

GENERAL DESIGN NOTES

A. APPLICABILITY:

- THIS STANDARD DESIGN APPLIES TO VERTICAL STEEL FUEL TANKS IN JET A, JP-5 OR JP-8 SERVICE BUT MAY BE ADAPTED FOR USE WITH OTHER PRODUCTS.
- THIS STANDARD DESIGN APPLIES TO TANKS WITH FLOATING PANS. FLOATING PANS ARE REQUIRED FOR JET A, JP-5 AND JP-8 SERVICE ONLY WHEN REQUIRED BY UFC 3-460-01: DESIGN: PETROLEUM FUEL FACILITIES. FOR TANK DESIGNS WITHOUT FLOATING PANS, CONSIDER THE ISSUES MENTIONED IN THE NOTES TITLED "F. DESIGN CONSIDERATIONS FOR TANKS WITHOUT FLOATING PANS" ON SHEET G.04.
- THE GENERAL INTENT OF THIS STANDARD IS FOR NEW CONSTRUCTION, BUT THE DETAILS CAN BE USED FOR TANK UPGRADES OR REHABILITATION.
- THIS STANDARD APPLIES TO CONUS AND OCONUS LOCATIONS, UNLESS OTHERWISE INDICATED. WHERE THE TERMS LOCAL, STATE, OR FEDERAL ARE USED, THIS SHALL ALSO BE INTERPRETED TO MEAN "HOST NATION, IN ACCORDANCE WITH THE FINAL GOVERNING STANDARDS OF THE NATION THE TANK IS LOCATED IN."

B. NOTES ON USE OF THIS STANDARD:

- ALL NOTES ON SHEETS G.03 AND G.04 ARE DESIGNER NOTES.
- FOR THE PURPOSES OF THIS STANDARD, WHEN A TANK SIZE IS GIVEN, THAT TERM SHALL MEAN NOMINAL TANK SIZE, WHICH IS DEFINED AS THE VOLUME BETWEEN THE LOW LEVEL AND THE HIGH LEVEL ALARMS OF THE TANK. SEE TABLE 1 ON SHEET C.01.
- THE TANK DESIGN DETAILS SHALL BE USED AS PROVIDED UNLESS THERE ARE SPECIFIC CONDITIONS (SAFETY OR ENVIRONMENTAL RELATED) THAT WARRANT A MODIFICATION. ANY MODIFICATION SHALL BE APPROVED BY SERVICE HEADQUARTERS.
- THESE DRAWINGS ARE NOT CONSTRUCTION DRAWINGS. THE ENGINEER OF RECORD MUST INCLUDE APPURTENANCES AND ADDRESS OTHER ISSUES INCLUDING, BUT NOT LIMITED TO, AFFF, HIGH-POINT VENTS, LOW-POINT DRAINS, COATINGS, AND ELECTRICAL CODES. THE ENGINEER OF RECORD MUST ALSO SELECT THE APPLICABLE DRAWINGS AND DETAILS BASED UPON A SITE SPECIFIC INVESTIGATION AND DESIGN IN ACCORDANCE WITH THE FOLLOWING UNIFIED FACILITIES CRITERIA:

 UFC 3-301-01 STRUCTURAL ENGINEERING
 UFC 3-460-01 DESIGN: PETROLEUM FUEL FACILITIES
 UFC 3-600-01 FIRE PROTECTION ENGINEERING FOR FACILITIES

