made in the USA

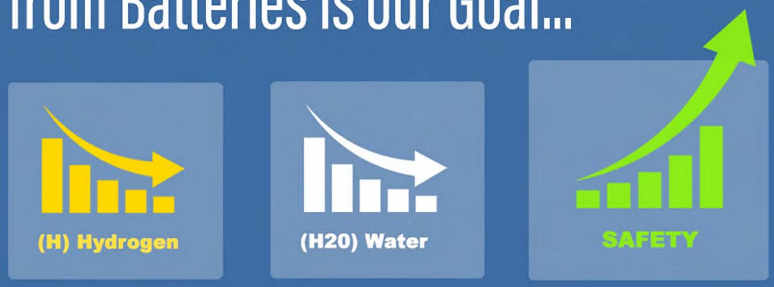
*INTRODUCING THE **FLUX** LINE OF...*

Battery Recombination Vents

For All Stationary Lead Acid & Ni-Cd Vented / Flooded Cells

FLUX RECOMBINATION VENT

Reducing Environmental Hydrogen from Batteries is our Goal...



FLUX Recombination Vents capture and recycle 98%+ of the water lost through battery out-gassing and evaporation.

Flow Systems patented catalytic recombination process forms an almost perfect closed loop system that saves valuable electrolyte, reduces maintenance, improves safety, and nearly eliminates environmental hydrogen. An absolute must for any battery storage facility.

ADVANTAGES

- Nearly Eliminates Battery Watering
- Removes environmental hydrogen even when existing ventilation systems fail.
- Pays for itself in labor savings
- Includes spark and flame arrestor
- Available with or without internal pressure regulating valve
- Fits all standard size US and European quarter turn batteries, + GNB threaded covers
- Designed, Engineered and Manufactured in the USA
- US Patent # 10,601,010

developed by:

FLOW SYSTEMS
RECOMBINATION TECHNOLOGIES

EMAIL: FLUXVENT@FLOWSYSTEMSUSA.COM **PHONE:** (419) 290-1103

Why use a Battery Recombination Vent...

REDUCED ENVIRONMENTAL HYDROGEN - One of the most problematic issues with the operation of vented stationary batteries is the explosive Hydrogen that is produced while in service. FLUX Vents operate in tandem with your battery to continuously remove hydrogen even in the event of a power outage or ventilation system failure. The FLUX Vent adds redundancy to your existing hydrogen mitigation or ventilation contingency plan.

REDUCED ON-SITE LABOR & MAINTENANCE - Simply put, installing FLUX Battery Recombination Vents reduces the amount of time required for battery maintenance personnel to be on-site topping up cells with depleted electrolyte levels. Very few companies would not benefit from freeing up maintenance hours. Less maintenance, less long term costs.

INCREASED SAFETY - Reduced hydrogen means a safer work environment for all battery maintenance personnel

REDUCED IMPACT ON SURROUNDING EQUIPMENT - The FLUX Vents unique two stage recombination process, also reduces acid mist in the work area that contributes to corrosion of battery terminals, racking and related electronic monitoring equipment.

How much gas is Generated?...

While there are a number of battery hydrogen gas calculators available on-line, its hard to actually visualize the amount of gas in a given space. Take a look at the picture on the right (2a). We took both the FLUX1000 & FLUX2000 and performed a side-by-side test to compare them with the standard spark arrestor battery vents that come installed on most stationary cells. All 8 FLUX Vents captured and recombined nearly all hydrogen & oxygen while the standard vent produced enough residual gas to completely fill the test balloon within one 25 hour period. Multiply the amount of gas from that one balloon over multiple cells and multiple days, **the resulting environmental Hydrogen produced is alarming**. When you consider that only a 4% concentration of Hydrogen in any given area is a hazard then, the FLUX Recombination Vent should be considered an integral part of any new or existing stationary battery installation.

