

Dan Spohn

From: ARM, Inc. <dspohn@arminc.com>
Sent: Thursday, July 20, 2017 9:17 AM
To: dspohn@arminc.com
Subject: Joey Chestnut eat your heart out, New gas cooling design,



Advanced Research Manufacturing 719-538-5959
Innovative High Purity Gas Supply System Solutions

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Dear Dan,

Did you know that this 4th of July, according to Forbes, approximately 150 million hot dogs will have been consumed. Piqued my interest it did that stat, so I dug a bit deeper.....

Began thinking about what 150 million hot dogs would look like? Based on a pack of 10 hot dogs being 4" x 6" x 1" (straight out of my memory, I did not actually measure anything) the volume taken up is 24 cubic inches, or 2.4 cubic inches / dog. 150,000,000 hot dogs would then take up 360,000,000 cubic inches, or 208,333 cubic feet. Calculating the cube root of that, the US will consume a carton of hot dogs that would be 59.3 feet wide, deep and tall this July 4th. To picture that a bit clearer, assume a ranch style house with 2400 square feet of living space and 8' ceilings, those hot dogs would fill 10.85 houses from floor to ceiling.

Found a site www.centives.net that had hot dog stats indicating the average American eats 65 hot dogs a year (I would say purchased, no way to tell they don't feed them to the dog). According to www.census.gov/popclock the US population is currently something over 325,000,000 people. At 65 dogs a year per person, that is 21,125,000,000 dogs/year. Bases on the ranch house calculation that number of dogs would fill 1528 ranch homes, or a town about the size of Sidney, NE.

Was going to look at why dogs come 10 to a pack and buns 8 to a pack (I'm thinking Fido is involved), but that's not what I wanted to talk about.....

In this issue.....

[Cost impact, 9Ns pure or <1ppb O2 & H2O.](#)

[Existing PS8 Bulk N2 Purifier Available from ARM.](#)

[New design from ARM for gas cooling!](#)

Cost impact, do you need 99.9999999% pure process gas, or just <1 ppb of a particular impurity?

9Ns (99.9999999%) pure gas equates to 1 ppb impurity, and that is the combination of all impurities that may be present. When it comes to cost there is a big difference between 9Ns pure gas and say, <1ppb Oxygen in the gas. One of the largest contributors to cost of a purifier is the media used. ARM like other purifier manufacturers spec media based on the gas being purified and typical impurity loads based on how the pure gas was generated. Another approach though is to look at only the specific impurities that negatively affect the process or product using the gas being purified.

For example, your 5N5 (99.9995% pure) process gas contains small amounts of CO, CO₂, O₂, H₂O, and NMHC (non-methane hydrocarbons). To remove the 5 impurities to a combined <1 ppb (99.9999999% pure) would require a reactive catalyst purifier. But say the process using the gas is only sensitive to H₂O. To remove H₂O only to <1 ppb requires an adsorber not a reactive catalyst. Adsorber purifiers can be 2/3 the cost of a reactive catalyst purifier.

Another way to look at it.... Reactive catalysts have a capacity for each impurity it removes, and the capacities vary. ARM's literature recommends specific size purifiers to provide a 1 year life at rated flow with no breakthrough of any of the impurities listed in the removed column. Essentially it is 1 year before breakthrough of the listed impurity with the least capacity. If your concern is with one specific impurity, it may be that the reactive catalyst has a much higher capacity for that impurity, and a smaller, less costly purifier can give you a 1 year life for that specific impurity.

Knowing the entire impurity load on the incoming gas is important in selecting the appropriate type of purifier, knowing the impurities of concern and the required outlet levels can significantly impact quoted price. If you have a purifier requirement, our web site has a purifier information sheet you can fill out that will provide ARM with all the information needed to quote the most affordable solution.

[Purifier Information Form](#)

Existing SAES PS8-VM600-N-2 Available from ARM

ARM has a SAES PS8-VM600-N-2 bulk gas purifier for sale. Acquired in an asset liquidation this PS8 has never been installed, and is still in the original shipping packaging. The flyer describing this asset, cost, etc is below. If interested contact [ARM](#) and we can provide a firm fixed price quote, and any additional details required. If you know of anyone interested please forward this newsletter. No reasonable offer refused!

Model Number: PS8-VM600-N-2

Included Options: Mass Flow Meter, Inlet/Outlet Pressure Transducer, Instrument Air management

system, High Temp Hardware Interlock, Over-Pressure Safety, Particle Filter - TFE, Separate Control Power, MODBUS data communication port, Mixing Panel to provide regeneration gas mixture blending and control.

Facilities:

Maximum Flow rate: 600Nm³/hr
 Main Power: 208 VAC, 3 phase, 50/60 hertz
 Installed power: 18.3 kW
 Gas Main connections: 1.5" tube stub

Maximum Inlet pressure: 150 psig
 Separate Control power: 120 VAC, 50/60 hertz
 Size: 75" x 94" x 95" tall

Available from:



New, never installed.

Inert Gas Purification System

The PS8 VM series purifiers manufactured by SAES are enhanced, optimized designs providing sub ppb performance in very compact configurations. These purifiers remove impurities from inert gases through use of an advanced catalyst/adsorber hybrid material providing complete purification in a single column without the need for secondary adsorber vessels.