 THE INFORMATION SHOULD BE INCLUDED IN THE CONSTRUCTION DOCUMENTS PREPARED BY THE ENGINEER OF RECORD.
- THIS STANDARD DOES NOT INCLUDE FINAL DETAILS FOR THE STRUCTURAL DESIGN OF THE TANK AND ITS APPURTENANCES. THE STRUCTURAL DESIGN ITEMS (FOUNDATION, TANK SHELL PLATE THICKNESSES, ROOF SUPPORT STRUCTURE, WIND GIRDERS, TANK ANCHORAGE, ORIENTATION OF THE NOZZLES AND MANHOLES, ETC), ARE SITE SPECIFIC AND CAN ONLY BE DETERMINED BY THE ENGINEER OF RECORD.
- TANK DESIGN SHALL BE IN ACCORDANCE WITH API STANDARD 650, EXCEPT WHERE IT CONFLICTS WITH THIS STANDARD; IN THOSE CASES THIS STANDARD WILL GOVERN.
- TANK FOUNDATION DESIGN SHALL BE IN ACCORDANCE WITH API STANDARD 650, EXCEPT WHERE IT CONFLICTS WITH THIS STANDARD; IN THOSE CASES THIS STANDARD WILL GOVERN. A GEOTECHNICAL REPORT SHALL BE REQUIRED FOR EVERY TANK FOUNDATION DESIGN. TANK FOUNDATION DESIGN SHALL, AT A MINIMUM, INCORPORATE A RINGWALL, AND SHALL EXCEED THAT MINIMUM WHEN REQUIRED BY THE GEOTECHNICAL REPORT.
- MODIFY THE TANK HEIGHT AS REQUIRED WHERE THE SITE IS NEAR A FLIGHT LINE AND THE HEIGHT CONFLICTS WITH AVIATION FLIGHT LINE GUIDELINES AND REQUIREMENTS. RECALCULATE THE DIAMETER TO KEEP THE SAME USABLE VOLUME.
- THE GOVERNMENT SHALL DETERMINE PRIOR TO DESIGN IF THE FACILITY HAS, OR WILL INCORPORATE, AN AUTOMATED FUEL HANDLING EQUIPMENT (AFHE) CONTROL SYSTEM. THE TYPE OF INSTRUMENTATION AND THE SEQUENCE OF OPERATION VARIES DEPENDING ON THE TYPE OF CONTROL SYSTEM.
- ENSURE THAT THE DESIGN, INCLUDING THE LEVEL ALARM SETTINGS, LEVEL ALARM LOCATIONS, AND THE MATERIAL OF SECONDARY CONTAINMENT, COMPLIES WITH LOCAL, STATE, AND FEDERAL CODES AND REGULATIONS.
- ENSURE THAT THE DESIGN COMPLIES WITH LOCAL, STATE, AND FEDERAL CODES AND REGULATIONS FOR AIR QUALITY. AT CERTAIN LOCATIONS THIS MAY REQUIRE THE TANK ROOF VENT BE FITTED WITH A PRESSURE VACUUM VENT, ESPECIALLY FOR TANKS WITHOUT FLOATING PANS, BUT ALSO, LESS OFTEN, FOR TANKS WITH FLOATING PANS.
- SERVICE HEADQUARTERS IS DEFINED IN UFC 3-460-01 DESIGN: PETROLEUM FUEL FACILITIES.
- INTERPRETATIONS, WAIVER, AND EXEMPTIONS, SHALL BE ADDRESSED USING THE WAIVERS AND EXEMPTIONS PROCESS DESCRIBED IN UFC 3-460-01. SERVICE HEADQUARTERS SHALL BE INVOLVED IN THE APPROVAL PROCESS.

C. DESIGN PARAMETERS/LIMITS:

THE FOLLOWING DESIGN PARAMETERS/LIMITS SHALL BE CONSIDERED BY THE ENGINEER OF RECORD AND SHALL BE INDICATED AS SUCH BY THE ENGINEER OF RECORD IN THE CONSTRUCTION DOCUMENTS IN ORDER TO CONSTRUCT THE TANK IN ACCORDANCE WITH API STANDARD 650, UFC 3-301-01 STRUCTURAL ENGINEERING, AND ASCE 7:

- RISK CATEGORY IV
- WIND SPEED
- SNOW LOAD
- S_s AND S₁ SEISMIC SPECTRAL ACCELERATIONS
- FUEL TYPE
- SPECIFIC GRAVITY OF FUEL
- DESIGN METAL TEMPERATURE
- CORROSION ALLOWANCE