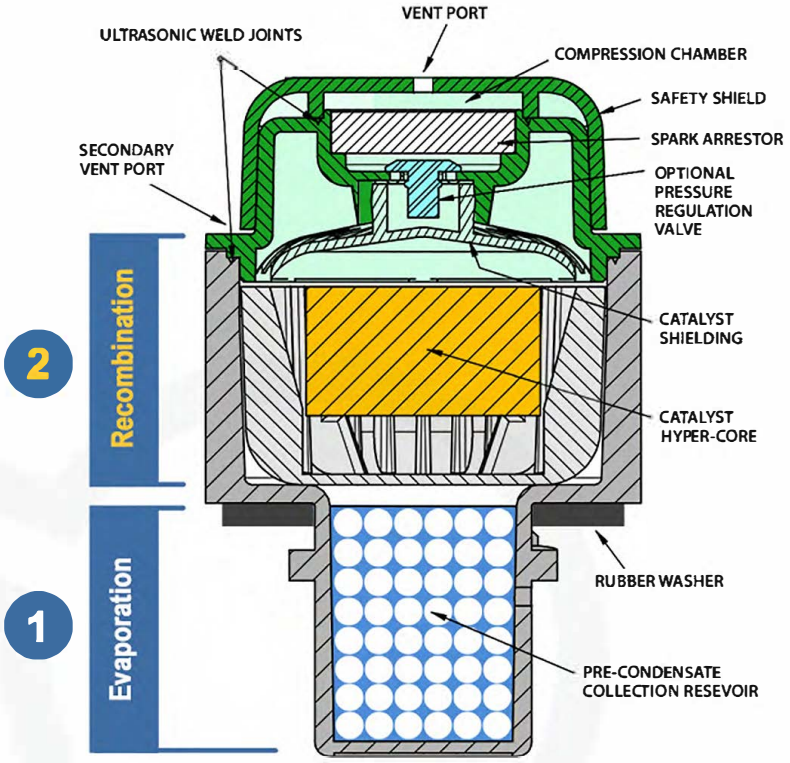
(2a)

2022 Hydrogen Release test performed by Battery Resarch and Testng, Inc. - Enersys 100 AH PowerSafe C Cells charged at 2.35 VPC for 25 hours

How they work...

Charging of vented/flooded stationary batteries results in the problematic generation of highly flammable Hydrogen gases which then freely exit through traditional battery venting assemblies into the surrounding atmosphere. This Off-gassing, in combination with loss of water in the electrolyte from evaporation, lowers the electrolyte levels while simultaneously increasing the labor requirements and safety concerns for battery maintenance personnel.

FLUX Recombination Vents eliminate these concerns using a patented process that catalytically bonds hydrogen and oxygen back together to reform water and maintain the electrolyte levels in mission critical battery installations.



EVAPORATION CONTROL

In this initial stage, Hydrogen, Oxygen and non-gaseous water vapor enter the FLUX Vent passing through the Pre-Condensate Collection Reservoir. There, any existing water vapor collects on a set of polymer pellets specifically designed to intercept and condense smaller non-gaseous water droplets into larger ones. This process also blocks any corrosive mist from passing through and exiting the recombiner into the surrounding atmosphere.

****** INTERNAL PRESSURE VALVE OPTIONAL******

All FLUX Vents are available with or without a pressure regulating valve to accomodate those cells that:

- *Have sample tubes*
- *Have leaking post seals*
- *Or where the user prefers not to increase pressure in the head space*

CATALYTIC RECOMBINATION

The remaining gas then rises up to begin the recombination process inside the catalyst hyper-core. As gas is passed to the interior of the core, Hydrogen and Oxygen molecules are catalytically bonded back together to form more water vapor.

H_2O VAPOR CONDENSATION & COLLECTION

The resulting vapor created from the catalytic reaction needs surface area to collect, condense and form heavier water droplets. The FLUX Vent's patented condensation collection system maximizes the surface area available to the vapor to collect on while maintaining a very compact overall footprint. Finally the larger, heavier water droplets will then return to the battery cell.

Advanced Technology...

Developed in the **USA** by Flow Systems in conjunction with other leading advanced materials companies specializing in catalysis.

HYPER-CORE CATALYST

The precious metal catalyst, contained within the FLUX Hyper-Core, combines precisely the right combination of particle size, concentration and surface coverage to optimize the catalytic recombination process in stationary battery systems.

