



PENFLEX

METAL HOSES FOR DATA CENTER COOLING

The rise of AI, cloud computing, crypto mining and other advanced technologies has triggered an unprecedented demand for data processing and storage. As these technologies expand, so too does the need for a powerful supporting infrastructure. The rapid build-out of data centers around the world is a key driver of current demand for metal hose.

Running 24/7 to process and store data, these facilities use immense amounts of electricity, generating an enormous amount of heat in the process. If temperatures climb too high, risks include damage to equipment – even failure – as well as data loss and costly downtime. With stakes this high, it's no surprise data centers require the latest in cooling technology.

Reliable and robust, metal hose is used within equipment like cooling distribution units, as transfer lines between system components, and as a conduit protection solution to keep data centers running smoothly and efficiently.

FLEXIBLE HOSES FOR EASY INSTALLATION

Understanding the importance of flexibility for components that will bridge short distances, sometimes incurring tight bends, we designed our metal hoses with the following characteristics.

- **Annular hose design.** Annular hoses, where corrugations are “stacked” parallel to one another, consistently achieve longer dynamic cycling than helical hoses, where corrugations have a screw-like appearance, given bending happens between corrugations rather than through them.

At a glance

Penflex offers the widest range of metal hose and braid products in the industry.

Nominal I.D. ranges from ¼” to 24”.

Custom-pitch options for required flexibility

On-call engineering support for hose products and assembly quoting

ASME IX certified welders and on-site Certified Welding Instructor and Non-Destructive Examiner ensures highest quality fabrication.

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Penflex hoses are sold through a worldwide distribution network.

- **Thin wall.** Using thinner metal strip to make our data center hoses means less force is required to bend the hose. Force to bend is a key indicator of how flexible a hose is.
- **Compressed pitch.** The greater the number of corrugations, or the higher the corrugation count, the more flexible a hose will be. To give our customers a greater range of options, we offer both standard and compressed pitch.
- **Higher corrugation height.** Increasing the height of the corrugations is another way to increase the flexibility of a hose.

CLEAN COMPONENTS FOR EFFICIENT MEDIA TRANSFER

Sensitive by design, an operating environment free of debris, greases, oils, and residue is necessary for servers and other IT equipment to function optimally. Contaminants trigger a host of issues including overheating, corrosion, and mechanical failure.

- **Hose series: Clean ID.** Recognizing the cleanliness requirements for data center cooling applications, we re-worked the way we make hose to remove all internal tooling and, with it, the need for lubrication oil to deliver a hose with a truly clean inside – we call it Clean ID.
- **Welding: Argon purge.** All Penflex assembly welds are argon purged, a proven process that enhances weld quality by decreasing, even preventing, oxidation, a reaction that weakens parent materials and increases a weld's susceptibility to chemical attack.



Mass spectrometer tested Clean ID assembly being bagged in preparation for shipment.

ROBUST PRODUCTS FOR LONGER SERVICE LIFE

Given it's not just water moving through these cooling systems, the corrosion resistance of components is an important consideration. So too is the life span of a component in an industry that's focused on sustainability.

Superior Corrosion Resistance

Many data center cooling systems use glycol to keep operating environments within the suggested range. If temperatures climb—suppose a leak or system malfunction—glycol will degrade into various acidic compounds that can cause corrosion.

The austenitic stainless steels are compatible with glycol and other commercial refrigerants, and are generally considered to have superior corrosion resistance, meaning they will last longer than other kinds of hoses in most corrosive applications.

Built to Last

An advantage of metal—regardless of application—is its relative robustness as compared to other materials of construction. If metal hoses are stored, handled and installed properly and operate within design limits, they will last for years. Other kinds of hoses, like rubber, have a defined shelf life.

Impermeable by Nature

Porosity is a concern specific to rubber and plastic hoses. While outgassing can be an issue from a safety and, certainly, from an efficiency standpoint, it also affects performance. In the case of rubber, blisters signaling flow media has permeated inner layers adversely affect pressure carrying capacity and the ability to flex in response to piping system movements.

Reliable components, designed to work hard, metal hoses align with the goals of data center owners for efficient and sustainable operations.