KMT INTERNATIONAL

www.kmtinternational.com

AUTOMATED MODULAR WASHING SYSTEM FOR FOODGRADE TANK TRUCKS AND OTHER VESSELS

1. System description.

Trucking transportation of different liquefied food products significantly increased in the last several years.

KMT International Inc. proposes a unique, compact, modular, automated washing system able to clean tank trucks used for transportation of different food products, such as: juices, milk, chocolate, food oils, liquefied yeast, liquors, etc. Proposed turnkey system enables users to perform a fully automated tank washing cycle.

System available for one or two simultaneously washed tank trucks configurations.
Two tank trucks washing system includes two sets of mirrored equipment installed side by side. This configuration has throughput of 30-40 tank trucks per day. Based on our USA experience we recommend this type of system configuration. However single tank truck configuration may be ordered with capacity to process 15-20 tank trucks per day. Should more capacity will be needed later on; second set of equipment can be added. This will not require personnel increase because both washing units (capable now to process two trucks at a time) are operated by one operator from same work platform.

Modular system design was specifically targeted for two independent and interchangeable units controlled from single operator platform, which makes system independently manageable for repairs and downtime. System is compliant with USA "3A" requirements for tanker washing equipment used for transportation of pasteurized milk. It is also approved and certified by following companies: "Coca Cola", "Nestle", "Arrowhead", "Calistoga", "Juicy Juice", "Minute Made", "Ocean Spray", "Odwalla", "Vitel", "Cardill Juice", and "Sunkist". In addition, this is the only equipment certified by the "Florida Citrus Processors Association".

Certification by "Sunkist" company shows that system compliant with requirements for packing for kosher products washing equipment. Such certifications and approval by industries dramatically increase systems demand in USA and confirms its high quality design, construction and performance.

System is fully compliant with JPA (Juice Products Associates) and USDA requirements. Each module unit allows operator to select 8 type of automated washing cycles depending on food product transported by the tanker trucks.

Photo #1. General view of automated washing system for two tank trucks (two views).

2. System operation

Automated washing cycle is controlled by "Allen Bradley" PLC, eliminating possible operator errors. Operator only selects type of food product, enters it using system control panel with touch screen (See Photo #2) and system performs fully automated washing cycle specifically designed for this food product. Two tanker trucks washing system have two symmetrically placed control panels. Control panel has control gauges and graphic display for process monitoring in real time. Control panel is also equipped with the recorder for logging process data and operator's input. Two people required to operate the system, one operator and one supporting person. The control panel overview is shown on the Photo #2. Control buttons, to select type of washing cycle depending on the food product, are placed on the top part of the screen. The most important process parameters (tank liquid levels, washing liquid temperature etc) displayed on the graphic screen as well as a current status of all equipment (pump operation, position of actuated valves etc). In case of emergency situations, alarm message displayed on the screen along with possible operator action to resolve it.

Minimal system knowledge is required by operating personnel. Personnel can operate system, just after two days training developed by KMT International Inc. without supervision
One full washing cycle, for one tank truck, takes on average 40 minutes. During this time personnel can wash exterior of the tanker increasing service value.

Photo #2. Control panel with touch screen

Control panel placed directly on a service platform that allows operator to work in direct contact with its support technician who is responsible for installation of the manway adaptor with washing mechanism.

Photo #3. Adjustable gangway platform with manway adapter.

Roll out gangway with adjustable height is used to install manway adapter (See Photo #3), that facilitates not only hatch adaptor installation on the tank trucks but also trucks positioning.

After manway adapter is installed on the top manway, hoses delivering washing liquid are connected as well as vent flex ducts (See Photo #4).

Support person responsibilities also include connection of draining hoses to the tanker truck and helping drivers to properly position trucks in relation to the washing station.

Photo #4. Manway adapter installed on the top manway of the tanker truck.

