Preparing Activity: NAVFAC Superseding
UFGS-33 08 55 (April 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 33 08 55

FUEL DISTRIBUTION SYSTEM START-UP (NON-HYDRANT)
08/19

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NOTE: This guide specification covers the requirements for the start-up (flushing, cleaning, equipment tests), and performance testing of new and existing fuel systems that are dead head type. That is, systems where fuel is issued out of a tank, through a pump, and then into a dead-end piping system with an outlet such as a fueling pier, a truck fillstand or a transfer pipeline. The following types of systems are covered by this specification:The following types of systems are covered by this specification:

a. Tank truck, rail (tank) car, pipeline, and marine off-loading and loading systems.
b. Fuel transfer piping and pumphouses.
c. Installation pipelines, and interterminal pipelines.
d. Military Service Station (MSS) facilities handling gasoline, diesel, and/or jet fuel that refuel (that is, provide motive fuel for) commercial type government and military type tactical vehicles; and that load fuel into the storage tank of tactical refueler tank trucks.
e. Any "dead end" system. This system has only a supply line. There is no return line to return unused fuel to the storage system.
f. Any system that uses a "bypass" pressure control device (a relief valve or a control valve mounted directly downstream of the pumps) to relieve pressure from the downstream side of the pumps to the suction side of the pumps.

The following types of systems are not covered by this specification:

a. Private vehicle fueling stations such as military exchange service stations.
b. Looped aircraft direct fueling systems such as DoD Type III/IV/V hydrant systems, Cut and Cover

Tank hydrant systems.
c. Looped edge of apron and rotary wing aircraft direct refueling systems that are looped, plumbed, and controlled like a looped hydrant system.
d. Looped piping systems for loading trucks that are looped, plumbed and controlled like a hydrant system. These are often labelled as "super truck fill systems."
e. A "looped" piping system is a piping system with a permanent supply line and a return line. This system issues fuel out the supply line and returns and "unused" fuel, (not issued to a truck or aircraft(), back through the return line.
f. For "looped" systems use Section 33 08 53 AVIATION FUEL DISTRIBUTION SYSTEM START-UP.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

PART 1 GENERAL

****
NOTE: Designer must edit this specification section as required to perform a successful start-up and acceptance of the new, repaired, upgraded, or modified fuel system.

The startup process must be designed such that the cleanliness of the existing system can be verified prior to flushing, or flushing and cleaning the new system or system extension.

The startup process must be designed to the extent possible, to avoid contaminating or disrupting the existing fuel system when the new system is filled, flushed, cleaned, and tested with fuel.
****

1.1 SUMMARY/APPLICABILITY

This specification defines the requirements and procedures for startup and performance testing of all equipment, components, control systems, devices, and associated appurtenances which are used for the receipt, storage, transfer and issue of petroleum fuel products for non-hydrant

fuel facility systems. It covers requirements for safety, Government scheduling and coordination, device testing, existing and new system cleanliness, system [flushing][flushing and cleaning], demonstration of indicated and specified system performance, and final acceptance and reporting. The types of fuel systems covered include:

a. tank truck, rail car, pipeline and marine off-loading and loading systems

b. fuel transfer pumphouses and systems

c. installation pipelines and interterminal pipelines

d. military service station facilities handling gasoline, diesel, and jet fuel that:

(1) refuel (provide motive fuel for) commercial type government vehicles.

(2) refuel (provide motive fuel for) military tactical vehicles.

(3) load fuel into the storage tanks of tactical refueler tank trucks.

It does not cover private vehicle fueling stations such as exchange service stations, nor aircraft direct refueling hydrant systems.

1.2 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API 570 (2016; Addendum 1 2017; Addendum 2 2018; ERTA 1 2018) Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems

API RP 1595 (2012; R 2019; 2nd Ed) Design, Construction, Operation, Maintenance, and Inspection of Aviation Pre-Airfield Storage Terminals

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-8167 (2016) Engineering and Desig -- Petroleum, Oil, and Lubricants Mandatory Center Of Expertise

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-3004-1 (2018) Quality Assurance for Bulk Fuels, Lubricants and Related Products

1.3 ADMINISTRATIVE REQUIREMENTS

1.3.1 Plans

The Contractor must submit detailed written plans [(prepared by the System Supplier)] for implementation of the System Start-Up Plan, [the Existing System Cleanliness Confirmation Plan,] the Fuel Provisioning Plan, and the Performance Testing Plan. The plans must specify a detailed plan incorporating in a sequential manner all work specified in PART 3 EXECUTION of this specification section. Plan elements must include:

a. Personnel. List of Contractor's personnel by trade, list of key personnel, list of safety equipment, list of miscellaneous equipment such as two-way radios, and personnel transportation vehicles.

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NOTE: Designer must identify what type of fluid is used for each section of the system.

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b. Fluid Used for Hydrotesting,[and Cleaning Pigging,][and Verification Pigging,] [and Flushing][Flushing, and Cleaning]. Identify what fluid will be used for each operation in each system section.

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NOTE: During the design process the Designer must investigate who is providing fuel to the project and identify that entity in this paragraph.

NOTE: The periods shown in this specification are nominal. The Designer must also investigate how long it will take for the fuel to arrive once the Plans have been approved by the Government and modify the periods listed in this specification accordingly. For CONUS locations, minimum period is 60 days. For OCONUS locations, the minimum period is normally 90 days but can sometimes take 120 days or even longer. This may, but does not necessarily, include approval time. Fuel delivery must be coordinated with the Installation and Service Headquarters.

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c. Fuel. See the Fuel Provisioning Plan.

[d. Water. Specification and quantities of water needed for all system start-up activities and water delivery schedules. Water must meet the characteristics requirements specified. In cases where it is not specified, water must be potable and treated and must meet all the requirements of water used for hydrostatic testing in API 570. Plan must include requirements and schedules for Government-provided materials and equipment.

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NOTE: Designer must identify where the piping system contents are going to be pushed into for hydrotesting, pigging, [and flushing][flushing and cleaning]. This may be a simple decision for permanently looped systems or for systems where temporary loops can be provided. It is more complex for "dead end" systems where the Government or Contractor must provide temporary or mobile tankage.

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e. Storage-Into. Identify where the contents of the piping will be pushed into including the capacity required, how the storage vessel will be prepared for receiving the piping content, how it will be emptied and how it will be cleaned after the contents are removed.

f. Storage-From. Identify where the fluid that will be drained or pushed into the piping will come from including the capacity required, the number, size and type of the storage vessel, how the storage vessel is filled, how it will be emptied, and how it will be cleaned after the contents are removed.

g. Piping. Notwithstanding the requirements described elsewhere, every pipe section and individual component in the system covered by this specification section must be filled, vented, hydrostatically tested, flushed, cleaned, and tested for fuel quality. It must also be able to be isolated and drained if found that it needs repair. The Plans must detail how this is to be done.

h. Equipment Tests. Detailed procedures and schedules for each system component to perform all system tests under each operating scenario in accordance with paragraph EQUIPMENT TESTS.

i. Performance Testing. Detailed procedures and schedules for each system component to perform all system tests under each operating scenario in accordance with paragraph PERFORMANCE TESTING.

[j. Pigging Plans. See Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

][k. Hydrotesting Plans. See the Work Plan in Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

] l. Schedule. Schedules must be generated with listing dates and durations of all system start-up activities as well as regular coordination and safety meetings and dates of key events for Government participation.

m. Contingency plans. Information on spill and fire contingencies, along

with the required Government Fire and Safety Office involvement and approvals.

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NOTE: Designer should identify all base-specific phasing and operational issues for incorporation in the Contract documents.

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n. Coordination with Installation. Description of how Contractor [and System Supplier]must implement system start-up in coordination with ongoing operations at the Installation. Plan must incorporate all phasing and work restriction requirements of the Contract documents.

1.3.2 Copies of API Publication

Provide four copies of API RP 1595 to the Contracting Officer.

[1.3.3 Existing System Cleanliness Confirmation Plan

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NOTE: Provide an Existing System Cleanliness Confirmation Plan when connecting into an existing system to confirm the fuel coming into the new system is clean.

Provide a method of checking the fuel quality at the entrance point into a new system and the exit point out of a new system to identify where the contamination is coming from during start-up. If there are no fuel sample points at these points, a method acceptable to the Contracting Officer must be provided. The use of piping connections such as vents, drains, reliefs, and gauges can sometimes be modified and used; existing flanged spool pieces that can be removed and new ones with fuel sample points provided is another method. Avoid to the fullest extent possible the introduction of permanent small piping connections in pipe that is to remain for temporary fuel sample points.

While the Designer does not prepare the plan, the Designer must design the project with at least one method for the Contractor to check the existing system cleanliness to serve as a Basis of Bid for the Contractor.

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Submit a detailed written plan prepared by the [Contractor][System Supplier] for the Contractor to verify and confirm the cleanliness of the existing system before connecting it to the new system or extension. The cleanliness confirmation test of the existing system (pre-cleanliness test) must be per MIL-STD-3004-1. Submit the plan [60 (CONUS)][90 (OCONUS)][_____] days prior to making the connection to the existing system. The Contractor [and System Supplier]are responsible for implementing the Existing System Cleanliness Confirmation Plan in coordination with ongoing base operations.

]1.3.4 Fuel Testing Laboratory Qualifications

Contractor must submit the qualifications of the DoD Fuel Testing Laboratory which will be used to test the fuel samples.

1.3.5 System Start-up Plan

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NOTE: Insert number of days of notice after consulting with the Contracting Officer.