D. SPECIFICATIONS:

1. SPECIFICATIONS TO BE USED AS A PART OF THIS STANDARD:

- UFGS 01 33 00 SUBMITTAL PROCEDURES
- UFGS 01 33 23.33 AVIATION FUEL SYSTEM SPECIFIC SUBMITTAL REQUIREMENTS
- UFGS 01 45 00.00 20 QUALITY CONTROL
- UFGS 01 78 23.33 OPERATION AND MAINTENANCE MANUALS FOR AVIATION FUEL SYSTEMS
- UFGS 05 50 13 MISCELLANEOUS METAL FABRICATIONS
- UFGS 09 97 13.15 LOW VOC POLYSULFIDE INTERIOR COATING OF WELDED STEEL PETROLEUM FUEL TANKS
- UFGS 09 97 13.27 EXTERIOR COATING OF STEEL STRUCTURES
- UFGS 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS
- UFGS 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS
- UFGS 26 42 19.00 20 CATHODIC PROTECTION BY IMPRESSED CURRENT
- UFGS 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS
- UFGS 32 13 15.20 CONCRETE PAVEMENT FOR CONTAINMENT DIKES
- UFGS 33 01 50.01 CLEANING FUEL STORAGE TANKS
- UFGS 33 40 00 STORM DRAINAGE UTILITIES
- UFGS 33 52 43.11 AVIATION FUEL MECHANICAL EQUIPMENT
- UFGS 33 52 43.13 AVIATION FUEL PIPING
- UFGS 33 52 43.14 AVIATION FUEL CONTROL VALVES
- UFGS 33 52 43.23 AVIATION FUEL PUMPS
- UFGS 33 52 43.28 FILTER SEPARATOR, AVIATION FUELING SYSTEM
- UFGS 33 56 13.13 STEEL TANKS WITH FIXED ROOFS
- UFGS 33 56 13.15 UNDERTANK INTERSTITIAL SPACE
- UFGS 33 56 63 FUEL IMPERMEABLE LINER SYSTEM

UFGS 33 40 00 STORM DRAINAGE UTILITIES SHALL BE EDITED TO SPECIFY ASTM A746 DUCTILE IRON GRAVITY SEWER PIPE AND FUEL RESISTANT DIP JOINT GASKETS.

E. NOTES:

- ALL MATERIALS SHALL BE CARBON STEEL, UON.
- BOTTOM PLATES SHALL BE 5/16"; ROOF PLATES SHALL BE A MINIMUM OF 1/4". A CORROSION ALLOWANCE OF 1/16" IS INCLUDED IN THESE THICKNESSES. PROVIDE CORROSION ALLOWANCE OF 1/16" FOR ALL SHELL AND COMPONENTS.
- REQUIRE SLIP-RESISTANT COATING ON THE ROOF AT THE SAMPLE GAUGE WELL, THE ROOF MANHOLE, AND OTHER AREAS AS REQUESTED BY THE FACILITY.
- ADD AVIATION OBSTRUCTION LIGHTS WHERE REQUIRED IN ACCORDANCE WITH FEDERAL AVIATION ADMINISTRATION AC 70/7460-1K, OBSTRUCTION MARKING AND LIGHTING (LATEST EDITION).
- ROUTE ALL PIPING, TUBING AND CONDUITS FOR THE LLS, LLSs, HLS, HHLS, AND HLV FLOAT PILOT TOGETHER ON THE SAME SUPPORT. VERTICAL ROUTING UP THE TANK SHELL TO THE HLV FLOAT PILOT, HLS, AND HHLS SHALL BE ON THE SAME SUPPORT AND SHALL BE STRAIGHT UP AND THROUGH THE OPENING IN THE INTERMEDIATE PLATFORM. HORIZONTAL ROUTING BELOW INTERMEDIATE PLATFORM SHALL BE ALONG THE SIDE OF THE CONCRETE RING WALL, NOT ON THE TOP. DO NOT INTERFERE WITH ACCESS TO THE TANK CIRCUMFERENTIAL STAIRWAY. SUPPORT LEVEL SWITCHES AND HLV FLOAT PILOT CHAMBER ON SHELL AS INDICATED.
- MOUNT HLV FLOAT PILOT CHAMBER AND HLS CHAMBER ON THE SHELL AND MAKE THEM ACCESSIBLE FROM THE INTERMEDIATE PLATFORM. PROVIDE AS INDICATED AND IN ACCORDANCE WITH UFGS 33 52 43.14. ARRANGE HLV FLOAT PILOT CHAMBER, LLS CHAMBER, HLS CHAMBER, AND ASSOCIATED SHELL SUPPORTED PIPING, FITTINGS, VALVES, AND CONDUIT SUCH THAT A 4" MINIMUM CLEARANCE WILL BE MAINTAINED FROM THE SHELL, AND SUCH ITEMS SHALL NOT EXTEND MORE THAN 1'-6" FROM SHELL.
- IN CORROSIVE ENVIRONMENTS, AS DETERMINED BY SERVICE HEADQUARTERS: ALL PIPING, VALVES, AND FITTINGS OUTSIDE THE TANK SHALL BE STAINLESS STEEL EXCEPT FOR THE DBB VALVES, THE TANK FILL LINE, THE TANK ISSUE LINE, THE TANK LOW SUCTION LINE, AND THE PIPING TO THE SIDESTREAM FILTRATION SYSTEM, WHICH SHALL BE INTERIOR AND EXTERIOR COATED CARBON STEEL. PROVIDE STAINLESS STEEL HLV FLOAT PILOT CHAMBER, LEVEL SWITCH HOUSINGS, PROBE HOLDERS, AND ASSOCIATED PIPING, FITTINGS, VALVES, AND CONNECTIONS FOR HLV FLOAT PILOT AND LEVEL SWITCHES. CORROSIVE ENVIRONMENT (WET, COASTAL) - AS DEFINED BY SERVICE HEADQUARTERS.