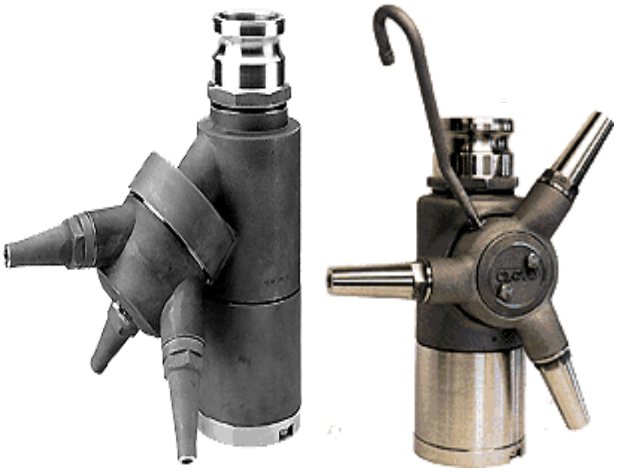

Photo #5. Washing heads, general view.

High pressure water jets are used for washing cycle. Water re-circulated through the system reducing water consumption. On average water consumption is about 0.2 cubic meters.
Washing liquid (water, washing solution and disinfecting liquid) is fed under pressure 13.4 Bar to the washing heads.
After final rinse with the cold water, tank is cooled to ambient temperature, hatches are closed and seals are installed.

Each module is equipped with own water softener, boiler and heat exchanger for preparing washing liquid. Compact heat exchanger allows washing liquid to be heated up to 90°C.
Water treatment unit is located at the side along with filter and softener to feed boiler with cleaned water (See Photo #6).

Photo #6. Water cleaning system.

Should customer be able to provide required quantity of steam, then steam generator and water cleaner could be excluded from scope of supply. However in this case customer is responsible for required quantities as well as quality (pressure, temperature, steam flow, solid particulate content and dissolved salts content) of steam supply. Heat exchanger's life span will be reduced dramatically should steam flow contains excess amounts of solids particulate and dissolved salts. Washing system is also equipped with tank air-drying unit that dries tanks by hot air. Usually this unit is used to dry tanks used for transportation of refined food grade oils.

3. Skid mounted system

Photo #7. System main frame.

All system's equipment is mounted on the skid (See Photo #7). This allows less than a week for installation and startup time.
All piping, pumps, connections, fittings are made from material approved for use in food industry, mainly from food grade stainless steel.

Photo #8. Pumps mounted on the frame.

To intensify washing process steam heat exchanger brings washing solutions temperature close to water boiling point.
Vapour and vent gases from washed tank are evacuated from tank by the draft fan.
Finally tanks are cooled to ambient temperature after final rinse using cold water.

Photo #9. Induced draft fan.

4. Scope of supply for one tanker truck washing system (equipment list)

4.1. Main frame:

- Dimensions: Length – 10670 mm, Width – 2750 mm, Height – 3050 mm (without hand rails).
- Frame material – construction steel gauge 6.35 mm, square pipe with dimensions – 152 x 152 mm and 152 x 203 mm.
- Frame has protective corrosion resistant coating, prime and three layer of polymer painting.
- Service platforms – galvanized bar grating, greed gauge 6.35 mm.
- Service platform have hand rails according to OSHA requirements.
- Access to service platform through stair case with hand rails. Stair case width – 762 mm.
- Roll out gangway for access to the top of tanker trailer.
- Overheat pneumatic crane to lift and install manway adapter with washing apparatus.

4.2. Two tanks with washing solutions:*

- Each tank have capacity of 1.7 cubic meters, cylindrical body with conic bottom, manufactured from stainless steel and polished from inside and outside.
- Tanks have hermetically sealed top manways with diameter of 508 mm for access to the tanks interior.
- Tanks have heat insulation, covered by polished sheets from stainless steel.
- Tanks have instrumentation to monitor continuous liquid level.
- All tanks certified according to "3A" requirements.

4.3. Two tanks with rinsing solutions:*

- Capacity of each tank – 1.70 cubic meters, cylindrical body with conic bottom manufactured from stainless steel polished from inside and outside.
- Tanks have hermetically sealed top manways with diameter of 508 mm for access to the tank interior.
- Tanks have instrumentation to monitor continuous liquid level.
- All tanks certified according to "3A" requirements.

Note: * - Customer is responsible to provide additional three tanks with capacity 1.9 cubic meters each, to prepare caustic washing solution and settling tank with capacity 20 cubic meters to store and settle solid particulate from contaminated washing liquids from washed tanks and to adjust pH levels.