The periods shown below are nominal and the Designer must coordinate through the Contracting Officer with facility personnel, required Government witnesses, and other stakeholders to determine the actual period required.

See paragraph FUEL for discussion on how long it may take for fuel to be available for Start-Up before setting period below. The periods below are probably only valid when the project does not require that additional fuel be brought in for start-up and performance testing.

****

Submit a detailed written plan prepared by the [Contractor][and System Supplier] for implementation of System Start-Up. Submit the plan [60 (CONUS)][90 (OCONUS)][_____] days prior to System Start-Up. The Contractor [and System Supplier] are responsible for implementing System Start-Up in coordination with ongoing operations.

1.3.6 Performance Testing Plan

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NOTE: Develop Performance Testing Plan as a function of the system layout. An example plan is provided. See Attachment 2 - Performance Testing.

The periods shown below are nominal and the Designer must coordinate through the Contracting Officer with facility personnel, required Government witnesses, and other stakeholders to determine the actual period required.

See aragraph FUEL for discussion on how long it may take for fuel to be available for Start-Up before setting period below. The periods below are probably only valid when the project does not require that additional fuel be brought in for start-up and performance testing.

****

Submit a detailed written plan prepared by the [Contractor][Single System Supplier] for implementation of Performance Testing. Submit the plan [60 (CONUS)][90 (OCONUS)][_____] days prior to System Start-Up. The Contractor [and the System Supplier]are responsible for implementing the Performance Testing Plan in coordination with ongoing operations.

1.3.7 Fuel Provisioning Plan

Submit a detailed written Fuel Provisioning Plan prepared by the Contractor. The Fuel Provisioning Plan must include a timeline for the required receipt date(s), grade of fuel, and quantity of fuel on each receipt date required to execute the Start-up and the Performance Testing plans.

1.3.8 Certification (Ready for Start-Up and Performance Testing)

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NOTE: The periods shown below are nominal and may be much longer for remote and/or complex projects. The Designer must coordinate through the Contracting Officer with facility personnel, required Government witnesses, and other stakeholders to determine the actual period required.

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As a prerequisite to fuel system start-up, the Contractor must submit a certificate that certifies all work provided on the fuel system, except for touch-up field painting, has been inspected and approved by the specified approving authorities. Further, the Contractor must certify on this certificate that all specified checks and inspections have been successfully completed prior to start-up. Submit the plan [30 (CONUS)][45 (OCONUS)][_____] notice prior to commencement of fuel system start-up. The Contractor must submit the Certificate of Completion to the Contracting Officer at least [7][_____] calendar days prior to commencement of system start-up and performance testing. The Contracting Officer must then be responsible for scheduling the Government representatives [and appropriate military command authority] [and designers]for participation in the inspection, performance testing, and final approval activities. Any contractual deficiencies observed must be corrected by the Contractor without cost to the Government.

1.4 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for

Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.
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NOTE: Select water options in this specification section for flushing pier piping only.
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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Copies of API RP 1595; G[, [_____]]

[Existing System Cleanliness Confirmation Plan; G[, [_____]]

] System Start-Up Plan; G[, [_____]]

Performance Testing Plan; G[, [_____]]

Fuel Provisioning Plan; G[, [_____]]

SD-06 Test Reports

Final Reports; G[, [_____]]

[Water for Flushing Pier Piping

] Cathodic Protection Reports; G[, [_____]]

Equipment Tests; G[, [_____]]

Piping Flushing Checklist; G[, [_____]]

Piping Cleaning Checklist; G[, [_____]]

SD-07 Certificates

Fuel Testing Laboratory Qualifications; G[, [_____]]

Certification (Ready for Start-Up and Performance Testing); G[, [_____]]

[Contractor Start-Up Qualifications; G[, [_____]]

] Certificate of Calibration; G[, [_____]]

Disposal Of Waste Materials

SD-11 Closeout Submittals

Certification of Entire System

1.5 CLOSEOUT SUBMITTALS

1.5.1 Final Reports

Contractor must prepare a final report that documents the execution of the approved start-up and performance testing plan. All items of work specified in the Start-up and Performance Testing plans must be carried out and reported in this report unless otherwise approved by the Contracting Officer. Include as a part of this report:

a. Verification letters of approved fuel storage tank hydrostatic tests and the approved piping hydrostatic tests, as generated under other specification sections.

b. Final settings of the valves and switches.

c. A copy of the flow and pressure output graphs and excel data and charts on CDR media with an explanation of what the graph indicates and what the system is doing.

d. A schematic flow diagram drawing of the resultant system showing major valves with the "normal" position of each manual valve noted, equipment, and the type, location, and setpoints of each safety relief valve and thermal relief valve.

e. A certified pipeline inventory - a detailed list with sizes, lengths, quantity, and volumes must be provided for the systems in this project. Such systems include, but are not limited to: marine receipt, pipeline receipt, truck off-loading receipt, pumphouse, pump pad, truck loading, marine loading, transfer pipeline, product recovery, and other miscellaneous piping systems. Fuel system volume must be calculated using as constructed pipe lengths, internal diameters, fittings, and components. Totals must be provided for all items containing fuel with the exception of tanks which is covered by other specifications.

1.6 QUALITY ASSURANCE

[1.6.1 Contractor Start-Up Qualifications

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NOTE: If there is a System Supplier requirement, that entity will be responsible for the start-up of the system. In the case of systems where the System Supplier requirement is not included, include the bracketed text below to designate that the Contractor is responsible for start-up.

The System Supplier requirements and qualifications are defined in Specification 33 57 55 FUEL SYSTEMS COMPONENTS (NON-HYDRANT).
****

Submit the following data for approval:

a. Certification stating that the Contractor has provided start-up services (including start-up, existing system cleanliness confirmation, and performance testing experience) for five similar systems in the last five years.

b. Project names, locations, system description, and items provided at these installations. Include user point-of-contact and current telephone numbers.

][1.6.2 Water for Flushing Pier Piping

Submit results of water testing and amount of water required.

]1.6.3 Certification of Entire System

****
NOTE: The periods shown below are nominal and may be much longer for remote and/or complex projects.
****

Prior to the acceptance of the newly constructed system by the Government, all installed mechanical and electrical system components must be inspected and approved by the Contracting Officer. Provide the Contracting Officer [45] [60] [_____] days notice in order to schedule the Installation[, DLA] and Service Headquarters and/or their designated appointee for participation in the inspection, Performance Testing, and approval. Any deficiencies observed must be corrected by the Contractor without cost to the Government.

1.6.4 Service Headquarters Definition

SME is defined as Service Headquarters Subject Matter Experts: Air Force - The Air Force Fuels Facilities Subject Matter Expert (AFCEC/COS); Army - Headquarters, U.S. Army Corps of Engineers; POL-MCX Facilities Proponent (CECW-EC) through the Army Petroleum Center (APC); Navy/Marine Corps - NAVFAC POL Facility Subject Matter Expert (NAVFAC EXWC, CI11). ER 1110-1-8167 Engineering and Design Petroleum, Oil, and Lubricants Mandatory Center of Expertise must be followed.

The Service Control Point (SCP) is defined as follows: Army - Army Petroleum Center; Air Force - Air Force Petroleum Office; Navy/Marine Corps - Naval Supply Systems Command - Energy.

[1.7 SYSTEM SUPPLIER INVOLVEMENT

****
NOTE: In most projects, including those requiring control valves, motorized or alarmed isolation valves, wired sensors and controllers, pumps, control panels and other equipment and system components a System Supplier will be used to Start-Up and Performance Test a system. Include the

bracketed text to require the use of a System Supplier for system components/controls supply, coordination and installation verification.

In the simplest of projects such as one with only simple piping modifications, the addition of thermal relief valves, the replacement of assorted manual valves, etc, the Contractor will cover that role. In that case, require the Contractor to demonstrate his qualifications in a Submittal.

****

The System Supplier is defined in Specification 33 57 55 FUEL SYSTEMS COMPONENTS (NON-HYDRANT). The Contractor and the System Supplier must work together to prepare the Start-Up Plan, [the Existing System Cleanliness Confirmation Plan,] Equipment Testing Plan, Performance Testing Plan, and the Final Reports. They must both be present during all activities described in this section. The System Supplier must be responsible to the Contractor for scheduling all Contractor, sub-Contractor, and manufacturer's service personnel during activities described in this specification section.

]1.8 DISPOSAL OF WASTE MATERIALS

The Contractor must be responsible for properly disposing of any sludge, debris, filtration elements,[waste water, contact water,] and waste fuel resulting from piping and tank [flushing] [flushing and cleaning] activities as specified in Section [_____].[Comply with all applicable Installation, local (city and county), State, and Federal Regulations for hazardous waste disposal.]

PART 2 PRODUCTS

2.1 GOVERNMENT-FURNISHED MATERIAL AND EQUIPMENT

The Government will furnish the following materials, equipment and services during the performance of the work under this section.

2.1.1 Fuel

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NOTE: During the design process the Designer must determine if the fuel is DLA or Service funded.

NOTE: The Designer must also investigate how long it will take for the fuel to arrive once the Plan has been approved by the Government and modify the periods listed below accordingly. For CONUS locations, minimum period is 60 days. For OCONUS locations, the minimum period is normally 90 days but can sometimes take 120 days or even longer. This may, but does not necessarily, include approval time. Fuel delivery must be coordinated with the Installation and Service Headquarters.