- IN NON-CORROSIVE ENVIRONMENTS, AS DEFINED BY SERVICE HEADQUARTERS: ALL PIPING, VALVES, AND FITTINGS 2.5" AND LARGER SHALL BE INTERIOR AND EXTERIOR COATED CARBON STEEL. ALL PIPING, VALVES (EXCEPT DBB VALVES), AND FITTINGS 2" AND SMALLER SHALL BE STAINLESS STEEL. PROVIDE STAINLESS STEEL HLV FLOAT PILOT CHAMBER, LEVEL SWITCH HOUSINGS, PROBE HOLDERS, AND ASSOCIATED PIPING, FITTINGS, VALVES, AND CONNECTIONS FOR HLV FLOAT PILOT AND LEVEL SWITCHES.
- UNLESS OTHERWISE INDICATED, ALL PIPING AND FITTINGS INSIDE THE TANK SHALL BE INTERIOR AND EXTERIOR COATED CARBON STEEL, EXCEPT FOR PIPING 2.5" AND SMALLER, WHICH SHALL HAVE AN UNCOATED INTERIOR. MATERIALS FOR STILLING WELLS AND LADDERS SHALL BE AS INDICATED.
- ALL END CONNECTIONS FOR VALVES, EQUIPMENT, PIPE, AND FITTINGS, INCLUDING PIPING FOR THE WATER DRAW-OFF SYSTEM, SIDESTREAM FILTRATION SYSTEM, DRAINS, THERMAL RELIEFS, HLV FLOAT PILOT CHAMBER, AND LEVEL SWITCHES SHALL BE WELDED OR FLANGED EXCEPT AS INDICATED: PIPING AND FITTINGS 2.5" AND LARGER SHALL BE BUTTWELDED. PIPING AND FITTINGS 2" AND SMALLER MAY BE BUTTWELDED OR SOCKETWELDED. THREADED CONNECTIONS SHALL NOT BE ALLOWED EXCEPT WHERE WELDED OR FLANGED CONNECTIONS TO APPURTENANCES ARE NOT AVAILABLE (IE, PRESSURE GAUGES, FUEL SAMPLE CONNECTIONS, LEVEL SWITCH PROBES, HLV FLOAT PILOT CHAMBER, ETC).
- ORIENT MOTORIZED ACTUATORS, WHEN PROVIDED, WITH MOTOR HANGING DOWN, HAND WHEEL FACING UP AND LOCAL CONTROLS FACING AWAY FROM TANK SHELL.
- PROVIDE HIGH-POINT VENTS AND LOW-POINT DRAINS ON PIPING IN ACCORDANCE WITH UFC 3-460-01.
- COAT ALL CARBON STEEL SURFACES IN ACCORDANCE WITH UFC 3-460-01 AND THE FOLLOWING UFGS SPECIFICATION SECTIONS: COAT EXTERNAL CARBON STEEL SURFACES IN ACCORDANCE WITH UFGS SECTION 09 97 13.27; COAT INTERIOR CARBON STEEL SURFACES OF NAVY TANKS IN ACCORDANCE WITH UFGS SECTION 09 97 13.15; COAT INTERIOR CARBON STEEL SURFACES OF ALL OTHER TANKS IN ACCORDANCE WITH UFGS SECTION 09 97 13.17.
- PROVIDE AND INSTALL ALL MATERIAL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
- WHEN REQUESTED BY THE FACILITY AND APPROVED BY SERVICE HEADQUARTERS, PROVIDE A SIDESTREAM FILTRATION SYSTEM WITH A 100 GPM FILTER/SEPARATOR AND A 100 GPM PUMP IN ADDITION TO THE WATER DRAW-OFF SYSTEM. INCLUDE INSTRUCTIONS TO THE OPERATOR TO TURN OFF THE WATER DRAW-OFF SYSTEM AND SIDESTREAM FILTRATION SYSTEM PUMPS AND TO CLOSE RELATED ISOLATION VALVES BEFORE RECEIVING FUEL. THE INSTRUCTIONS SHOULD BE LOCATED ON A STAINLESS STEEL PLACARD ATTACHED TO THE WATER DRAW-OFF SYSTEM PRODUCT SAVER TANK AND THE SIDESTREAM FILTRATION SYSTEM FILTER/SEPARATOR.
