, externally. This aggravates the compressor inefficiency KW / CFM very early; that is why it takes more KW actually to deliver air at rated pressure, De-rating and early wear & tear, due to dusty harsh ambience inside the hood.

## EXISTING SYMPTOMS OF INEFFICIENCY:-

1. Here, many industries are keeping the all side doors Open and forcing air throw by man coolers. Many industries feel that their compressor runs healthy without hood side walls. So the OEM to give proactive thought to compressor sub systems' comfort cooling for sustainability. Otherwise, the element gets accelerated ageing and early de-rating, and failing prematurely.



Courtesy:- BOJE compressor manual / Compressor hood V type pre-filter reduces ambient dust.

2. When thermal imaging was done inside a running screw compressor package unit, **we find the inside temperature around 10 °C more than the ambient temperature surrounding the unit.** Having done energy audits in many industries, we observed the trended input power & thermal imaging parameters. **We could infer that, if the compressor runs at its rated pressure, but its motor overloads always.**
3. We find heat exchanger is choked / restricted by plant dust externally when hot air passing thro HX. Heat transfer efficiency of the exchangers is reduced due to hotter inlet air from the inside hood to cool the same, instead of the cooler ambient air surrounding the package.
4. Here, the compressor motor skin at 60\* C gets forced cooling by its cooling fan whereas the compressor element boiling at 100\*C is only allowed to cool down itself by the induced hot air from motor to the HX fan.
5. **This all, leads to 3 % KWH as Energy increase due to higher than ambient air intake to compressor directly. Thermal imaging shows, the air intake mouth reveals choked and hotter temperature.**

### HOW TO RECTIFY THE SAME AT SITE:-

#### EASY OPTION:-

1. **Give Isolated Cooling to compressor element.** Give fresh air by opening and fixing ½ HP Heavy Duty fresh air fan at the door near suction mouth on the front side of compressor element so that ambient air is forced to surround the element. Provide guarded ventilation opening on the panel door at the rear side of element to scatter out, the heat of element easily.
2. **Next is to provide only ambient air inlet to the heat exchangers.** Insert barrier sheet that only ambient air comes to HX fins. If the HX are mounted horizontally, then provide slope duct sheet across the heat exchanger width and extend duct barrier sheet to the side door. Here too, V type filters across the openings of side wall, and at the air intake wall will help to compressor hood internals clean.
3. Provide Magnehelic type draft gauge to monitor compressor air intake suction filter. If the Delta P crosses 4 inches WC, this will alert user daily. **This, Delta P crosses 20 inches WC within a month and not gets noticed. Here the user is losing 3 % KWH energy. Condition monitoring daily saves here.**

#### PERMANENT OPTION:-

1. **Give Isolated Cooling to compressor element.** Give fresh opening and fix ½ HP fresh air fan at the suction mouth on the front side of compressor and exhaust thro guarded ventilation opening.
2. **REORIENT the HX:-** Many OEMs have relocated their HX vertically to the side door to face ambient air inlet to HX in their latest versions. **So in consultation with the OEMs, Re-Engineering at Site Service Providers can take up this quick fix job. This can be outsourced. They can re-orient this heat exchanger** which is horizontally mounted inside the skid to be mounted vertically on side door and relocate the HX in such a way that its suction is facing ambient air outside the skid.

#### POINTERS TO THE INDUSTRY & COMPRESSOR OEM:-

As an industry consumer, it is not enough to give only the natural induced draft to the machine. Once the surrounding air is blocked to the machine, very shortly the machine goes red-hot, and fails sooner. Now the trend here is that to give forced draft of ambient cool dry air to the machine. Then allow the machine to breathe out hot stale exhaust air freely out of compressor house. **The Heat Exchangers, Compressor Element, Motors where the cool ambient surroundings is there, this indirectly sustains & improves the efficiency of the above systems. Allow the Hot sub systems in the compressor hood to breathe in & out, utilizing the ambient surroundings.**