GL51
Hygienic design aspects for tank and vessel cleaning in the food industry.

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Objectives and Scopes

- Recommendations on cleaning aspects of tanks
  - Including tank cleaning devices
- Recommendations on hygienic design of tank
  - Including selected appurtenances

- Limited to automated wet cleaning (CIP) of product contact surfaces of tanks using tank cleaning devices intended to remain in place.

- Excluded from the scope are the selection of chemistry and temperature for specific cleaning agents (see EHEDG guideline 52) and specific requirements for aseptic tank design.

Hidden agenda

- Create a common language/term platform for tank cleaning device manufactures and end-users to facilitate discussion on what tank cleaning technology that is best suited for the cleaning task.
- Tank cleaning devices
  - Static spray devices
  - Single-axis spray devices
  - Multi-axis spray devices

Hidden agenda

- Topics of importance:
  - Installation and positioning of tank cleaning devices.
    - Avoid shadow areas
    - Ensure cleaning impact
  - Soil nature, removal mechanisms and hydrodynamics om tank cleaning
  - Cleaning strategies and tips & tricks
    - Fill-and-dump, burst cleaning, agitator cleaning, CIP optimization using Multi-axis cleaning devices, does-and-don’ts during cleaning, downpipe cleaning
  - Total cost of ownership
  - Sizing tank cleaning devices
    - Flow rate, wetting distance and cleaning distance
  - Tank cleaning device
    - Types, principles, operation, wear, maintainability, hygienic design and potential failure mode
    - Issues related to purging, remain in-place and submerged during production, self-cleaning, “lubrication” and strainer recommendations

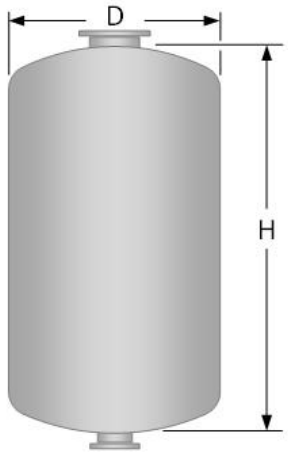
Success full tank cleaning

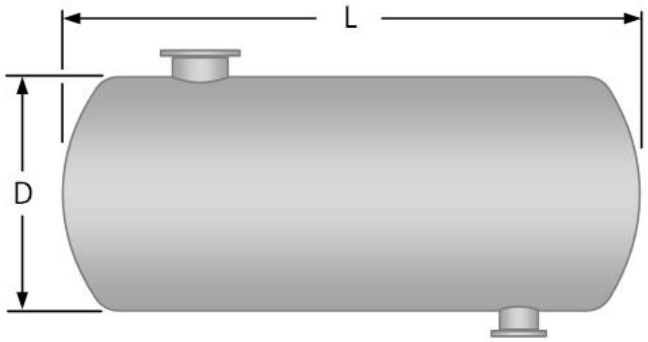
- Hygienic design of tanks, appurtenances and installations of these
  - EHEDG GL 8, 10 and 13 – general design req.
  - EHEDG GL 9, 18 and 35 – welding and passivation
  - EHEDG GL 16 and 25 – seals
  - EHEGD GL 14 and 20 – valves

- NB: EHEDG certified (EL Class I) components may not by cleanable when installed in a tank

- Special considerations related to hygienic tanks (examples)
  - Tank shape (radiused corners, slope)
  - Surface imperfections
  - Open tanks = lid with build-in cleaning device
  - Process connections
  - Shadow zones

Selection of Tank Cleaning Device





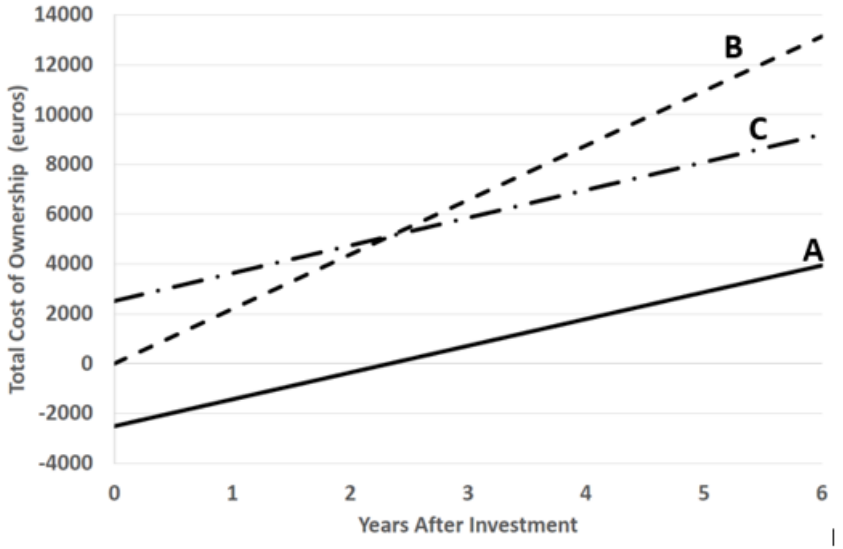
Tank size & orientation	Soil*	Cost - investment				Cost - Operational				Liquid usage				Cleaning time				Pressure			
		Static	Single-Axis	C.Single-Axis	Multi-Axis	Static	Single-Axis	C.Single-Axis	Multi-Axis	Static	Single-Axis	C.Single-Axis	Multi-Axis	Static	Single-Axis	C.Single-Axis	Multi-Axis	Static	Single-Axis	C.Single-Axis	Multi-Axis
D < 2 m; H < 2-3xD L < 2 m; L < 2-3xD	light, easy to rinse			NR	NR			NR	NR			NR	NR			NR	NR			NR	NR
	medium soil				NR				NR				NR								NR
	high soil, mechanical action required	NR				NR				NR				NR				NR			
2 < D < 4 m; H < 2-3xD 2 < L < 4 m; L < 2-3xD	light, easy to rinse				NR				NR				NR				NR				NR
	medium soil	NR				NR				NR				NR				NR			
	high soil, mechanical action required	NR				NR				NR				NR				NR			
D > 4 m; H < 2-3xD L > 4 m; L < 2-3xD	light, easy to rinse	NR				NR				NR				NR				NR			
	medium soil	NR				NR				NR				NR				NR			
	high soil, mechanical action required	NR	NR			NR	NR			NR	NR			NR	NR			NR	NR		

Green = best choice

Green = lowest pressure

Total cost of ownership

Device/cleaning method	Cost Index	Installation index[d]	Cleaning time index	Energy index	Detergent index	Water index	Spare part index[c]
Fill-and-dump	-	-	1000	1000	1000	1000	NA
Static device[a]	100	100	100	100	100	100	NA
Free spinning single-axis[a*]	200	75	75	75	75	75	NA->50
Controlled spinning single-axis[a]	500	75	70	70	70	70	75
Multi-axis	1000	40	50[b]	25[b]	25	25[b]	1000



A: Accumulated savings
B: Running cost using a Static-tank cleaning device
C: Investment + Running cost using a Multi-axis tank cleaning device

5 CIP pr week, including maintenance

End goal

- Optimum tank cleaning by correct
  - Design of tank and appurtenances
  - Installed appurtenances
  - Selection of tank cleaning device
  - Numbers of tank cleaning devices
  - Positioning of tank cleaning devices
  - Cleaning strategies
- Leads to
  - Happy customers…..

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