NOTE: During the design process the Designer must investigate how much fuel can reasonably be expected to be "lost" during construction. Experience has shown that 200 gallons is a reasonable maximum

amount for a new system (project that does not tie into an existing system). For projects tying into existing systems, and for very large new systems, the number may be larger.

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Some fuel loss should be expected. Fuel that is lost during [flushing] [flushing and cleaning], equipment testing, and performance testing is viewed as a Start-up and Performance Testing expense and should be budgeted for in Contractor estimates. As Basis of Bid, the Contractor must allow for [200] [_____] gallons of fuel losses in the bid.

The Contractor is responsible for the disposal of any waste product.

The Contractor must establish a Department of Defense Activity Address Code and must reimburse the US Government for any US Government fuel lost resulting from poor workmanship or contamination.

The Government will provide fuel given that the requirements are submitted with sufficient lead time to allow the US Government to secure the grade and volume required and make the necessary transportation requirements. The Contractor must provide a copy of the Start-up, Fuel Provisioning, and Performance Testing plans a minimum of [60] [90][_____] days in advance of System Start-up.[When Defense Working Capital Fund (DLA Owned) fuel is used, provide a copy of the Start-up, Fuel Provisioning, and Performance Testing plans to DLA Energy at the same time.]

[FLUSHING, EQUIPMENT TESTS and PERFORMANCE TESTING][FLUSHING, CLEANING, EQUIPMENT TESTS and PERFORMANCE TESTING]: The [flushing], [flushing and cleaning] and testing phases will be identified separately in the start-up and Performance Testing plans. Fuel used for [flushing][flushing and cleaning], and testing will become contaminated, the fuel must be isolated and is considered off-specification until the quality can be verified. Fuel volumes required for [flushing][flushing and cleaning] and testing should be minimized to limit costs, so estimates should be made accordingly. The Contractor will be responsible for disposing of any waste product.

Upon satisfactory completion of the [flushing][flushing and cleaning] operations, the Government will supply the additional quantities of fuel required to complete the other work under this section. This larger volume of fuel will not be delivered to the system until the Contractor has satisfactorily completed all work and, in particular, [the cleaning and coating of the interior surfaces of the storage tanks and] the removal of preservatives and foreign matter from those portions coming in contact with the fuel valves, pumps, filter-separators and other such system components.

[2.1.2 Refueler Tank Trucks

****

NOTE: During the design process the Designer must investigate who is providing the refueler tank trucks for this project. If they are to be provided by the Contractor, add requirement under Contractor-furnished Equipment and delete this paragraph.

NOTE: If the refueler tank trucks are to be

provided by the Fuel Facility Operator and they are not Government-owned vehicles, the Fuel Facility Operator's Contract will need modification to provide the equipment and the service if this is not already in the Contract.
****

The Government will furnish and operate the refueler tank trucks for the testing of truck fill stands.

][2.1.3 Vacuum Trucks

****
NOTE: During the design process the Designer must investigate who is providing the vacuum trucks for this project. If they are to be provided by the Contractor, add requirement under Contractor-furnished Equipment and delete this paragraph.

NOTE: If they are to be provided by the Fuel Farm Operator and they are not Government-owned vehicles, the Fuel farm Operator's Contract will need modification to provide the equipment and the service if this is not already in the Contract.
****

The Government will furnish and operate the vacuum trucks required for removing water and fuel from pits, drains, and other systems.

][2.1.4 Fuel Bowser

****
NOTE: A fuel bowser is a small towed tank often used for larger project to vent fuel vapor laden air into. During the design process the Designer must investigate if a fuel bowser is needed for this project and who is providing the fuel bowser for this project. If they are to be provided by the Contractor, add requirement under Contractor-furnished Equipment and delete this paragraph.

NOTE: If they are to be provided by the Fuel Farm Operator and they are not Government-owned vehicles, the Fuel Farm Operator's Contract will need modification to provide the equipment and the service if this is not already in the Contract.
****

The Government will furnish and operate the fuel bowser required for removing water and fuel from pits, drains, and other systems.

][2.1.5 [Barge(s)][Ship(s)]

****
NOTE: During the design process the Designer must investigate who is providing the barges/ships for this project. If they are to be provided by the

Contractor, add requirement under Contractor-furnished Equipment and delete this paragraph.
****

[The Government will furnish and operate the [barge(s)][ship(s)] that provide the fuel required for system start-up activities.][The Government will furnish [Barge(s)][Ship(s)] for the use of water for pier piping hydrotesting and flushing.]

]2.2 CONTRACTOR-FURNISHED MATERIAL AND EQUIPMENT

2.2.1 Contractor-furnished

Provide material, equipment and labor not specified to be Government-furnished and required for proper System Start-Up of the system. Equipment being provided must be calibrated and the certificate of calibration be submitted to the Contracting Officer prior to use. Equipment must include but not be limited to the following:

a. Temporary strainers.

b. Pipe spools.

c. Flow meters.

****
NOTE: Include bracketed text for bottom loading of refueler truck loading systems using pressure fueling nozzles.
****

d. Pressure gauges[to include bayonet type gauge to be used on the single point receptacle (SPR) on the Government truck. Gauge must be turned over to the Government after startup is complete].

****
NOTE: All systems include fueling pumps. Most systems except military service stations include a pump control panel (PCP). Such systems may include a truck loading control valve, back pressure control valve, a bypass pressure control valve, and an issue venturi. Edit as appropriate for the particular project.
****

e. Electronic sensors and recorders for pressure [and flow recording]are included in the Pump Control Panel (PCP). This equipment must be used to monitor and record the system during the "Equipment Tests" and "Performance Testing" portions of this Specification Section. Recorded data must be used by the Contractor and equipment factory representatives to achieve final control valve and equipment adjustments. Recorded data must include:

(1) Fueling pumps discharge pressures.

(2) Storage Tank levels.

(3) Product Recovery Tank levels.

(4) Fueling pumps suction pressures.

[(5) Truck Loading Control Valve upstream pressures.

][(6) Truck Loading Control Valve downstream pressures.

][(7) Truck Fillstand Flowrate (measure flowrate at the fillstand using local instruments).

][(8) Supply Venturi flow rates.

][(9) Back Pressure Control Valve upstream pressures.

][(10) Back Pressure Control Valve downstream pressures.

][(11) Bypass Pressure Control Valve upstream pressures.

][(12) Bypass Pressure Control Valve downstream pressures.
]

****
NOTE: Delete below paragraph if project does not include filter-separators.
****

[f. The Contractor must have on hand sufficient filter elements [, spin-on filters,] and coalescer cartridges to adequately clean the system. During the cleaning operation, provide a flow versus pressure drop graph for each filter-separator, as provided in Attachment 1 - Equipment Tests. Change coalescers and cartridges upon reaching a differential pressure of 103 kPa 15 psi or when pressure drop is less than previous graph or fails to increase properly. Isolate each filter-separator, one at a time and use one fueling pump to obtain rated flow rate [19 lps 300 gpm] [38 lps 600 gpm]. A minimum of one complete set of coalescer elements and separator cartridges for each filter-separator must be turned over to the Government after new coalescer elements and separator cartridges are installed in each filter-separator vessel after completion of Performance Testing.

][g. Vacuum Trucks for removing water and fuel from pits, drains, and other systems.

][h. Fuel Bowser for removing water and fuel from pits, drains, and other systems.

][i. [Barge(s)][Ship(s)] to provide the fuel required for system start-up activities

][j. [Barge(s)][Ship(s)] for the use of water for pier piping hydrotesting and flushing.

][k. Over-the-road (OTR) tank trucks for [flushing,][flushing, cleaning] and draining of the system and for starting up and performance testing truck off-loading systems.

][l. Temporary Tankage for [flushing,][flushing, cleaning]and draining of the system and for starting up and performance testing.

][m. Temporary Piping to form a temporary "looped" piping system for

[flushing,][flushing, cleaning]and draining of the system and for starting up and performance testing.
]

****

NOTE: During the design process the Designer must investigate who is providing utilities for this project.

****

[n. The Contractor must be responsible for providing the electrical power from a source identified by the Government to the testing locations.

][o. Temporary filtration/strainers.
]

****

NOTE: Include bracketed text for systems indicated as piggable if they do not already have them.

****

[p. Pigging equipment and services per Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT) including pig launching and receiving barrels, kicker line, and receiver line.

]2.2.2 Design Conditions

Use temporary flushing lines and equipment that are equal in strength, stability, and materials to the associated permanent components. However, spools may be carbon steel. Additional design conditions must be as specified in Section 33 57 55 FUEL SYSTEMS COMPONENTS (NON-HYDRANT).

****

NOTE: During the design process the Designer must investigate who is providing electric power.

****

[2.2.3 Electric Power

Electric power required for the performance of the work under this section [will be furnished by the Government at no charge to the Contractor][must be furnished by the Contractor].

][2.3 WATER FOR FLUSHING PIER PIPING

****

NOTE: Water may only be used for work in this section for flushing pier piping. The use of water in hydrotesting and cleaning pigging is covered in Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

Availability of water services and charges are established by the activity and should be stated in Division 1 of the contract specifications. Contact authority having jurisdiction to determine what kind of water can be used, what flow rate is available for filling, days and hours of availability, allowable disposal rate, required testing, and characteristics.

Include location regulatory requirements for water

disposal permits, treatment, and testing of test water prior to disposal. Verify water discharge may be dumped without treatment.

During the design process the Designer must investigate who is providing water.

