



SIGMA THERMAL

NUK[®] High-Pressure Steam Generator

The **SAFE, EFFECTIVE** Alternative
to Thermal Fluid Systems





The NUK[®] High Pressure Steam Generator was specifically developed for oil deodorization applications typically used in the food industry. The NUK is used as a heat source during the deodorization process to safely remove undesirable flavors and odors from edible oils; leaving the oil free from toxins.

Steam for High-Temperature Applications

Many industrial processes require heating media temperatures between 400°F and 600°F. Media choices are organic heat transfer media in vapor phase, organic heat transfer fluid, or steam from water. There are disadvantages of organic media in deodorization applications, the smallest traces of the fluid in edible oils are unacceptable in food processing and food additive applications. Water is the safest medium for heat transfer in many cases. The NUK[®] produces non-toxic process heat while offering the same advantages of conventional hot oil systems.

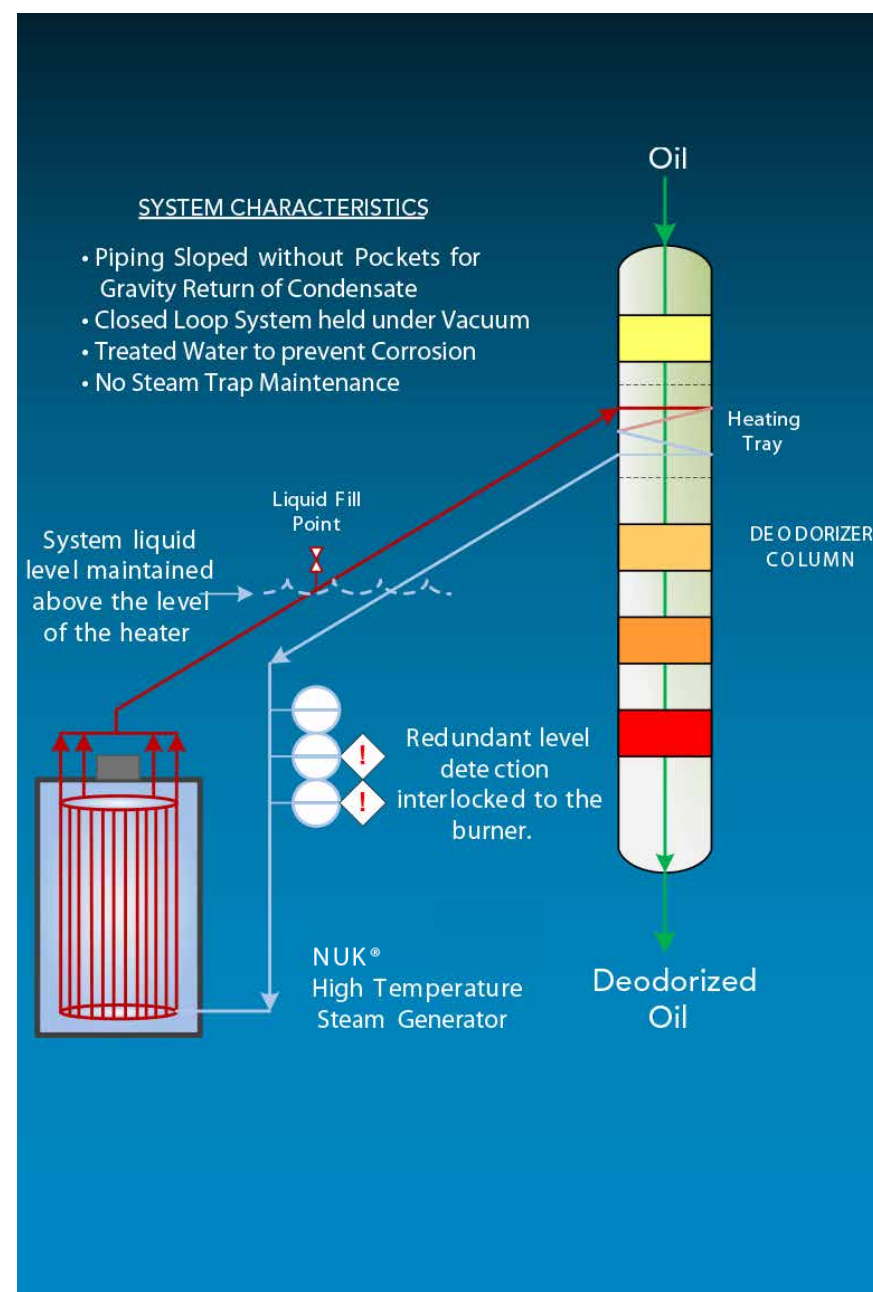
Design of the NUK Steam Generator

The NUK is a hermetically closed-looped heating system utilizing a water-steam mixture with maximum design pressures of 1950 psi. The system consists primarily of a vertical cylindrical combustion chamber, coil, burner, steam supply, and condensate return manifolds.

