Aviation Fuel Facilities

Aviation fuel facilities are constructed close to airfields to provide airplanes using the airfield with fuel. Aviation fuels come in two (2) types, Jet-A Fuel and Av-gas. Jet-A Fuel is a specially treated Kerosene used for jet planes. Av-gas is used for propeller airplanes. The biggest concern regarding airplane fuel is the purity of the fuel as impure fuel can cause a disaster while the plane is flying, so filtration of aviation fuel is repeated while the fuel is received and delivered. In the storage tank aviation fuel is sucked from the surface of the stored liquid to prevent suction of associated water. The standard governing the design of aviation fuel facilities is API RP 1595 (Design, Construction, Operation, Maintenance and Inspection of Aviation Pre-Airfield Storage Terminals).

•Zoning and orientation of the terminal elements shall serve security, safety, smooth traffic and the ability to easily manage the terminal.

•Filtration systems shall be designated at receiving and distribution points to evade contaminants, water, and other impurities.

•Storage tanks will be designed in accordance to API 650 (Design of Welded Steel Tanks for Oil Storage). The storage tanks are furnished with a floating suction device to suck the fuel from the surface of the tank liquid. The tank's flat bottom will be designed according to the size of the tank and rested on the ring foundation. The tank's cylindrical wall thickness shall be calculated by using API adapted methods. The tank will be anchored to the foundation using anchor clamps. The tank will have manways, manholes and pipe joints. The tank may have a fixed or floating roof depending on the stored liquid. The tank's venting capacity will be calculated in accordance to API standards. Also the tank will include a cathodic protection system, leak detection system, automatic gauging system/overfill protection and be coated on both the inside and outside. Tanks will be grouped in designated dikes. The distance between the tanks as well as other terminal elements shall be determined utilizing NFPA standards.

•Piping systems are designed according to ANSI/ASME B31.3 and/or ANSI/ASME B31.4. Piping material will be in accordance to ASTM A 53/A 53A. Piping systems run in parallel groups, above ground when possible or underground if crossing a road or area where traffic occurs. Pipe diameters are determined according to the flow rate. Velocity of the liquid inside the pipe shall be below the level of velocity which generates static electricity. The pipe wall's thickness is determined so that it withstands 1.5x the working pressure. Computer modeling software's are utilized to determine the piping system is able to bear pressure surge and hydraulic chocks. Underground piping is protected by cathodic protection and an overhead layer that is able to withstand the weight of traffic. The piping is coated in accordance to NACE standards and marked according to API.

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The operation requirements, cost of pipes/pumps and harmful effects of excessive fluid velocity, fatigue or failure are the main factors considered when developing the piping system design for the terminal.

•The terminal's pumping system shall be sufficient to transfer products between tanks and distribution outlets such as truck loading racks and marketing pipelines. The pumps shall be designed according to API 610 (Centrifugal Pumps for Petroleum, Petrochemicals and Natural Gas Industries). Every pump will be capable of achieving 110% of the head required in the correct working temperature range. All pumps are installed on concrete foundations. When taking into consideration the number of pumps necessary spare pumps per each capacity used will always be considered. Pumps are equipped with strainers, valves and bypass lines. Electrical and diesel drives shall be considered in the design.

•The trucks loading and unloading racks shall be capable of transferring up to 130 M3/H from or to the trucks. The trucks loading and unloading racks are installed on a concrete mat and have a weather cover to protect the trucks and workforce. The loading and unloading racks are positioned according to NFPA standards.

•The pumps shall be feeding fuel hydrants in the airfield to directly fuel the planes.

•The terminals will be powered by an electrical system consisting of two (2) sources of electrical power, a primary and secondary source. The primary source is most often the national grid while the secondary source consists of diesel power generators used in case of a primary source failure. The power supply's distribution system shall give management strong operation and maintenance capabilities.

•The terminal's control system shall be utilizing the SCADA system in the field and the LPC system in the control room. Field data should be transmitted from the field to the control system where the program is able to handle it without human interference.

•The associated water collection system shall be designed according to API standards in order to reduce the volume of associated water. Associated water will be processed through the O/W separators and gathered in the evaporation ponds where the water can be treated, made environmentally friendly and disposed of responsibly.

•A fire suppression system is necessary as the presence of flammable and combustible fluids/gases among oil and gas terminals present a fire safety hazard, potential to pollute the environment and endanger human lives. In order to prevent and extinguish fires the facility will be protected by a fire suppression system. A fire suppression system starts with a monitoring and alarm system to alert the workforce in case of a fire. The fire suppression system also includes heat/flame detectors, gas/vapor sensors and an alarm control panel. A water based fire suppression system includes a fire water source, water storage system, pumps, piping, foam tanks and proportioners. Water based fire suppression systems also include fixed delivery systems such as manifolds, sprinklers, foam chambers, monitors and mobile delivery systems for foam/cooling water such as mobile pumps and monitors. None-water based fire suppression systems include dry chemical agents, CO_2 and other non-aqueous firefighting material such as dykes and drainage systems for purging water and foam used in a fire event.