****

Water [will be furnished by the Government at no charge to the Contractor][must be furnished by the Contractor] and must be potable and treated and must meet all the requirements of water used for hydrostatic testing in API 570.

]PART 3 EXECUTION

****

NOTE: There are essentially five kinds of piping and equipment systems covered by this specification. Tailor this specification section to suit the actual system:

a. Systems or parts of systems that have fixed storage tanks that fuel can be pushed into as part of the start-up and performance testing. Examples include receipt systems of all types, pump stations where the pump discharge can be directed back to the tank, systems that have been provided with permanent piping as a method of connecting discharge piping back into receipt or return piping (flushing connection at some truck fill stands, etc.). It may be acceptable to allow the Contractor to construct a temporary piping system to convert one of the below systems into a "looped" system that can be flushed back into a storage tank. If so, the piping and fittings should be the same rating and strength as the system being flushed.

b. Relatively short, small volume, large diameter piping systems or parts of systems that do not have fixed storage tanks that fuel can be pushed into as part of the Start-up and Performance Testing. Examples include truck fillstands at Air National Guard bases where the piping is usually 200 mm 8-inch or less in diameter and are typically a few hundred feet long at most.

c. Relatively long, high volume, large diameter piping systems or parts of systems that do not have fixed storage tanks that fuel can be pushed into as part of the start-up and performance testing. Examples include pipelines and marine loading systems.

d. Small diameter piping systems that are within a larger system and it is not desirous to flush them back into an existing, clean system. Examples include thermal relief systems, and long vent and drain lines.

e. Relatively short sections of larger piping that are within a larger system, and it is not desirous to flush them back into an existing, clean system. Example include replacement sections of pipelines.

****

****

NOTE: Adjust the following to account for whether or not water is used for hydrotesting, pigging, or flushing (pier piping only). If water is used in any of these, it must take place before Initial Fuel Receipt into that section of piping. The use of water in hydrotesting and pigging is covered in Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT) and is only mentioned here because of how it affects the timing of the initial fuel receipt.

****

****

NOTE: Delete pigging paragraphs if piping is not piggable.

****

3.1 SEQUENCE OF EVENTS

****

NOTE: Aviation fuel piping and equipment systems require flushing and cleaning. Non-aviation fuel piping and equipment systems require only flushing.

NOTE: Jet Fuel systems where the jet fuel is used as a ground product, and is not used for aircraft or helicopters require only flushing.

NOTE: Filter vessels (such as filter-separators, spin-on filters and micronic filters) and strainers that are designed to be opened for cleaning purpses must be opened and cleaned no matter the product.

****

****

NOTE: Adjust the following to account for whether or not water is used for hydrotesting, or pigging. If water is used in any of these, it must take place before Initial Fuel Receipt into that section of piping.

- The use of water in hydrotesting and pigging is covered in Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT) and is only mentioned here because of how it affects the timing of the initial fuel receipt.

- The use of water in flushing pier piping is required and is covered in this section.

****

The following events take place in the Start-Up and Performance Testing of a system and their definitions:

a. System Start-Up Phase: The System Start-Up phase encompasses all of the events described below up to the Performance Tests Phase.

b. Preliminary Requirements: Confirms completion of the system before fuel is received[including verification of the cleanliness of the existing piping system being connected to].

c. Preparations for Flushing: Activities that take place before initial receipt of fuel.

d. Pneumatic Testing: Test for leaks in a piping system using air under pressure as the test medium. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

[e. Pipe Pigging - Pneumatic: Use of pneumatically propelled foam pigs to confirm that lines are clear and free of debris and obstructions. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT)

][f. Hydrostatic Testing - Water: Use of water to test for leaks in a piping system using liquid under pressure as the test medium. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

][g. Pipe Pigging - Cleaning with Water: Use of water propelled pigs to clean the line of gross contamination. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

][h. Pipe Pigging - Verification with Water: Use of water propelled pigs to inspect the condition of the pipeline. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

][i. Initial Fuel Receipt: The point in time at which fuel is introduced into the system with all that implies for safety, spill prevention and control, and inventory control.

][j. Hydrostatic testing - Fuel: Use of fuel to test for leaks in a piping system using liquid under pressure as the test medium. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

] k. Soak Testing: Perform "Soak Testing" of the piping system using fuel, as per Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT)

[l. Pipe Pigging - Cleaning with Fuel: Use of fuel propelled pigs to clean the line of gross contamination. Perform this as part of the work in Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

][m. Pipe Pigging - Verification with Fuel: Use of fuel propelled pigs to inspect the condition of the pipeline. For requirements see Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

] n. Flushing: In this context, refers to removing gross contamination (free water and solids) from a fuel system using [fuel][water (fuel pier only)].

[o. Cleaning (except filter vessels and strainers): In this context, refers to removing the remaining water and contamination from aviation fuel to the quality (allowable) levels suitable for issuing the final product using fuel as the cleaning medium.

] p. Cleaning (filter vessels and strainers): Filter vessels and strainers that are designed to be opened for cleaning must be opened and cleaned.

q. Control Valve Adjustment: Control valve adjustment so that equipment can be safely tested and adjusted.

r. Equipment Tests: Tests performed by the Contractor [and the System Supplier] to confirm that individual components of the fuel system are correctly installed and are operational.

s. Performance Tests Phase: Government witnessed demonstration of the proper operation of the individual pieces of equipment and the system or systems as a whole.

3.2 PRELIMINARY REQUIREMENTS

****
NOTE: Delete bracketed text if system does not include an Oil/Water Separator.
****

All activities listed in paragraph PART 3 EXECUTION must be performed sequentially in the order they are presented. Prior to any on-site system start-up activities, the Contractor must ensure that all requirements of the paragraph SAFETY are satisfied. Project must be substantially complete, except for touch-up field painting, and Contractor's work area must be free of debris, trash and obstacles.[Correct functioning of oil/water separator(s) must be verified prior to receipt of fuel.] Perform the following activities prior to receipt of fuel:

3.2.1 Safety

Prior to any on-site system start-up activities, the following safety procedures must be accomplished in all fueling areas to be started up and performance tested under this specification section: testing/operation of emergency showers and eyewash stations, placement of Contractor-provided portable eyewash units within 31 meters 100 feet or 10 seconds from the fueling point, verification of proper grounding throughout system, coordination with Government Fire and Safety Office and Fuels personnel, placement of [Contractor-][Government-]provided spill pads[and containment booms], placement of [Contractor-][Government-]provided fire extinguishers capable of extinguishing a fuel fire. Ensure that all radios/devices at all Class I, Division 1 areas are intrinsically safe.

3.2.2 Electrical Preparations

Prior to energizing the electrical system components, verify that short-circuit links have been removed from current transformer and that secondary circuits have been connected. Confirm that all tests required for fire detection and suppression systems have been performed and accepted. Verify all electrical transmitter connections and ensure proper calibration. Verify all electrical system components meet the classification and division as required by the design. Verify correct rotation of all motors prior to testing. Verify paddle type flow switches by physically actuating vanes and checking outputs. Conduit explosion-proof sealoffs must be poured after initial electrical checks but before fuel receipt.

3.2.3 Emergency Fuel Shutoff (EFSO) System Testing

****
NOTE: Modify as required for actual system.
****

Prior to initial fuel receipt, verify that each switch will trip the circuit breaker of the fuel pump[s][and de-energize the EFSO relay and close the [main emergency fuel shut-off valve] [flow control valve of each filter-separator]].

[3.2.4 Storage Tanks

****
NOTE: Delete entire paragraph if project does not include fuel flowing into a tank. All of the features described below may not be needed if project does not include starting up a new tank or modifications to an existing tank.
****

Ensure approved performance of storage tank integrity testing, hydrostatic tests, leak detection system, and coating application/inspection per the applicable specifications. Include verification letter of approved test results for information in the Final Reports. Ensure that tank interior is clean and free of any fuel-contaminating debris. Verify operation of tank level alarms[by closing tank connection valves and filling housings with fuel to confirm action]. Ensure that certified strapping charts for all tanks are available for start-up personnel. [API][STI] tank inspections have been performed per applicable specifications and the reports are on hand prior to commencement with the initial fill and Performance Testing. [Ensure tank cathodic protection inspections are performed per applicable specifications and the cathodic protection reports are on hand prior to initial fill and performance testing.][Verify correct orientation of internal tank inlet diffuser.]

]3.2.5 Piping System

****
NOTE: Modify as required for the system. Ensure a method of assessing the quality of the fuel and that start and end of the piping and/or system to be started up is provided.
****

Ensure that all piping weld integrity, leak detection systems, and coating inspections have been performed per the applicable specifications. Provide statement that required testing has been completed in the Final Reports. Evacuate all accumulated water from piping low point drains, valve cavities, and equipment drains. Verify all bolted connections are tightness tested to required torque using a calibrated torque wrench. Verify that all pressure gauges are properly calibrated, located and installed. Ensure that piping's cathodic protection system is tested, calibrated and operational. [Ensure the cathodic protection inspections are performed per applicable specifications and the cathodic protection reports are on hand prior to initial fill and performance testing.] Ensure that pipe marking and identification are provided as specified. Ensure that piping system thermal relief provisions are installed as designed. Verify the correct installation of piping expansion loops[,

joints,] and supports.

[3.2.5.1 Pier Piping Systems

For pier delivery/receipt systems or other over-water piping installations, ensure compliance with the Contractor's previously approved spill control plans.

][3.2.5.2 [Transfer][Installation][Interterminal] Pipeline Systems

For pipeline systems or any other piping running outside the fuel facility fence, ensure compliance with the Contractor's previously approved spill control plans.