Chamber walls are lined with vertical pipes that have continuously-welded longitudinal fins. The pipes are connected to a lower manifold (fed with condensate) and upper manifold (connected to the steam outlet). The vertical design of the piping is critical since vapor locking is a possibility with helical-type boilers. In many cases, the process of changing products in a semi-continuous deodorizer can also cause vapor lock. The NUK eliminates that possibility. The Burner (fueled by natural gas, #2 oil or #6 oil) fires down into the chamber.

The NUK's closed-looped design makes operation quite simple compared with an organic heat transfer medium-based system. No circulation pumps are required, no pump or seal maintenance is needed and there is no loss of heat transfer media via pumps or valves.

The NUK is manufactured to ASME code. The design of the pressure vessel and the material selection are in accordance with applicable regulations.



Control System and Safety Devices

The NUK[®] includes all controls needed for safe, reliable operation. The control system permits fully automatic operation; safety devices guarantee shutdown if a problem occurs. In the event of an emergency shutdown steam pressure will not increase because the NUK has low water volume and doesn't contain heat-storing materials.

Fully Modulating burners, with turndown ratios up to 40:1, are used for pressure control. A second input to the main controller (often product temperature) is also available for steam pressure setpoint shifting. With optional equipment we can achieve typical application ranges of 30-60ppm NOx. Ultra low NOx systems (5ppm) are available to meet the most stringent emissions requirements.

High Efficiency

Conventional "open" boilers can lose 15-20% of their heat capacity through flash or blowdown. Due to the closed steam/condensate system employed by the NUK, no flash or blowdown losses can occur. The NUK Steam Generator is more efficient than a conventional organic-based vapor system, with a typical LHV of 80%.

For additional fuel savings, combustion air preheaters can be installed with your NUK. The combustion air preheater will preheat the combustion air to minimize the heat loss associated with heating cold ambient air.

No Complex Feedwater System

Conventional steam boilers require very complicated feedwater treatment systems, including water level controls, feedwater pumps, sight glasses etc. The NUK with its closed-loop design eliminates these costly and unnecessary add-ons.

Freedom From Corrosion

The NUK features pressure and vacuum-tight construction which prevents air from entering the system. The corrosion that is possible in an "open" steam boiler can be avoided.



NUK® Steam Generator Specifications

NUK® Model No.	100	200	300	400	500	600	800	1000	1300	1500	1750	2250	3200
High Capacity (MM BTU/hr.)	0.5	1	1.5	2	2.5	3	4	5	6	7.2	8	10.5	15
Steam Generation (lb/hr) @ 1160 psi	82	1,690	2,520	3,260	5,050	6,210	6,730	8,410	10,100	12,124	13,400	17,680	24,790
Est. Dry Weight (lbs.)	3,300	3,800	5,800	6,600	6,900	7,400	8,900	11,100	14,500	18,000	21,900	25,300	38,200

Quality

Sigma Thermal is ISO 9001:2008 certified with design. We maintain complete quality control over all phases of design, manufacturing, installation and startup. Our In-house manufacturing facility, Sigma Manufacturing, is ASME code and National Board certified (with U, R, and S, Code Stamps). Sigma Thermal is committed to producing quality equipment and providing quality services that meet and exceed the demands of the application.



Service

Services and solutions are available to improve the efficiency and minimize the downtime of your heater. Our experienced team of service technicians can assist with system analysis and servicing of your a new or existing heater. If you need to order parts, we manage and extensive inventory of parts, most offered with same-day shipping. For questions, connect with Sigma representatives at 770-427-5770 or sales@sigmathermal.com

Sigma Thermal Process Solutions

- Direct Fired Heaters
- Indirect Fired Heaters
- Waste Heat Recovery Systems
- Gas and Oil Fired Thermal Fluid Systems
- Electric Process Heaters
- Biomass Fired Energy Systems