4.4. Process pumps:

- Main washing pump (centrifugal), manufactured from stainless steel:
  - Connections – sanitary Tri-clamp quick connection from stainless steel (two fro each pump – inlet and outlet),
  - Mechanical shaft seal,
  - Electric motor – 37.5 kW, TEFC,
  - Outlet pressure – 13.4 atm (190 psi),
  - Flow – 27.3 cubic meter per hour (120 gpm),
  - Pump is certified according to "3A" standards,
- Second centrifugal pump, manufactured from stainless steel:
  - Connections – sanitary Tri-clamp quick connection from stainless steel (two fro each pump – inlet and outlet),
  - Double mechanical shaft seal,
  - Electric motor – 15 kW, TEFC,
  - Outlet pressure – 3.5 atm (50 psi),
  - Flow – 31.8 cubic meter per hour (140 gpm),
  - Pump is certified according to "3A" standards.

4.5. Heat exchanger:

- Tube and shell heat exchanger from stainless steel rated to 2.5 – 3 MM BTUH,
- ASME rated 10.6 atm (150 psi) on shell side, 17.6 atm (250 psi) on tube side,
- Connections – sanitary Tri-clamp quick connect from stainless steel,
- Steam flow control valve,
- Steam trap and air vent valve (Armstrong),
- Safety electrical interlocks for no flow and lower temperature,
- Certified according to "3A" requirements.

4.6. Electrical and control system:

- Motor control panel with NEMA 12 enclosure with main breaker,
- All switches, enclosures and devices rated NEMA 12/13,
- Allen Bradley PLC to perform automated washing,
- Graphical operator touch screen do graphically display monitored system parameters,
- Status of all pumps, process valves are monitored in real time during system operation on the graphic operator screen,
- All electric wiring done according no NEC requirements.

4.7. Valves and piping:

- All process valves have body from stainless steel and have Tri-clamp quick connections. Certified by "3A",
- All process valves are air actuated,
- All piping done from food grade stainless steel pipes, polished inside and outside,
- All welding performed using tungsten electrodes in inert gas atmosphere,
- Water and air pipes from copper, all utilizes brass valves,
- Steam lines and valves from construction carbon steel.

4.8. Boiler:

- Steam generator – 50 BHP (490 kW),
- Hot water tank with level control,
- Continuous operating automatic water filtration and water softener (two water softening tanks),
- Chemical injection pump (anti scaling solution – to prevent scale forming in the heat exchanger),
- Fully modulated fire control system with all required safety interlocks.

4.9. Air Dryer unit:

- Air blower with TEFC electric motor 3.75 kW, rotation speed – 3600 RPM, flow capacity 2500 cubic meter per hour, replaceable "Heppa" air filter element.

4.10. Corrosion protection:

- All surfaces before painting are treated to remove rust and primed with epoxy based primer,
- All external painting done using high quality industrial urethane base paint,
- Service platforms, hand rails and stair case are galvanized.

4.11. Accessories:

- Orbital washing head series 360-2, manufactured from stainless steel,
- Manway adapter, manufactured from stainless steel,
- Set of high pressure hoses certified according to "3A" requirements (diam. 50 mm, length – 6100 mm),
- Set of low pressure hoses certified according to "3A" requirements (diam. 76 mm, length – 6100 mm),

5. System throughput

On average one module of washing system has an throughput from 15 to 20 tank trucks per day, depending on food product transported.

6. Additional services provided by KMT International, Inc

In additional to system manufacturing KMT International, Inc. cane provides following service to the customers at additional cost:

- Technical documentation in English (Other languages upon request) including installation, operation, maintenance and repair manuals,
- Export packaging for sea transportation,
- Equipment delivery to the customer on DDU basis, including freight insurance during transportation.
- Installation supervision,
- Personnel training according to training program provided by our specialists,
- Warranty and after warranty system service.

7. Warranty

All system covered by 12 months warranty starting from system startup but not more than 18 months from the day system is shipped, whichever comes first.

8. Delivery time

System delivery is 7-8 months starting from contract signing and first payment is received.

KMT International Inc
www.kmtinternational.com

39271 Mission Blvd, #101
Fremont, California 94539 USA
Tel: +1-510-713-1400, 713-1500
Fax: +1-509-752-0475
Email – info@kmtinternational.com