][3.2.6 Existing System Cleanliness Confirmation

Contractor [and System Supplier]must conduct tests to confirm the cleanliness of the existing system before connecting it to the new system or an extension, upgrade or repair of the existing system. Confirm that the fuel in the existing system meets the intra-governmental receipt limits defined in MIL-STD-3004-1. Sampling must be performed by the[Government][Contractor] and testing must be done by[the Service][a DoD regional fuels testing laboratory] [an independent fuel testing laboratory approved by the Contracting Officer].

]3.3 PREPARATIONS FOR FLUSHING

Upon completion of the system to the satisfaction of the Contracting Officer and the Service Headquarters and/or their designated appointee, make the following preparations for flushing the system.

3.3.1 Protection of System Components

The following items must be removed from the system prior to start of flushing operations and, where applicable, replaced with spools of pipe, diameter equal to the item removed.

[a. Control valves. This also includes control valve tubing exterior to the valve such as that which runs from tank level control valves up to tank float pilots.

][b. Sensors which are exposed to the fluid such as pressure gauges and thermometers.

][c. Coalescer and separator elements in filter-separators.

][d. Venturi Tubes and Pressure Indicating Transmitters.

][e. Meters.

] After flushing, the above items must be reinstalled in the system and the spool sections turned over to the Contracting Officer.

3.3.2 Strainers

****

NOTE: Remove temporary strainers unless directed otherwise by Service Headquarters.

NOTE: Use temporary strainers ahead of the pumps only if there are no permanent basket strainers immediately upstream of the pump. Consult with Service Control Point to determine appropriate mesh size.
****

Ensure strainers are clean before flushing. Temporary [7] [40] [60] [100] [_____] mesh strainers with minimum 300 percent open area must be provided in the suction line ahead of each fueling pump [for the entire flushing operation] [to remain permanently in the system].[A temporary strainer should be installed immediately upstream of the product recovery tank overfill valve.] Any damaged permanent or temporary strainers must be replaced by the Contractor at no additional cost to the Government.

3.3.3 Water Draw-off

****
NOTE: Delete reference to returning through filtration if no filtration to return to is available as part of the project and-or if no storage tank is being used to push fuel through as part of the project.
****

Remove any accumulated water from piping,[equipment,][and storage tanks' sumps and bottoms].[Drain water and return fuel via filtration to storage tank.] Repeat process until all water is removed. Dispose of petroleum contaminated water in accordance with Installation, local, State, and Federal regulations.

****
NOTE: All projects involve fuel receipt. Choose either paragraph INITIAL FUEL RECEIPT INTO STORAGE TANK or INITIAL FUEL RECEIPT DIRECTLY INTO PIPING SYSTEM.
****

3.4 INITIAL FUEL RECEIPT INTO STORAGE TANK

3.4.1 General

****
NOTE: Description below is written for a system with piping and systems to be started up that are upstream of the fixed system storage tanks. These systems have their initial fuel receipt through receipt piping, receipt filtration, and then into a storage tank. It covers pipeline receipt and any kind of truck, railcar, ship, or barge offloading system. If the storage tank is existing and not started up as part of this project, and fuel is still pushed into a tank, the process is the same but without a storage tank.

NOTE: Edit as required to suit the actual system.
****

Utilize one storage tank for initial fuel receipt to isolate contaminated

fuel. Initial receipt of fuel must be done by gravity if possible. The Contractor must station personnel throughout piping system at high point vents to bleed air. All flanges and system components will be periodically inspected for leaks during filling procedures.

3.4.2 Storage Tanks

****

NOTE: Delete bracket for horizontal tank or vertical tanks that do not have a floating pan.

NOTE: Delete paragraph for tanks where receipt is by gravity drop from an adjacent or nearby tank truck such as most service stations.

****

Receipt flow rate into an empty storage tank must not exceed 1 m/s 3 feet per second (FPS), as measured in the main receipt piping, until outlet of tank fill tube is submerged[and pan/roof legs are lifted].

3.4.3 Components

****

NOTE: Delete filter-separators and vessels if they are not being filled during this start-up. Delete strainer call-outs if the piping section is so short that using strainers is not possible. To use temporary strainers a flanged connection is normally needed.

NOTE: Provide either a differential pressure gauge or a pressure gauge on either side of the strainer.

****

[Ensure that [filter-separators and other]vessels are filled slowly by closing outlet valves and venting through air eliminators. [Fill filter vessels using slow-fill line][Fill vessels using throttled downstream valves] to maintain a packed condition in vessels throughout initial fill of piping system.]Differential pressure across strainers must be continuously monitored. Any time a strainer differential pressure reaches 138 kPa 20 psig, it must be cleaned.

3.4.4 Fuel Quality

****

NOTE: Provide fuel sample connection to allow for checking fuel quality. This may be difficult in some cases. See the Designer Notes in paragraph PLANS for a discussion of this. A method of checking fuel quality acceptable to the Contracting Officer must be provided.

****

Fuel used during initial receipt must be considered contaminated and must be positively isolated, with blind flanges or closed, padlocked manual valves, from any active transfer, or aircraft fueling or tank truck loading operations. Fuel isolation must continue until all [flushing][flushing and cleaning] is completed. A method of checking fuel quality that is acceptable to the Contracting Officer must be provided at the

beginning and end of any new piping section.

3.4.5 Fuel Receipt

****
NOTE: Choose one of the following and modify as required for the particular project.
****

[3.4.5.1 Fuel Receipt by Pipeline

Start-up personnel must meet with Government personnel in charge of existing fuel storage to discuss fuel transfer procedures. Topics must include: methods of communication to start/stop remote transfer pumps; flow rate and head characteristics of transfer pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be transferred. Contractor must provide a written summary of pipeline receipt procedures to the Contracting Officer.

][3.4.5.2 Fuel Receipt by Commercial Truck

Start-up personnel must meet with Government personnel in charge of existing fuel storage to discuss fuel transfer procedures. Topics must include: methods of communication to start/stop pumps; flow rate and head characteristics of transfer pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be transferred. Coordinate with Government personnel to schedule quantity of trucks required. Contractor's personnel must be positioned at each offloading position, at the pumphouse and at the receipt tank, all in radio contact. Contractor must provide a written summary of truck receipt procedures to the Contracting Officer.[If truck unloading system is newly constructed, perform initial receipt, flushing, and testing prior to performance testing].

][3.4.5.3 Fuel Receipt from Piping System

Start-up personnel must meet with Government personnel in charge of existing fuel storage to discuss fuel transfer procedures. Topics must include: methods of communication to start/stop remote pumps; flow rate and head characteristics of pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be used. Contractor must provide a written summary of piping fill procedures to the Contracting Officer.

][3.4.5.4 Fuel Receipt from Pier

Start-up personnel must meet with Government personnel in charge of existing fuel storage to discuss fuel transfer procedures. Topics must include: methods of communication to start/stop pumps; flow rate and head characteristics of transfer pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be transferred.

Contractor must provide a written summary of pipeline receipt procedures to the Contracting Officer.

]3.4.6 Initial Low Point Flush

Perform an initial low point flush operation by flushing each low point drain through a portable basket strainer for 10 seconds at a system pressure of 207 kPa 30 psig. Repeat flush until basket strainer collects no additional debris.

[3.4.7 Storage Tank Hydrostatic Tests

****
NOTE: Delete if API 650 Aboveground Storage Tanks are not being hydrotested as part of this project.
****

Hydrostatically test the storage tanks per Specification Section 33 56 21.17 SINGLE WALL ABOVE GROUND FIXED ROOF STEEL POL STORAGE TANK. Upon completion of hydrostatic testing, perform "Soak Testing" of the tanks per API RP 1595. Duration of the test must be a minimum of 4 days and maximum of 7 days.

][3.4.8 Storage Tank Tightness Tests

****
NOTE: Delete if Factory Fabricated Storage Tanks are not being tested as part of this project.
****

Perform tightness testing and manufacturer's tests of the storage tanks per Specification Section 33 56 10 FACTORY-FABRICATED FUEL STORAGE TANKS.

][3.4.9 Piping Hydrostatic Tests

****
NOTE: Delete the following if piping is hydrostatically tested with water.
****

Hydrostatically test the piping system with fuel as required by Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

]3.4.10 Piping Soak Tests

****
NOTE: Select the first option if hydrostatically testing with fuel. Select the second option if hydrostatically testing with water.
****

[Upon completion of hydrostatic testing with fuel,][After initial receipt of fuel,] perform "Soak Testing" of the piping systems per API RP 1595. Duration of the test must be a minimum of 4 days and maximum of 7 days.

3.5 INITIAL FUEL RECEIPT DIRECTLY INTO PIPING SYSTEM

3.5.1 General

****

NOTE: Description below is written for a system where the project does not involve one of the fixed storage tanks to push product into.

NOTE: Edit as required to suit the actual system.
****

Initial receipt of fuel must be done by gravity if possible. The Contractor must station personnel throughout piping system at high point vents to bleed air. All flanges and system components will be periodically inspected for leaks during filling procedures.

3.5.2 Components

****
NOTE: Delete filter-separators and vessels if they are not being filled during this start-up. Delete strainer call-outs if the piping section is so short that using strainers is not possible. To use temporary strainers a flanged connection is normally needed.
****

[Ensure that [filter-separators and other]vessels are filled slowly by closing outlet valves and venting through air eliminators. Downstream valves must be throttled to maintain a packed condition in vessels throughout initial fill of piping system.]Differential pressure across strainers must be continuously monitored. Any time a strainer DP reaches 138 kPa 20 psig, it must be cleaned.