- THERE ARE TWO POSSIBLE TANK FOUNDATION TYPES: A TANK SIGNIFICANTLY ELEVATED ENSURING THAT EVERY PORTION OF THE TANK BOTTOM UNDERSIDE (INCLUDING THE SUMP) IS ELEVATED ABOVE GRADE AND OUT OF GROUNDWATER (THIS REDUCES RISK OF BOTTOMSIDE CORROSION), AND A TANK ELEVATED 12" ABOVE GRADE WHERE GROUNDWATER CONTACT WITH THE TANK BOTTOM UNDERSIDE IS NOT AS MUCH A CONCERN. THE ELEVATED TANK IS THE TYPE INDICATED ON DRAWING C.01 AND THROUGHOUT THE TANK DETAIL SHEETS. THE TANK DESIGNS ARE SIMILAR; THE PRIMARY DIFFERENCE IS AS INDICATED BY DETAILS ON DRAWING D.01 AND D.02. SERVICE HEADQUARTERS APPROVAL IS REQUIRED FOR USING EITHER TYPE.
- FOR BOTH ELEVATED AND NON-ELEVATED TANK FOUNDATIONS THERE ARE FOUR TYPES OF POSSIBLE FOUNDATION DESIGNS: RINGWALL WITH FOOTER; RINGWALL WITHOUT FOOTER; RINGWALL WITH SLAB MAT FOUNDATION; AND RINGWALL WITH SLAB MAT FOUNDATION, PILE SUPPORTED. IF ONE OF THE LATTER TWO TYPES ARE USED, SEE DETAIL 5/D.04.
- UNLESS SPECIFICALLY DIRECTED WHERE TO PLACE AUDIBLE AND VISUAL ALARMS, REVIEW FACILITY SIZE AND OPERATING METHOD TO DETERMINE THE MOST DESIRABLE LOCATION; THIS WILL USUALLY BE OUT IN THE TANK FARM AND IN THE OPERATIONS BUILDING WHERE THE ALARM/CONTROL PANELS ARE LOCATED. WHERE MOUNTED REMOTE FROM THE TANK, CONSIDER ADDITIONAL LOCAL ALARM PANELS WHICH PROVIDE AUDIBLE AND VISUAL ALARMS TO WARN PERSONNEL IN THE IMMEDIATE VICINITY OF THE TANKS. CONSIDER MAKING ALL ALARMS AUDIBLE AT ALL LOCATIONS IN THE TANK FARM. AT A MINIMUM, PROVIDE AUDIBLE AND VISUAL ALARMS AT THE LOCATIONS WHERE OTHER ALARMS AND PANELS ARE LOCATED AND OUTSIDE IN THE FUEL FARM.
- PLACE EMERGENCY FUEL SHUT-OFF (EFSO) PUSHBUTTON STATIONS WHERE DIRECTED AND IN ACCORDANCE WITH UFC 3-460-01.
- PROVIDE OVERFILL PROTECTION WITH A HYDRAULICALLY OPERATED DIAPHRAGM CONTROL VALVE (HLV). WHERE DIRECTED, MAKE THE DOUBLE BLOCK AND BLEED (DBB) PLUG VALVE ON THE TANK RECEIPT LINE A MOTOR OPERATED VALVE (MOV). CONSIDER THE EFFECTS OF VALVE SHUTDOWN ON PIPELINE SURGING, ESPECIALLY TANKS CONNECTED TO OFF-BASE PIPELINES OR MARINE OFFLOAD SYSTEMS. SEE UFC 3-460-01 FOR GUIDANCE.

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SEAL

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO

DES MSO | DRW MHK | CHK WVB

SUBMITTED BY:

DATE: APRIL 2015

GENERAL NOTES

NAVAL FACILITIES ENGINEERING COMMAND - ATLANTIC
 DOD STANDARD DESIGN AWT8-24-27
FUEL TANKS WITH FIXED ROOFS ABOVEGROUND VERTICAL STEEL
 GENERAL NOTES

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|--------------------------|
| SCALE: AS NOTED |
| EPROJECT NO.: XXXXX |
| CONSTR. CONTR. NO. XXXXX |
| NAVFAC DRAWING NO. XXXXX |
| SHEET 3 OF 57 |

G.03

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