- *Produces ultra-efficient H_20 recombination process*
- *Tailored to the unique chemistries of stationary battery cells*
- *Catalyst nano-particles increase reactive surface area*
- *Balanced catalyst to coverage ratio to reduce cost*

FLUX Hyper-Core Catalyst in raw pellitized form

Superior Design...

SURE FIT BAYONET SYSTEM - Placement of the bayonet tabs was a crucial part of our design process. The FLUX Vent utilizes a very intentional bayonet tab placement that allows for use on the majority of US & European stationary cells.

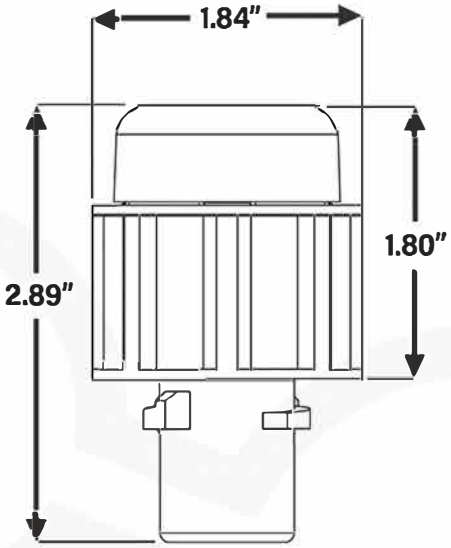
2 STAGE RECOMBINATION PROCESS - Exclusively available on FLUX Recombination vents. This two stage process not only captures and recombines escaping gas generated through electrolysis but also, addresses the escape of actual water vapor often associated with areas of increased ambient temperatures.

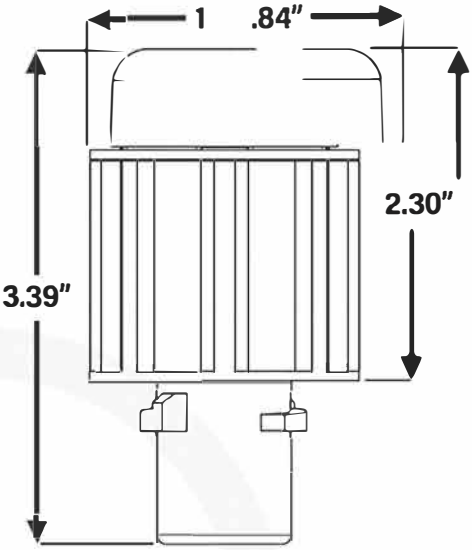
ULTRASONIC WELDED CONSTRUCTION - In order to protect the internal working components of the FLUX Vent, the entire outside shell is ultrasonically welded together producing an incredibly durable product that can withstand even the harshest industrial working environments.

SPECIFICATIONS

The FLUX Vent's unique bayonet design allows it to fit the following batteries:

- Enersys
- C&D
- Exponential Power / SBS
- GNB - Stryten Energy *
- Fiamm
- Hoppecke
- BAE
- Midac / MESA
- Alcad
- and many others....