[3.5.3 Fuel Quality

****
NOTE: Provide fuel sample connection to allow for checking fuel quality. This may be difficult in some cases. See the Designer Notes in the paragraph PLANS for a discussion of this. A method of checking fuel quality acceptable to the Contracting Officer must be provided.
****

Fuel used during initial receipt must be considered contaminated and must be positively isolated, with blind flanges or closed, padlocked manual valves, from any active transfer, or aircraft fueling or truck loading operations. Fuel isolation must continue until all [flushing][flushing and cleaning]is completed. A method of checking fuel quality that is acceptable to the Contracting Officer must be provided at the beginning and end of any new piping section.

]3.5.4 Fuel Receipt

****
NOTE: Choose one of the following and modify as required for the particular project. If there is another method of receiving fuel, add it and modify accordingly.
****

[3.5.4.1 Fuel Receipt from Existing Piping System

Start-up personnel must meet with Government personnel in charge of existing fuel system to discuss fuel transfer procedures. Topics must include: methods of communication to start/stop remote pumps; flow rate and head characteristics of pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be used. Contractor must provide a written summary of piping fill procedures to the Contracting Officer.

][3.5.4.2 Fuel Receipt from Pier

Start-up personnel must meet with Government personnel in charge of existing fuel storage to discuss fuel transfer procedures. Include barge or tanker operator(s) in this meeting. Topics must include: methods of communication to start/stop pumps; flow rate and head characteristics of transfer pumps; methods of restricting initial receipt flow rate; methods of straining and filtering initial receipt fuel; accommodating multiple pump starts resulting from required strainer and filter cleaning operations; required quantity of fuel to be transferred. Contractor must provide a written summary of pipeline receipt procedures to the Contracting Officer.

]3.5.5 Initial Low Point Flush

****

NOTE: If the system cannot generate 207 kPa 30 psig (such as a gravity system), use the highest pressure possible. 207 kPa 30 psig is the desired minimum pressure.

****

Perform an initial low point flush operation by flushing each low point drain through a portable basket strainer for 10 seconds at a minimum system pressure of [200 kPa 30 psig]. Repeat flush until basket strainer collects no additional debris.

[3.5.6 Piping Hydrostatic Tests

Hydrostatically test the piping system with fuel as required by Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).

]3.5.7 Piping Soak Tests

****

NOTE: Select the first option if hydrostatically testing with fuel. Select the second option if hydrostatically testing with water

****

[Upon completion of hydrostatic testing with fuel,][After initial receipt of fuel,] perform "Soak Testing" of the piping systems per API RP 1595. Duration of the test must be a minimum of 4 days and maximum of 7 days.

3.6 FLUSHING

****

NOTE: Delete and add names of piping segements and systems as needed.

NOTE: Flushing must be using fuel except for pier piping, which must be flushed with fresh water.
****

Flushing procedures remove gross particulate and water contaminants[and must precede cleaning procedures]. All piping including but not limited to[receipt piping,][issue piping,][transfer piping,][pump house piping,][supply and return lines to the storage tanks,][product recovery lines,][truck off-loading lines,][truck loading lines,][railcar off-loading lines,][railcar loading lines,][installation pipelines,][interterminal pipelines,][thermal relief piping,][high point vents,][low point drains,][control valve tubing on the control valves,][control valve tubing exterior of the control valves,][_____] must be flushed with fuel.[Pier piping must be flushed with water.]

In the event flushing identifies the presence of clay or soil like material in the system, Contractor must immediately notify Contracting Officer for direction.

3.6.1 Flushing Requirements

****
NOTE: Select bracketed text based on available pumping capacity. Require temporary pumps only after A/E feasibility review; if used, provide detailed work sequence/limitations on contract documents.

Select volume of flush based on practicality. For systems that are not looped, the system must either be flushed into a tank truck, or a portable tank, or into another storage tank at the end of the line in the case of an installation or interterminal pipeline. For very large piping systems, dozens of over the road tank trucks may be necessary to flush a single pipeline volume. Consider as well where the flushed fuel will have to go to be cleaned and re-used again and whose equipment may have to be used to slean the fuel up. Contact the Service Headquarters for guidance.
****

Begin flushing of fuel system piping at low flow rates using [one pump in multiple pump systems][a throttled pump in single pump systems (using the downstream isolation valve to throttle the pump)] at [_____] percent of rated flow. Slowly increase flushing flow rate [until a plus or minus 3.5 m/s 12 FPS fuel velocity is achieved][to full flow capacity of [_____] lps gpm]. Flush for [a minimum of 30 minutes] [four piping volumes][one piping volume][_____]. [For gravity, suction, or other non-pumped piping segments, minimum flushing volume must be [four][_____] times the pipe volume.] Sampling must be performed by the[Government][Contractor] and testing must be done by[the Service][a DoD regional fuels testing laboratory] [an independent fuels testing laboratory approved by the Contracting Officer]. Fuel must be free of gross contamination and visible free water to the satisfaction of the Contracting Officer.

In the event flushing identifies the presence of clay or soil like material in the system, Contractor must immediately notify Contracting Officer for direction.

3.6.2 Fueling System Piping

During flushing procedure periodically bleed air through high point vent and drain water through low point drains.

****

NOTE: For many projects that only involve replacing piping the above paragraph alone may prove sufficient. For others, select one or more of the following paragraphs.

****

[3.6.2.1 General Fuel Lines

The flushing of all of the system piping segments must be accomplished by pumping fuel through the fueling system piping and [back into the same tank the fuel was withdrawn from][back to another tank in the fuel farm][into Over-the road (OTR) tank trucks][into refueler tank trucks][into temporary tankage][into an existing tank][_____].[After high-speed flush of main system piping, all piping laterals to fuel dispensing points must be flushed with at least [18,930 L 5000 gallons for 200mm 8-inch piping and smaller] [three pipe volumes] with fuel.] Air must be bled from system high points. The procedure must be continued until the fuel being delivered [into the tanks] [into OTR tank trucks][into temporary tanks][into [_____]] is acceptable to the Contracting Officer. After the piping system segments have been flushed to the satisfaction of the Contracting Officer (and periodically during the flushing operation), the Contractor must flush all high point vents and low point drains for a minimum of 10 seconds at a pressure of 207 kPa 30 psig.[Remove any accumulated water from tank sumps and bottoms by means of the Water Draw-off systems.] Flush all plug valves of debris using the drain port at the bottom of the valve. Cone strainers must be kept clean in order to insure maximum flow rate. All accumulated material from the strainers must be reviewed and identified, including source if possible. Upon completion of the first flushing operations, the cone strainers must be [removed from the system.][cleaned, reinstalled, and remain in the system.] In addition, baskets from all strainers must be removed and cleaned.

][3.6.2.2 [Receipt Pipeline][Transfer Line]

Flushing of the [receipt pipeline][transfer line] must occur during the initial receipt/filling operations. Samples of the incoming fuel must be taken at the point of connection with the upstream and downstream systems at the start and the end of the flushing and every [_____] minutes in between the two. These samples must be tested by the designated government agency and turned over to the Contracting Officer.

][3.6.2.3 Truck Offloading System Piping

Flushing of the truck offloading system and piping must occur during the receipt operations. Samples of the incoming fuel must be taken at the point of connection with the OTR tank truck. Sample the fuel into and out of each offloading station.

][3.6.2.4 Rail-Car Offloading System Piping

Flushing of the rail-car offloading system and piping must occur during the receipt operations. Samples of the incoming fuel must be taken at the point of connection with the rail car. Sample the fuel into and out of each offloading station.

][3.6.2.5 [Pump House][Pump Pad][Pump Shelter] Piping

****
NOTE: Create a procedure based on the system's actual characteristcs.
****

Remove system components as specified in paragraph PROTECTION OF SYSTEM COMPONENTS. Perform the following flushing operations by withdrawing fuel from one tank and [returning it to another tank][pumping it to Contractor-furnished tankage][pumping it to Contractor-furnished over-the-road tank trucks]. [Circulate][Transfer] a sufficient amount of fuel for each operation. Bleed air from high points.

a. Position manual valves to circulate fuel through one pump, filter-separator combination.

[b. Provide a temporary connection between each truck fillstand nozzle and its associated return line connection single point receptacle. Position manual valves to circulate fuel through the nozzle and back to the tanks, upstream of the receipt filter-separators. Flush each fillstand using one fueling pump.

][c. Position manual valves to circulate fuel through the bypass line. Flush this line using two fueling pumps.

]][3.6.2.6 [Interterminal Pipeline][Installation Pipeline]

Samples of the incoming fuel must be taken at the point of connection with the upstream and downstream systems at the start and the end of the flushing and every [_____] minutes between the two. These samples must be tested by the designated government agency and turned over to the Contracting Officer.

][3.6.2.7 Truck Fillstand Piping

****
NOTE: Delete this paragraph if fillstand piping can be looped back into permanent piping without going through an over-the-road tank truck.
****

Position an over-the-road tank truck at each fillstand position and flush each fillstand lateral into the tank truck. Sample the fuel at the connection to the truck.

][3.6.2.8 Rail-Car Loading System Piping

****
NOTE: Delete this paragraph if piping can be looped back into permanent piping without going through an over-the-road tank truck or a rail car.

****

Position an [OTR tank truck][rail car] at each position and flush each fillstand lateral into the [tank truck][rail car]. Sample the fuel at the connection to the [truck][rail car].

