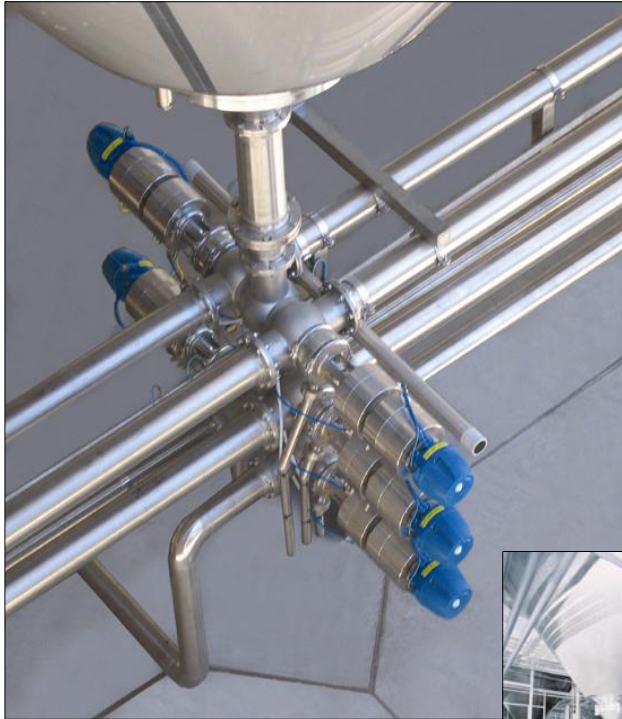


# Impact of different tank outlets at fermenter tanks on the product quality

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ECO-MATRIX installed underneath the tank

Common valve matrix installation in a tank cellar



**Horizontal tank outlet pipes at CCTs do not only generate particular problems for the product quality of fermented products, but also induce process technological challenges on the microbiological situation after tank cleaning.**

- As horizontal pipes are in the majority of cases neither insulated nor temperature-controlled, an undefined fermentation process takes place.
- The content in the horizontal pipe does not take part in the mass transfer process with the content of the CCT, because the pressure applied is at maximum.
- Yeast cells trapped in this area tend to autolysis with excretion of amino acids, short chained fatty acids and proteinase A, which are not wanted in the final product. Excretion of these substances results in limited foam stability and off flavor.

**A potential solution is introduced and discussed with the use of ECO-MATRIX as a new piping concept to avoid any of this disadvantages.**

Chart 1 demonstrates the course of fermentation (gravity/temperature) in the tank and in the line of conventional piping. It also shows the development of the pH including a strong increase of the pH at the end of fermentation.

Chart 2 depicts the same figures for a tank equipped with an ECO-MATRIX piping. In addition to that, Chart 3 compares the losses (product, water, CIP) of conventional piping systems and ECO-MATRIX.

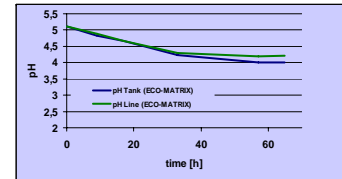
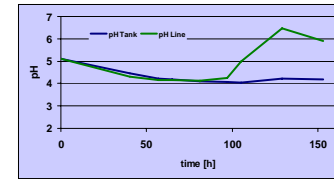
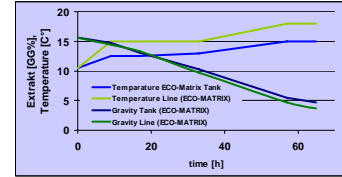
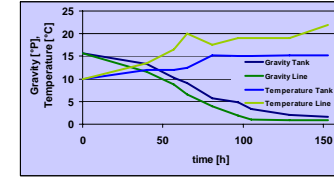


Chart 1: Conventional Piping

Chart 2: ECO-MATRIX System

Chart 3 - Savings

	Conventional valve matrix	ECO-MATRIX with LEFF®		Lifting of VARIVENT® Mixproof Valves	Lifting with LEFF® 2 x 30 sec (m²)	Lifting without LEFF® 2 x 30 sec (m²)
Product loss [hl/year/tank]	158,61	116,81		VARIVENT® Mixproof Valve DN 125 / 5"	0.0356	0.2295
Water loss [hl/year/tank]	3299,44	1003,08		VARIVENT® Mixproof Valve DN 100 / 4"	0.0308	0.1857
Acid loss by seat cleaning per year [1%]*	413,10	64,08		VARIVENT® Mixproof Valve DN 80 / 3"	0.0213	0.1365
Caustic loss by seat cleaning per year [2%]*	413,10	64,08		VARIVENT® Mixproof Valve DN 65 / 2,5"	0.0086	0.0565
Water loss by seat cleaning per year*	1239,30	192,24				
Cost	4.604,41 USD	2.681,08 USD				
<b>Savings per year and operated tank</b>		<b>1.923,33 USD**</b>				

1 hl unfiltered beer 20,00 USD  
 1 hl water 0,25 USD  
 1 hl acid (1%) 0,35 USD  
 1 hl caustic (2%) 0,37 USD  
 \*\* final results outstanding  
 \* further savings from tank cleaning still under evaluation

An uncontrolled fermentation process takes place in the horizontal tank outlet pipes mainly because of the uncontrolled temperature. This process runs faster than the parallel fermentation in the tank. An exchange between tank and line seems not to happen. That results in poor living conditions for the yeasts in the line. It starts to autolyse which can be determined in the huge increase of pH. It must be expected that other negative effects of yeast autolysis (for example proteinase A excretion) also occur.

ECO-MATRIX offers besides clearly enhanced product quality, large saving potentials in running costs.