TURBOSEP

- mechanical separator
- off-gas filtration

TURBOSEP is a key part of Parker domnick hunter's filtration solutions for fermentation applications.

Specifically designed for the removal of foam aggregate and aerosol from fermenter off-gas, TURBOSEP improves the overall efficiency of the fermentation process and facilitates the effective operation of final sterilizing grade filters.

This highly efficient mechanical separator has no moving parts and very low pressure drop. Foam, aerosol and entrained liquid removal from the off-gas are returned to the fermenter housing thereby minimizing product loss.

TURBOSEP is a patented product of Parker domnick hunter.

Note: TURBOSEP is a registered trademark of Parker domnick hunter

Features and Benefits

- Highly efficient separation of liquid and foam from off-gas
- Increases fermenter capacity by up to 30%
- Protection of off-gas filters for extended life
- Reduction in antifoam usage of up to 70%
- Continuous operation of the fermenter throughout the foaming process
- Improved downstream processing efficiency through reduced antifoam consumption
- ASME Code Certification available

Specification

Materials of Construction

- TURBOSEP 304L or 316L Stainless Steel
- Seals: EPDM (FDA)

Standard Surface Finish

- Internal: Linished to 0.8 µm Ra
- External: Bead Blast to 0.5 µm Ra

Welding

All assembly welds are full penetration.
All welds are crevice and undercut free.
Weld finish & detail drawings available upon request.

Design Conditions

- Maximum Allowable Working Pressure (MAWP): 3 Barg (43.5 psig)
- Maximum Allowable Working Temperature (MAWT): 149°C (300 °F)

Directives

Housings designed in accordance with the European Council Pressure Equipment Directive (PED).
ATEX (where applicable).

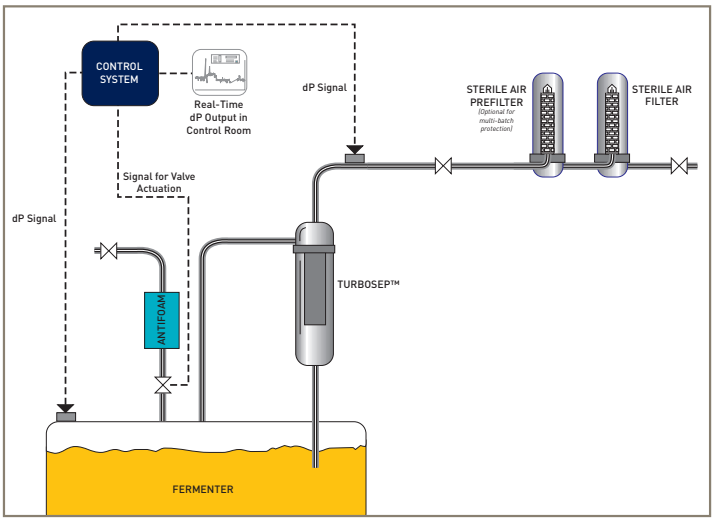
Design Basis

ASME VIII Division 1.
ASME Code Stamp Option available

Approvals

EAC 032-2013, (No. RU C-GB.АИ01.B.00094)
Approval type: Import Certificate, TRCU
Pressure Equipment (available on request)

Installation of TURBOSEP



Typical Installation

When off-gas exits the fermenter it enters the TURBOSEP unit. Fixed turbine blades spin the incoming air forcing foam and liquid to the outer walls.

The off-gas then flows across a specially designed impingement plate and spirals down the wall of the TURBOSEP. The off-gas is now free of foam and entrained liquid and exits the TURBOSEP.

Applications

TURBOSEP can be employed in any fermentation application where the creation of foam is causing process control problems. This includes:

- Healthcare products (e.g. penicillin, cephalosporin)
- Food and feed additives (e.g. lysine, M.S.G.)
- Organic chemicals (e.g. citric acid)
- Enzymes (e.g. proteases, carbohydrases)

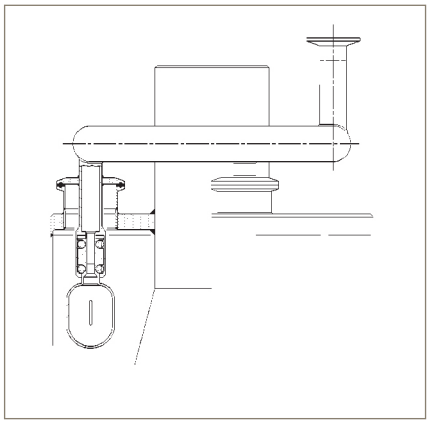
Process Optimization

When employed with a differential pressure monitoring unit, TURBOSEP optimizes the fermentation process by utilizing off-gas separation and antifoam injection.

When foam-over occurs, foam and liquid entering the TURBOSEP cause an increase in the differential pressure monitoring unit which triggers the controlled release of antifoam, at a predetermined level of foam-over, into the fermenter.

This process control system has proven to substantially reduce the levels of antifoam required to control foam-over and has led to fermenter capacity being increased in many applications.

Validated cleaning via internal spray balls



Ordering Information

TURBOSEP sizing is normally based upon the completion of a TURBOSEP questionnaire available from Parker domnick hunter. Below we give an indication of the product range based on the typical gas flow (actual rather than normalized) through the fermenter.

Each TURBOSEP is tailor made to its application to ensure maximum effectiveness in operation and overcome critical issues with respect to installation.

Typical Process Flow Rate (A l / min)	(Acfm)	TURBOSEP Code	Pipe Connection *1
200	7.0	ZVT-200-BTE	$^{3}/_{4}$" Tri-Clamp
500	17.7	ZVT-500-BTE	1" Tri-Clamp
1000	35.0	ZVT-1K-BTE	$1^{1}/_{2}$" Tri-Clamp
2000	71.0	ZVT-2K-CTE	2" Tri-Clamp
3000	105.0	ZVT-3K-CTE	$2^{1}/_{2}$" Tri-Clamp

Typical Process Flow Rate (A m^3 / min)	(Acfm)	TURBOSEP Code	Pipe Connection *2
5	176	ZVT-5K	3" Weld Prepared
10	350	ZVT-10K	4" Weld Prepared
20	707	ZVT-20K	6" Weld Prepared
40	1414	ZVT-40K	8" Weld Prepared
60	2118	ZVT-60K	10" Weld Prepared
90	3177	ZVT-90K	12" Weld Prepared
120	4236	ZVT-120K	14" Weld Prepared

*1 Other connections styles available upon request.

*2 Pipe size is nominal bore. Connection style options include flange variants.

Tri-Clamp® is a registered trademark of Alfa-Laval, Inc.
Note: All Tri-Clamp® Connections conform to BS4825 Pt.3

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