

# Datasheet

## Flexible Heat Pipe



### Flexible Heat Pipe and Flexible Heat Pipe Cold Plate

For improved aerospace thermal control with a need for freedom of movement, minimum weight and maximum reliability, Boyd's custom flexible heat pipes are an advanced heat pipe technology that provides an ideal solution.

These flexible heat pipes give design engineers the freedom to:

- Specify moving actuators, and remote terminals
- Maintain thermal controls in rugged and demanding environments
- Use as building blocks for innovative systems to meet emerging aerospace challenges.
- Vibration and isolation tested

Flexible heat pipes have been qualified for use in military aircraft — specifically, for cooling electronics on the More Electric Aircraft, and the All Electric Aircraft.



### Flexible Heat Pipe Cold Plate (FHPCP)

Flexible Heat Pipe Cold Plate (FHPCP), available in four configurations, solves cooling problems with a cold plate that transfers electronic heat to the most convenient heat sink via a flexible heat pipe. The flexibility allows relative motion between the heat sink and the component to be cooled — increasing durability and mean time between failures.

### How Can Heat Pipes Be Made Flexible?

Heat pipes are made flexible by inserting a bellows section between the evaporator heat input section, and the condenser heat output section. Flexible heat pipes are made from a wide range of metal materials, and use a variety of working fluids, depending on the application.

Flexible heat pipes can be installed in either gravity-aiding, or against-gravity orientations. The against-gravity orientation is possible because of Boyd's proprietary flexible wick structures, which are used to return the working fluid to the evaporator section. The cold plate portion attaches to the surface to be cooled, and the other end attaches to the heat sink. The flexible section allows for ease of installation, and it accommodates any relative motion between the heat source and the heat sink. The condenser region can be cooled by air cooled fins, like many other Boyd's products.

## Features and Benefits

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Aircraft Level Vibration Tested: Met shock and acoustic noise design requirements, and test procedures for the aircraft equipment
Thermal-Cycled Tested: Freeze/Thaw from -55°C to 135°C
Bellows Flex Fatigue Tested to Over 5 million cycles with No Signs of Failure
Shock Tested for Cooling Missile Avionics

## Critical Need Application

Vibration Isolated Heat Sources	Assemblies that Require Relative Motion	Challenging "Fit-Up" with Tolerance Stack-Up Issues
Optical Sensors	Deployable Radiators	Complex, Multiple-Part Assemblies
Radar Amplifiers	Electro-Mechanical Actuators	Difficult to Assemble, Constrained Spaces
-	Molding/Tooling	-

## Specifications – Flexible Heat Pipe Cold Plate

Specifications – Flexible Heat Pipe Cold Plate	
Length	Up to 30 in
Design Power	Up to 150 Watts
Weight	Typically less than 2 lbs.
Cold Plate Size	Up to 5" x 8" x 3/16" Solid A
Heat Sink Attachment	Customer Specified
Working Fluid	Water
▲ T at 150 Watts	Typically Less Than 4 °C

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