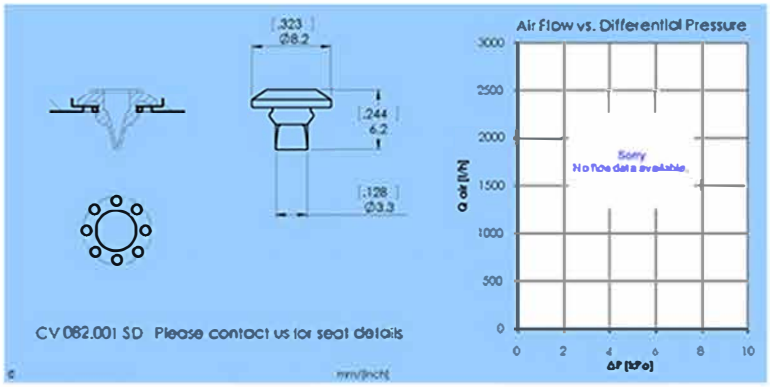
	FLUX1000	FLUX2000
CELL SIZE *(Amp Hours)*	0 TO 3,000 / per cell **	3001 TO 4,000 / per cell **
TOTAL HEIGHT	2.89"	3.39"
TOTAL WEIGHT	1.50 oz / 44.0 g	1.85 oz / 52.0 g
BODY MATERIAL	Polypropylene Co-polymer	Polypropylene Co-polymer
MOUNTING STYLE	Bayonet / GNB Threaded	Bayonet / GNB Threaded
PRESSURE VALVE	OPTIONAL	OPTIONAL
INTERNAL PSI W/VALVE	< 0.5 PSI	< 0.5 PSI
INTERNAL PSI W/O VALVE	0 PSI	0 PSI
SPARK & FLAME ARRESTOR	YES	YES
SPARK ARRESTOR FLOW RATE	15.0-22.9 LPM @ 10" H20 Pressure	15.0-22.9 LPM @ 10" H20 Pressure
PRIMARY GAS RELEASE PATH	YES	YES
SECONDARY GAS RELEASE PATH	YES	YES
OPERATING TEMPERATURE	32F to 250 F / 0 C to 120C	32F to 250 F / 0 C to 120C
2 STAGE WATER LOSS CONTROL	YES	YES
ELECTROLYTE MIST BLOCKER	YES	YES
ENHANCED CONDENSATE SURFACE	YES	YES

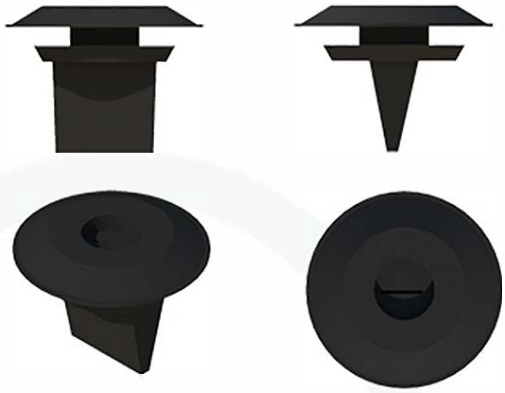
* *GNB - (Stryten Energy) Flooded Classic cells require a threaded adapter only available through Battery Reserach & Testing*

** *In certain cases, FLUX1000 may be used on cells that exceed 2,000 AH capacities*

BI-DIRECTIONAL VALVE

OPTIONAL COMPONENT - Each FLUX Vent comes with an optional bi-directional mini valve. Most FLUX Vent customers do not incorporate the bi-directional valve.





MATERIAL	EPDM - Ethylene Propylene Diene Monomer
AIR-FLOW	Bi-Directional
(-) NEGATIVE PRESSUE OUT OF CELL	< 1 PSI
(+) POSITIVE PRESSURE IN TO CELL	1.2 PSI
MOUNTING STYLE	Duckbill Combination
OVERALL INCREASE IN EFFICIENCY	2% - 3%

WHY USE A VALVE - The purpose of the bi-directional valve is to help maintain pressure within the FLUX Vent. This added pressure ensures that gas circulates around the catalyst in order to increase catalytic recombination efficiency. With the addition of the valve, the efficiency of the FLUX Vent increases by 2%-3%.

CONSIDERATIONS WHEN USING A VALVE - While the valve adds a layer of additional efficiency, there are certain circumstances where the valve should not be used.

Added Cell Head Pressure

If your batteries utilize a sample tube, the added pressure of the valve may cause complications. On these batteries, the added pressure is enough to push electrolyte up through the sample tube and out of the cell. It is recommended that a valve is not used on batteries with sample tubes.

Recombiners - A Track Record of Success Around the World...

The undisputed benefits of using recombiners to reduce maintenance and improve safety have been recognized throughout Europe for over 50 years. In fact, the European Union standard UNE-EN IEC 62485-2 allows for a 50% reduction in ventilation when recombiners are installed in the cells in place of standard flame arrestors.

