Copper Alloy Bed (Cu Bed)

Features & Benefits

Double Use:	Reduced state: capture O_2 Oxidized state: capture H_2
No trapped water:	Combine O_2 or H_2 in an inert gas stream to form vapor
Inherently safe:	No ignition source, reaction is catalyzed
Tritium compatible:	Bellow Sealed valves, full Stainless-Steel construction, high leak tightness
Pressure Vessel:	Registered to ASME Section VIII Div 1

Typical Uses

- extract trace O_2 from inert gas streams
- extract trace H_2 from inert process effluents

Overview

The Copper Alloy Bed (Cu Bed) is a fully integrated device designed to recombine hydrogen with oxygen over a catalytic alloy at high efficiency in a safe and controlled manner or to remove trace oxygen from an inert stream.

When the alloy is oxidized, the bed will convert small amounts of hydrogen in an inert gas stream to water vapor without the need for an oxygen feed. When coupled with a drier bed the water vapor can be trapped and removed from the inert gas stream.

When the alloy is reduced, the bed will extract the oxygen from an inert gas purge stream to sub-ppm concentrations. This guard bed is ideal to protect oxygen sensitive equipment from passivation or damage through oxidation.

The efficient operation at low temperatures reduces the heat load and any attendant cooling requirements in enclosed spaces.

Design Benefits

The copper alloy bed is designed for robustness. The alloy is able to withstand oxygen or hydrogen concentration spikes in the stream without damage. The stainless steel welded vessel, rugged band heater, sheathed thermocouples, insulation and protective stainless-steel jacket ensure a clean small package that can operate continuously up to 150°C without damage.

The copper alloy bed comes standard with metal bellows isolation hand valves fitted with copper stem tips and VCR-8 female nuts. The unit is helium leak tight to $1x10^{-9}$ scc/sec at the operating temperature which makes it suitable for tritium service.

Specifications

Operating Conditions	200 g Bed	2 kg Bed
Carrier gas flow	1 to 10 SLPM	1 to 30 SLPM
Reduced State Capacity	1.5 SL of O_2	13 SL of O_2
Oxidized State Capacity	3 SL of H_2	26 SL of H_2
Bed Residence time	2.1 s @ 1 SLPM	3 s @ 30 SLPM
Modified Reynolds number	0.9 @ 1 SLPM	0.9 @ 30 SLPM
Pressure	0 – 200 psig	
Temperature	100 – 450°C	
Humidity	0 – 90%	
Pressure Drop	< 0.3 psig at full flow	
Carrier gas composition	Inert gases, He NOT recommended: streams containing sulfur and/or potassium, volatile organic compounds	
Maximum Conditions		
Max Operating Pressure	200 psig	
Max Operating Temperature	220°C	
Physical	**200 g Bed**	**2 kg Bed**
Dimensions	4.5” Dia x 15” length	6” Dia x 19.5 Length
Isolation Valves	Bellows sealed, manual, copper stem tip	
Wetted Materials	Copper Alloy, 304/316L Stainless Steel, Copper stem tip	
Leak Tightness	$1x10^{-9}$ cc/sec helium with 1 atm helium upstream	
Pressure Vessel	ASME Section VIII Div 1	
Electrical	**200 g Bed**	**2 kg Bed**
Number of Heaters	1	2
Heater Power	300 W	400 W
Heater Current	2.5 A	3.33 A ea, 6.66 A Total
Heater Voltage	120 VAC	
Thermocouple	3 - Type K welded, braided wire, standard mini-connector, ungrounded	

Drawings

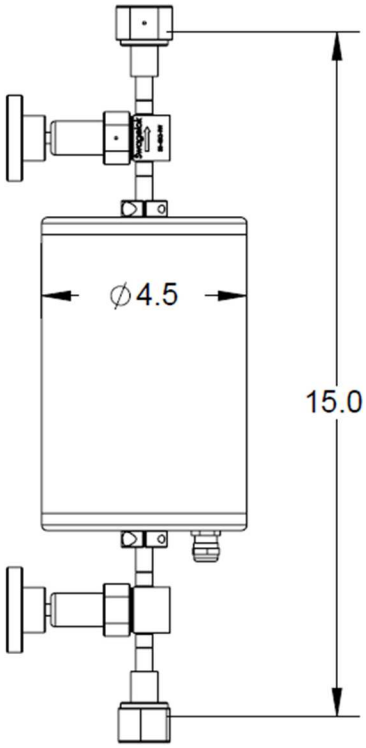

Figure 1: 200g Copper Alloy Bed

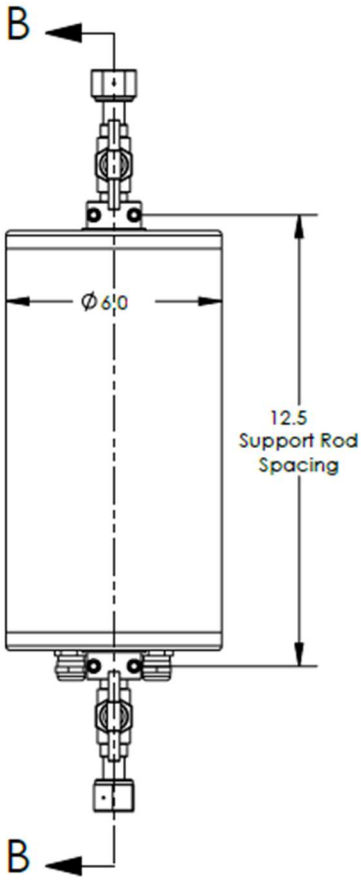

Figure 2: 2kg Copper Alloy Bed