][3.6.2.9 Product Recovery Tank Lines

During the flushing of pumphouse piping, operate all manual drain lines individually to flush their connection to the product recovery tank. Fill the tank a minimum three times, each time utilizing [the fuel transfer][tank drain pump][vacuum truck][[_____] pump] to drain it by returning the fuel to storage.

****

NOTE: Amount of line changes will vary. It should be at least 10.

****

][3.6.2.10 [High Point Vent Lines][Low Point Drain Lines][Thermal Relief Piping][Instrumentation Piping and Tubing]

During the flushing of pumphouse piping, operate valves and connections on all lines individually to flush their connection to a tank. Put at least [25] [_____] times the volume of the line through each line.

][3.6.2.11 Pier Piping

****

NOTE: Modify to suit project-specific facilities/water availability at pier.

****

Pier piping and loading arms should be hydrostatically tested with fresh water per the requirements of Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT). After testing, flush piping with fresh water at 3.5 m/s 12 FPS for 30 minutes. [The Contractor will be allowed to use Government-furnished hoses.]Drain all water from piping system and refill with product. Perform flushing with product at 3.5 m/s 12 FPS for [30 minutes][_____]. [Government barges/equipment may be used to facilitate system flushing.]At end of testing, drain pier piping of water.

]3.6.3 Piping Flushing Checklist

The Contractor must generate a comprehensive matrix of all new[and existing] piping sections in the system. Matrix must serve as an Owner's piping inventory and a checklist for all Contractor-provided flushing operations. Column entries must include pipe section name, location, diameter, approximate length, flushing fuel velocity and volume achieved and acceptable results of sampling.

****

NOTE: Delete cleaning if system is not for aviation fuel.

****

3.7 CLEANING

****

NOTE: This paragraph will most often be used for systems that issue aviation fuel to refueler trucks. Include this paragraph for any system with filter-separators. Delete this paragraph if system is for ground products. Delete this paragraph for aviation jet fuel systems if the system being cleaned is bulk fuel handling farm, a marine loading and offloading operation, or an Interterminal or Installation pipeline without filter-separators.

Cleaning will always take place with fuel. Do not clean with water.

****

After initial flushing is completed, clean each piping segment with product in accordance with the procedure specified hereafter. Isolate Tanks from the system and clean them as specified in Section 33 01 50.55 CLEANING OF PETROLEUM STORAGE TANKS.

In the event cleaning identifies the presence of clay or soil like material in the system, Contractor must immediately notify Contracting Officer.

3.7.1 Preparation for Cleaning

****

NOTE: When two tanks are being used for this project, the Contracting Officer may want to allow the contractor to transfer fuel from a "dirty tank" to a "clean tank" through filtration in order to clean the "dirty fuel" of its water and/or solids contamination.

****

[Filter elements must be installed in the filter-separators. Adjust filter-separator flow control valve.]Valves and system components removed for flushing must be reinstalled. Tanks must be drained, vapor freed and cleaned.[Transfer the contents from one tank to the other for the purposes of cleaning where possible.]

3.7.2 Cleaning Requirements

****

NOTE: Select independent or DOD fuels laboratory, include in MOU.

****

Cleaning must continue until the Contracting Officer certifies that the fuel meets the intra-governmental receipt limits as defined in MIL-STD-3004-1. Sampling must be performed by the[Government][Contractor] and testing must be done by[the Service][a DoD regional fuels testing laboratory][an independent testing laboratory approved by the Contracting Officer].[Also take samples at truck fillstands.]

3.7.3 Cleaning Procedure

During cleaning procedure periodically bleed air through high point vent and drain water through low point drains.

****
NOTE: For many projects that only involve replacing piping this paragraph alone may prove sufficient. This paragraph covers piping that is not part of a looped system. For others, select one or more of the following paragraphs in addition to this one.
****

3.7.3.1 General Fuel Lines

General fuel lines must be cleaned as follows:

a. Position manual valves to circulate fuel through the piping and into [the receiving tank] [temporary tanks] [over the road tank trucks] [refueler tank trucks] [_____] at the discharge end [through the receiving filter-separators].

****
NOTE: The flowrates are nominal and must be adjusted to suit the individual system. It may be necessary to provide temporary filtration to achieve the desired goals although that is very seldom done and may prove prohibitively expensive.
****

b. Initially pump fuel at a flow rate of [38 lps 600 gpm] [_____] lps gpm, then increase flow rate up to the same velocity the line was flushed at using as many pumps and filter/separators as required, starting manually one pump at a time.[When pumping at a rate greater than [76 lps 1200 gpm] [_____] lps gpm, by-pass receiving filter-separators].

c. Monitor pressure drop through the filter-separators during the cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

d. Periodically take samples from all sample connections. Continue cleaning until the fuel meets specified requirements of paragraph CLEANING REQUIREMENTS.

[3.7.3.2 [Receipt Pipeline][Transfer Line][Rail Car Offloading Line][Truck Off-Loading Line]

Continue to receive fuel until the fuel samples taken at the tanks meet the requirements of paragraph CLEANING REQUIREMENTS above.

][3.7.3.3 [Pump House][Pump Pad][Pump Shelter] Piping

Piping must be cleaned as follows:

a. Position manual valves so that fuel is withdrawn from one tank, circulated through one fueling pump and issue filter-separator, then returned to the tank through the receiving filter-separators.

b. Clean the piping system using one pump at a time. Alternate the

fueling pumps and filter-separators during the operation to clean the individual fueling pump suction and discharge lines.

c. Monitor pressure drop through the filter-separators during each cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

d. Periodically take samples from all sample connections. Cleaning must continue until the fuel meets the specified requirements.

][3.7.3.4 Truck Fillstands with a Return Line

Piping must be cleaned as follows:

a. Provide a temporary connection between the truck fillstand connection and the return line. Position valves to circulate fuel through the fill line and back to the return line. Clean each position using two fueling pumps, two issue filter separators and two return filter separators.

b. Monitor pressure drop through the filter-separators during each cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

c. Periodically take samples from all sample connections. Cleaning must continue until the fuel meets the specified requirements.

][3.7.3.5 [Truck Fillstands][Rail Car Loading Positions] without a Return Line

Piping must be cleaned as follows:

a. Position a [OTR tank truck][refueler truck][rail car] at the [fillstands][railcar loading position] and clean each one, one at a time. Clean the lines using two fueling pumps, two issue filter separators and two return filter separators.

b. Monitor pressure drop through the filter-separators during each cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

c. Periodically take samples from all sample connections. Cleaning must continue until the fuel meets the specified requirements.

][3.7.3.6 [Interterminal Pipeline][Installation Pipeline]

Pipelines must be cleaned as follows:

a. Position manual valves to circulate fuel through the piping and into [the receiving tank] [temporary tanks] [over the road tank trucks] [refueler tank trucks] [_____] at the discharge end[through the receiving filter-separators.]

****

NOTE: Delete if piping is not piggable. In some cases of a line designed to be piggable, the pig launcher and receiver is not permanently installed and the specifications will need to be written to indicate the contractor will need to provide

temporary units.
****

[a. First clean the pipe using pigs as called out in paragraph PIPE PIGGING-VERIFICATION, Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT). During this, low point drains and high point vents must be blown clean. Monitor pressure drop through the filter-separators during the cleaning operation.

][b. Inspect the pipe as called out in paragraph PIPE PIGGING - VERIFICATION, Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).
]

****
NOTE: The flowrates are nominal and must be adjusted to suit the individual system. It may be necessary to provide temporary filtration to achieve the desired goals although that is very seldom done and may prove prohibitively expensive.
****

c. Initially pump fuel at a flow rate of [38 lps 600 gpm] [_____] lps gpm, then increase flow rate up to the full capacity (all pumps running) starting manually one pump at a time. When pumping at a rate greater than [76 lps 1200 gpm] [_____] lps gpm, by-pass receiving filter-separators.

d. Monitor pressure drop through the filter-separators during the cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

[e. Periodically take samples from all sample connections. Continue cleaning until the fuel meets specified requirements of paragraph CLEANING REQUIREMENTS.

]][3.7.3.7 Looped Piping

****
NOTE: If piping is permanently looped consider using SECTION 33 08 53 AVIATION FUEL DISTRIBUTION SYSTEM START-UP. Delete this paragraph if the piping is not permanently looped or if the decision is made that it must not be temporarily looped.
****

Loop piping must be cleaned as follows:

a. Position manual valves to circulate fuel out the issue line and back to the tank through the return line and through the receiving filter-separators.

****
NOTE: Delete if piping is not piggable In some cases if a line designed to be piggable, the pig launcher and receiver is not permanently installed and the specifications will need to be written to indicate the contractor will need to provide temporary units.
****

[b. First clean the pipe using pigs as called out in paragraph PIPE PIGGING-VERIFICATION, Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT). During this, low point drains and high point vents must be blown clean. Monitor pressure drop through the filter-separators during the cleaning operation.

][c. Inspect the pipe as called out in paragraph PIPE PIGGING - VERIFICATION, Section 33 52 40 FUEL SYSTEMS PIPING (NON-HYDRANT).
]

****

NOTE: The flowrates are nominal and must be adjusted to suit the individual system.

****

d. Initially pump fuel through the loop at a flow rate of [38 lps 600 gpm] [_____] lps gpm, then increase flow rate up to the full capacity (all pumps running) starting manually one pump at a time. When pumping at a rate greater than [76 lps 1200 gpm] [_____] lps gpm, by-pass receiving filter-separators.

e. Monitor pressure drop through the filter-separators during the cleaning operation and provide flow vs. pressure drop graphs as specified herein before.

