



ADVANCED COOLING TECHNOLOGIES

The Thermal Management Experts | www.1-ACT.com



AGENDA

- Why do you need an enclosure cooler?
- Enclosure Cooling Families
- Q&A



WHY & WHERE

- **Why is there a need for innovative thermal designs for Industrial enclosures?**
 - Increasing power densities (waste heat)
 - High cost electronics, controlling high cost equipment
 - Enclosures are placed in harsh environments
- **Where have Sealed EC's been used?**
 - Industrial Process Control
 - Petrochemical
 - Telecommunications / Ground Stations
 - Food Processing
 - Defense Electronics
 - Transportation (Rail, EV)



ENGINEERING CONSIDERATIONS



Physical size of your enclosure

- What surfaces are available for waste heat removal?



Environment



Total waste heat



Ambient temperature range



Max internal temperature



Electrical considerations

ENVIRONMENT

- **National Electrical Manufacturers Association, NEMA Rating** explain what types of environments an electronics enclosure can be safely used
- **Ingress Protection:** classifies and rates the degree of protection provided against intrusion (body parts such as hands and fingers), dust, accidental contact, and water by mechanical casings and electrical enclosures.

NEMA Rating	IP Rating	Description
12	52	Indoor, dust tight, drip tight
4	65-66	Indoor/outdoor, hose directed water tight
4X	65-66	Same as above with corrosion resistant materials
3R	11-14	Indoor/outdoor, rain protection



ENCLOSURE COOLING OPTIONS

Above Ambient Options:

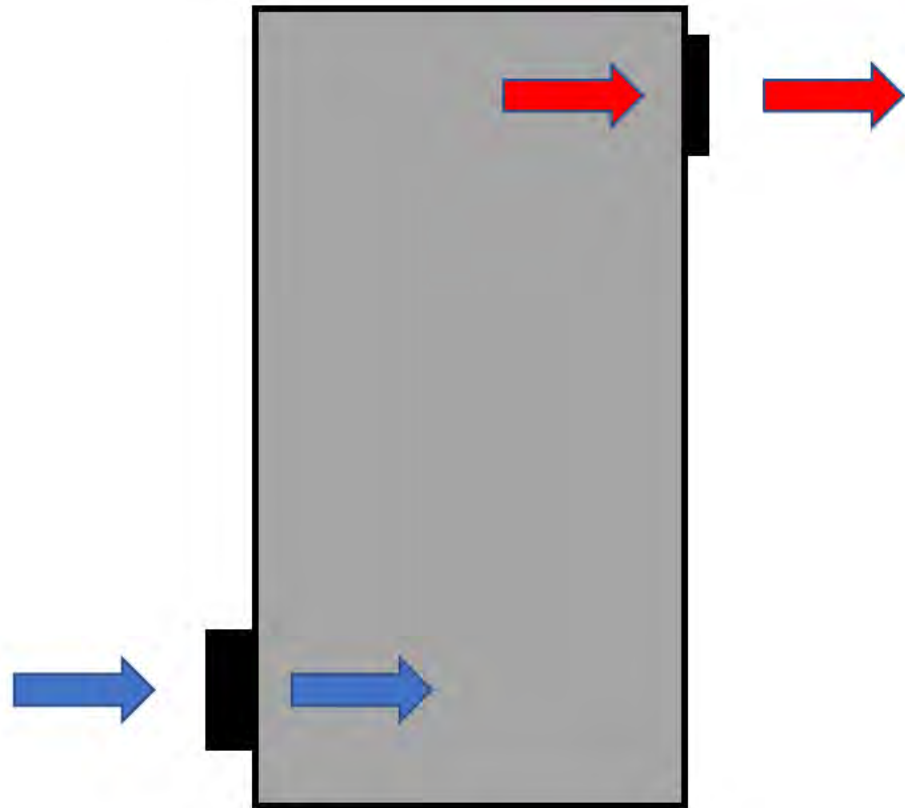
- Fan / Filter
- Sealed Enclosure Cooler

Sub-Ambient Options (Air Conditioners)

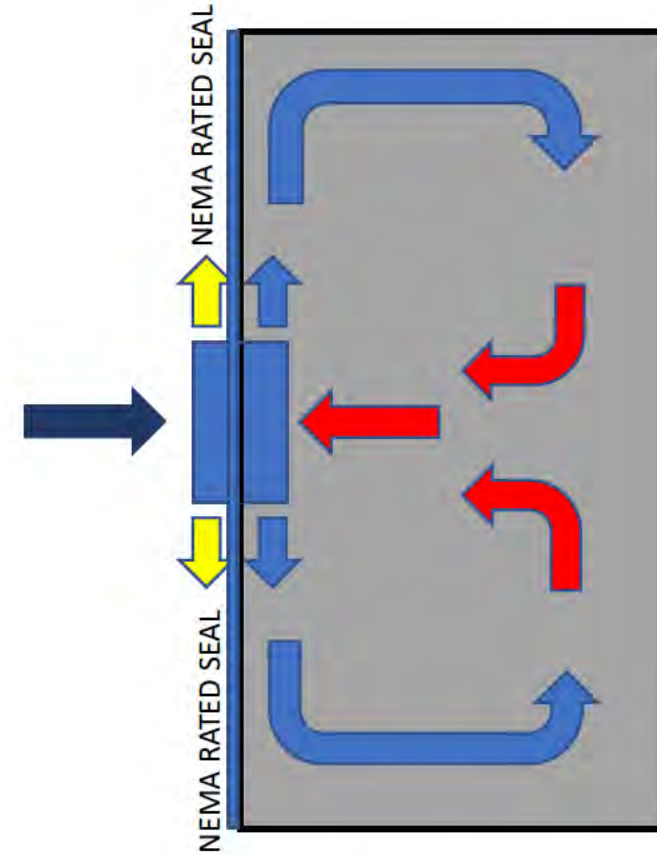
- Thermoelectric Coolers (TECs)
- Liquid/Air Heat Exchangers, Chillers
- Vapor Compression (VCCs)
- Vortex Coolers