Trace CO₂, CO, O₂, H₂, and H₂O are removed under room temperature operation. The two adsorber columns are automatically alternated with an elevated temperature regeneration taking place between purify and stand-by modes.

Standard Features:

- Automated Microprocessor Controller
- HMI (Human Machine Interface)
- System Alarms
- Electric Gas Preheaters
- Closed-Loop Temperature Controls
- All Metal Cabinet with Doors

Model Number: PS8-VM600-N-2

Included Options: Mass Flow Meter, Inlet/Outlet Pressure Transducer, Instrument Air Management System, High Temp Hardware Interlock, Over-Pressure Safety, Particle Filter - TFE, Separate Control Power, MODBUS data communication port, Mixing Panel to provide regeneration gas mixture blending and control.

Facilities:

Maximum Flow rate: 600Nm³/hr
 Maximum Inlet pressure: 150 psig
 Main Power: 208 VAC, 3 phase, 50/60 hertz,
 4 wire with ground
 Separate Control power: 120 VAC,
 3 phase,
 50/60 hertz

Installed power: 18.3 kW
 Size: 75" x 94" x 95" tall
 Gas Main connections: 1.5" tube stub

This unit can be purchased:

As-Is Immediate Delivery: \$95,000.00

With ARM Tech Refresh 6-8 weeks ARO \$145,000.00

Buyer is responsible for all import and shipping costs.
 Terms are cash with order.
 Details of Tech Refresh are on our website: http://www.arminc.com/VenetaTech_refresh.pdf
 See page 2 for OEM PS8 datasheet information.



Original marketing information from SAES

PS8 Series Catalytic Nitrogen Gas Purifiers

Front View Back View

The PS8 VM series purifiers are enhanced, optimized designs providing sub ppb performance in very compact configurations. These purifiers remove impurities from inert gas through use of an advanced catalyst/adsorber hybrid material providing complete purification in a single column without the need for secondary adsorber vessels.

Trace CO₂, CO, O₂, H₂, and H₂O are removed under room temperature operation. The two adsorber columns are automatically alternated with an elevated temperature regeneration taking place between purify and stand-by modes.

Flow rates from 1.5 Nm³/hr to 6000 Nm³/hr are available in the platform. The PS8 nitrogen regulator includes fully automatic, unattended operation using the multi-point microprocessor based controller and full instrumentation. Operator input is accomplished via the unique PMI (Human Machine Interface) allowing operator protected access to all purifier functions. All purifier operations, such as adsorber regeneration, are automatic. Closed loop control of all process variables gives confidence that each operation is complete and correct. There is no need for operator input on any process operations.

Standard Features

- Automated Microprocessor Controller
- HMI (Human Machine Interface)
- System Alarms
- Electric Gas Preheaters
- Closed-Loop Temperature Controls
- All Metal Cabinet with Doors
- Hydrogen Blending Station

Customer Interface Connections:

- Alarm Relay - fail safe relay contacts allow remote detection of alarm condition.
- Remote Contact Shutdown - allows remote shutdown of the purifier.

Optional equipment

- Inlet & Outlet Isolation Valves
- Mass Flow meters with 4-20mA Output
- Inlet & Outlet Pressure Transducers
- Instrument Air Management System
- Air Cooled Heat Exchanger
- High Temperature Hardware Interlock
- Over Temperature Safety/Interlock System
- Auto or Manual Bypass
- Particle Filter
- Separate Control Power
- MODBUS data Communication Port

New gas cooling design from ARM, Inc.

ARM has a Xenon purifier currently in production (more about that in the next issue) and is about to start testing. This purifier is a 5 vessel arrangement, the first 2 of those vessels will operate in excess of 700 degC. The third vessel operates in the 200 degC range and the remaining 2 are ambient operation.

The facilities available did not support water cooling of the gas from the heated vessels to protect downstream valves and non heated vessels, so we had to think somewhat outside the box (outside the cabinet in this case) and do some digging.

ARM found a supplier that would work with high purity 316L electro-polished stainless tubing we provided, and wrap the tubing in a continuous aluminum fin, and bend the 20 ft length of tube into an 8" diameter coil with 7-1/2 turns.



The purifier plumbing design routes the hot gas outside the cabinet through the cooling coils. One coil is plumbed between the second and third vessels and the other between the 3rd and 4th vessels.

The completed installation will include a personnel barrier to prevent operators/technicians from inadvertently coming into contact with the hot coils. We will report actual cooling data

after testing is complete in the next newsletter. If interested send us an [e-mail](#) or call 719-538-5959 for additional information on this or any of ARM's UHP solutions.

Thanks for reading this far!

We understand that there is very little time in the day to read all the newsletters that make it to your inbox. We will strive to not be 'that company' spamming the world with useless information seemingly every other day for no better reason than some webinar told them that is what they should do.

As noted above if you opt out we will honor your request. If you do tho, you may want to like us on Facebook or follow us on LinkedIn so you can keep your inbox clear, but still keep in touch with what is going on with ARM Inc. in the gas world.

Sincerely,

Dan Spohn
ARM, Inc.



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