This is all about to change. As of October 2022, the newly revised "IEEE1635/ASHRAE21 Guide for the Ventilation, and Thermal Management of Batteries for Stationary Applications" now fully substantiates the benefits of the use of Recombination Vents. This industry standard reference manual clearly states that recombination vents catalytically recombine most of the hydrogen and oxygen gases escaping from the head space of a cell and return that water back into the cell. It also states for both vented lead acid and for vented nickel cadmium cells that they may be used to reduce maintenance, as well as that by recombining the charge gases they provide a significant maintenance benefit.

Here are a few take aways from that document:

"A definition has been added that states "recombination vent: An assembly on a vented cell in which most of the hydrogen and oxygen gasses escaping from the head space of a cell are catalytically recombined and returned to the cell as water."

"Under both section 5.1.1.2 Vented lead-acid (VLA) batteries and in 5.1.2 Nickel-cadmium (Ni-Cd) batteries, it is stated that In some cases, recombination vents may be used to reduce maintenance. See 7.2.1 for recommendations for ventilation calculations when such vents are used."

"In section 7.2.1 it states "Recombination vents catalytically recombine most of the charge gases from vented cells, providing a significant maintenance benefit."

Testing Procedures:

In additional to numerous field studies, the following tests have been performed to confirm functional efficacy of the FLUX Vent:

SAEJ1495 Test Procedure for Flame and Spark Retardant Venting Systems 02-2013 (Performed by JBI Corporation)

BCIS-06, DECEMBER 2010 - 75 AMP CYCLE TEST (Performed by JBI Corporation) - Confirmed water loss reduction values on 6V GC2 cells using FLUX1000 / FLUX2000.

BCIS-06, DECEMBER 2010 - 75 AMP CYCLE TEST (Performed by JBI Corporation) - Confirmed water loss reduction values on 2V L16 cells using FLUX2000.

EXTENDED WATER LOSS TESTING (Performed by Battery Research and Testing, Inc.) - In process...Initial test results confirm water loss and hydrogen reduction values

PRODUCTION RELIEF VALVE TESTING - (Performed by Flow Systems) - Insures each Internal pressure regulation system meets minimum and maximum pressure relief requirements. Not performed on FLUX Vents that do not include a pressure regulating valve.

5 POINT QUALITY INSPECTION TESTING - (Performed by Flow Systems) - Insures each vent meets Flow Systems rigid quality standards including integrity of welded seams, physical defects and bayonet fitment.

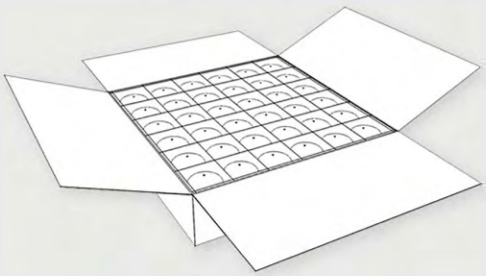
FLUX Recombination Vents are available from:

Please direct all global inquiries regarding pricing, distribution opportunities, technical information, sizing or the use of FLUX Vents with stationary batteries to Flow Systems Recombination Technologies.

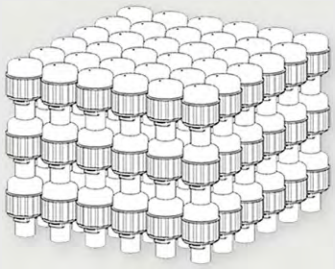
MASTER DISTRIBUTOR .....Flow Systems Recombination Technologies
CONTACT: .....Megan Barrett
PHONE: .....(419) 290-1103
MOBILE: .....(419) 262-0562
EMAIL: .....Megan@FlowSystemsUSA.com
LEGACY EMAIL: .....FlowSystemsUSA@Gmail.com

Packaging:

Packed in 200 lb test durable corrugated cartons. Standard Case = 12" X 12" X 8", Master Case = 12" X 12" X 12"



60 piece standard case



90 piece master case

Warranty:

1 Year / 12 Months from Date of Purchase - All FLUX Vents are 100% unconditionally guaranteed for the period of 1 year from date of purchase. We will accept all returns or exchanges regardless of condition due to defects in workmanship. Proof of purchase must be supplied at the time of return or exchange.