ABOVE AMBIENT COOLING OPTIONS



Fan/Filter System



Sealed Enclosure Cooler



HEAT SINK COOLERS

COST EFFECTIVE

RELIABLE

ABOVE AMBIENT COOLING APPLICATIONS

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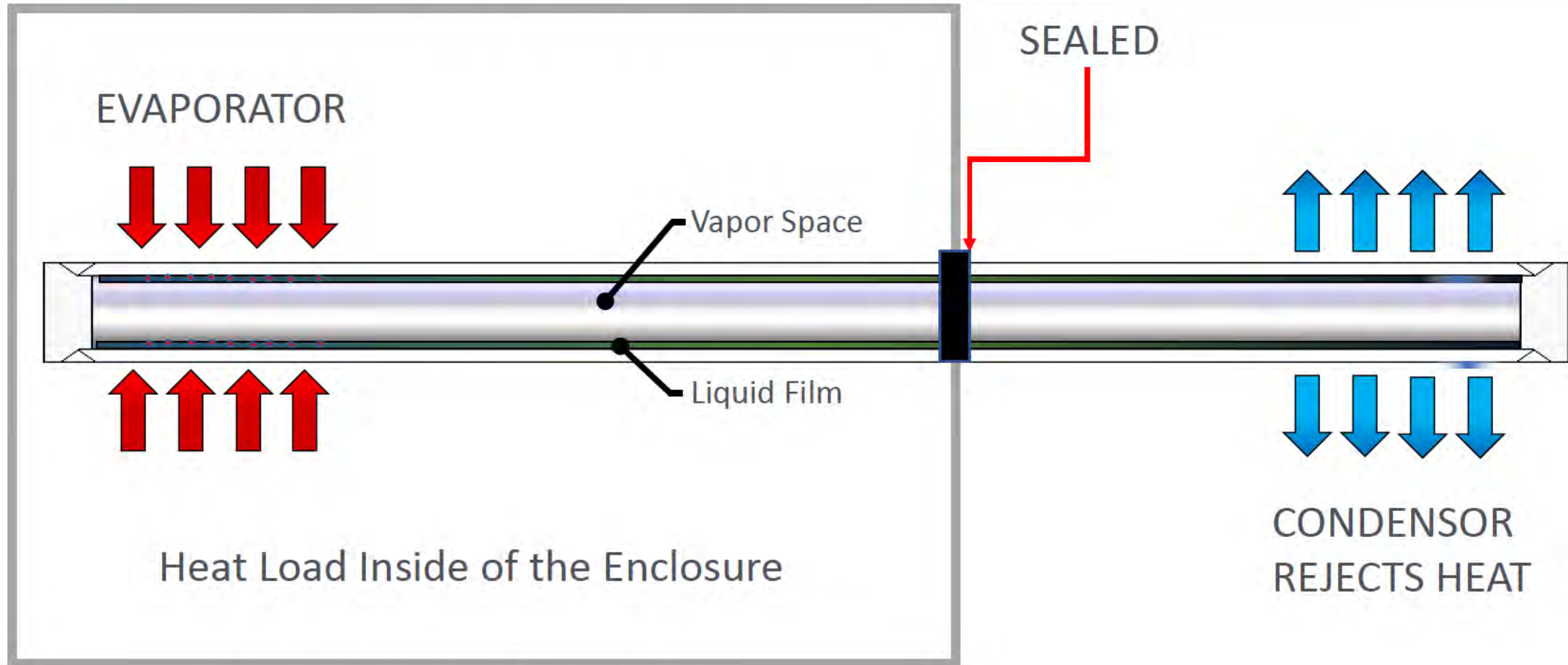


HEAT PIPE COOLER

**COMPACT
HIGH PERFORMANCE**

ABOVE AMBIENT COOLING APPLICATIONS

HEAT PIPE OPERATION



Sealed Enclosure



**ACT-TEC SERIES:
THERMOELECTRIC
SOLID STATE ENCLOSURE
AIR CONDITIONERS**

SUB-AMBIENT COOLING APPLICATIONS



ACT-VCC SERIES: VAPOR COMPRESSION COOLING

SUB-AMBIENT COOLING APPLICATIONS

ACT SEALED ENCLOSURE COOLER RESOURCES

- [Home Page: Product Overview](#)
- [Selection Tool](#)
- [Easy Ordering Online](#)
- **Technical Resources**
 - [Technical & Sales Videos](#)
 - [PDF's Data Sheets](#)
 - [.DXF & STEP files, Mounting Diagrams](#)



Selection Tool



Order Online



DXF/STEP files



Why ACT?



THANK YOU

For on-demand viewers

- You can submit any questions to: solutions@1-act.com



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IN FIELD EXAMPLES