[f. Periodically take samples from all sample connections. Continue cleaning until the fuel meets specified requirements of paragraph CLEANING REQUIREMENTS.

]][3.7.3.8 [Product Recovery Tank Lines][High Point Vent Lines][Low Point Drain Lines][Thermal Relief Piping][Instrumentation Piping and Tubing]

Repeat the process described under initial flushing until samples taken at the end of the piping meet the requirements.

]3.7.4 Piping Cleaning Checklist

The Contractor must generate a comprehensive matrix of all new[and existing] piping sections in the system. Matrix must serve as an Owner's piping inventory and a checklist for all Contractor-provided cleaning operations. Column entries must include pipe section name, location, diameter, approximate length, cleaning fuel velocity and volume achieved and acceptable results of sampling.

3.8 CONTROL VALVE ADJUSTMENT

Check all control valve settings and field adjust from the factory settings at System Start-Up as necessary to provide a smooth operation, devoid of pressure surges, spikes, and hunting. Check the [filter separator control valves][and][fueling pump non-surge check valve] and adjust as follows:

[3.8.1 Rate of Flow Control Feature on Fueling Pump Non-Surge Check Valve

Run one pump at a time and adjust rate of flow feature at nominal rated flow.

][3.8.2 Control Valves on Issue Filter-Separator Downstream Side

a. Position valves so that one fueling pump can pump through only one

filter-separator. Close the valve at the entrance of the apron loop, and open the bypass valve, allowing discharge into the circulating line.

b. Start the pump and adjust the filter-separator control valve for the rated flow capacity of the filter-separator at nominal rated flow.

c. Repeat above for each remaining filter-separator.

]3.9 EQUIPMENT TESTS

****
NOTE: Designer to edit Equipment Tests (Attachment 1) for this project and provide to the Contractor.
****

After completion of flushing,[cleaning,][and control valve and electrical components adjusting operations], [Contractor][System Supplier] must complete and submit the Equipment Tests (see Attachment 1 - Equipment Tests). Equipment Tests must be submitted prior to Performance Testing [(Government approval not required prior to Performance Testing.)]

****
NOTE: Select from the following all those that apply. The only one that must be in every project is the Emergency Shutdown testing.
****

[3.9.1 Control System and Control Valves

Field adjustment of [automatic control valves][and][automatic pump controls] while in operation must be made only by the valve manufacturer's authorized field test engineer. [For final adjustment of installed electrical control equipment provide an experienced electrical engineer, factory representative of pump control panel manufacturer][and][factory representative of [pressure indicating transmitter (PIT) manufacturer]] [and] [differential pressure transmitter (DPT) manufacturer]. Both the mechanical and electrical components must be adjusted concurrently. Record required data necessary to prepare Equipment Tests Report.

][3.9.2 Tank Level Alarms

****
NOTE: Modify to suit adjustments for tanks in this project, if any. The critical level alarms in the tanks are the ones that that stop the fueling pumps (Low or Low-Level) as they protect the pumps from running dry at startup, and the ones that act to keep the tank from overflowing (High or High Level).
****

Position valves to transfer fuel between tanks.

Start fueling pump and pump sufficient fuel out of the first tank to allow the [low][low-low]level alarm [(LLA)][(LLLA)] to stop the fueling pump. Repeat procedure for each fueling pump and each tank until the [low][low-low]level alarm [(HLA)][(HHLA)] [stops the fueling pumps][sounds an alarm][closes the valve] due to low liquid level in tank.

Repeat testing for [high] [high-high] level alarm other alarms checking each one in turn. Repeat procedure for each fueling pump and each tank until the [high][high-high]level alarm [(HLA)][(HHLA)] [stops the fueling pumps][sounds an alarm][closes the valve] due to high liquid level in tank.

][3.9.3 Fuel Delivery with Loading Control Valve

****

NOTE: Select loading control valve size and verify flow rate with Service Headquarters and/or their designated appointee. Coordinate the flowrate with the control system setpoints.

****

Deliver fuel to each fueling point with a Loading Control Valve against a backpressure at the outlet of the control valve created by the [tank trucks and hoses][tank trucks and pantograph][_____] used during the tests. The flow rate must not be less than [_____] gallons per minute. Flow rates might be affected by the vehicle's being loaded capability.

][3.9.4 Fuel Delivery w/o Loading Control Valve

****

NOTE: Select valve size and verify flow rate with Service Headquarters and/or their designated appointee. Coordinate the flowrate with the control system setpoints.

****

Deliver fuel to each fueling point without a Loading Control Valve against a backpressure at the outlet set by modulating a manual downstream valve. The flow rate must not be less than [_____] gallons per minute. Flow rates might be affected by vehicle's being loaded capability. Ensure that the Loading Control Valve is tested per 33 52 43.14 AVIATION FUEL CONTROL VALVES.

][3.9.5 Fueling Pump Operation

Demonstrate operation of all [pressure and flow devices][pump control start/stop station] to start and stop the fueling pumps[at the indicated pressure and flow rates] in the presence of the Contracting Officer. Repeat the operating sequence with each of the pumps being selected as lead pump if the pumps are controlled by a Pump Control Panel or an automatic control system with a variable lead pump. For this test, measure the flow rates. Witness and record flow rates and test results.

]3.9.6 Emergency Shutdown

****

NOTE: Should be present in every project as it is either being worked on as part of the project, and/or its proper functioning is necessary to shut down the system during start-up and performance testing operations.

****

With one fueling pump circulating fuel through the system, test each "Emergency Stop" pushbutton station to verify that the pump stops [and the

emergency shutoff solenoid activates and the control valve closes]. Repeat above procedure for each fueling pump and "Emergency Stop" pushbutton station. Conduct tests for both the automatic and manual modes. With all the fueling pumps circulating fuel through the system, push an "Emergency Stop" pushbutton station.

[3.9.7 Loading Control Valves

****
NOTE: Delete if no Loading Control Valves are provided.
****

Each Loading Control Valve must be operated to demonstrate the following:

[3.9.7.1 Surge Shut-Down Capability

Surge from shut-off of a downstream valve can be simulated by closing a quick turn valve downstream of the control valve, use a 3 second closure.

][3.9.7.2 Pressure Control at Setpoint Plus 15 kPa 2 psi

Requires use of a pressure gage downstream of the control valve.

]][3.9.8 Filter-Separator Float Control Valves with Manual Tester

Using the manual float control test level on each Filter-Separator, lift the weight from the float ball slowly and observe the operation and closure of the water slug shut-off feature on the Filter-Separator Control Valve.

][3.9.9 Overfill Valve

****
NOTE: Delete if no Overfill Valve.
****

Place fuel transfer pump in the "off" position. Delivery quantity of fuel to Product Recovery Tank to demonstrate capability of valve to close. Empty the tank pump to demonstrate capability of valve to open when fuel level drops below set point.

]3.10 PERFORMANCE TESTS

Performance testing must occur after the Contractor has performed the Equipment Tests. Performance testing must demonstrate to the satisfaction of the Contracting Officer and Service Headquarters and/or their designated appointee these portions of the fueling system are working as specified. Performance testing must consist of repeating the Equipment Tests (indicated in previous paragraphs) and operating the fueling system during actual operations in the presence of Government Witnesses. The maximum rated capacity of the system must be demonstrated. The Contractor must notify the Contracting Officer [30] [45] [60] [_____] calendar days in advance of the test to permit arrangement for the use of Government-furnished items. During the time period of performance testing, no construction activities will be allowed on the project site. The project site must be considered an operational (fuel) zone (verses a construction zone) during this performance testing period. Personnel, dressed for fuel's operation, will be present to witness testing and

participate in Contractor provided training.

****
NOTE: Choose as many below as applicable to the project. Add ones not on the list.
****

3.10.1 Final Performance Test

A final performance test must consist of demonstrating the operation of the system for the purpose for which it is intended:

[a. loading refueler trucks
][b. loading over the road tank trucks
][c. loading rail cars
][d. loading marine vessels
][e. off-loading over the road tank trucks
][f. off-loading rail cars
][g. off-loading marine vessels
][h. transferring fuel through the[pipeline][piping system]
][i. loading motive fuel into vehicles

]3.10.2 Satisfactory Performance

In the event a portion of the system or any piece of equipment fails to meet the test, make the necessary repairs or adjustments and repeat the Performance Test until satisfactory performance is obtained. The determination of satisfactory performance must be made by the Contracting Officer and the Service Headquarters and/or their designated appointee.

3.10.3 Performance Testing Plan

****
NOTE: Designer to edit Performance Testing Plan (Attachment 2) for this project and provide to the Contractor.
****

[Contractor][System Supplier] must edit the example Performance Testing plan and submit for approval. An example Performance Testing plan can be found at the end of this Section as Attachment 2 - Performance Testing Plan. Submit plan a minimum of [60] [180][_____] days prior to performance testing.

[3.10.4 Equipment Tests

[Contractor][System Supplier] must provide [10 hard copies][and][electronic copies] of the completed Equipment Tests to the Service Headquarters and/or their designated appointee at the start of Performance Testing for validation during Performance Testing.

][3.10.5 Control Valve Tagging

After the performance testing and system acceptance, tag the control valves with their final adjustments.

]3.10.6 Final Acceptance

Fill the system with fuel and operate leak-free prior for acceptance.

Anything wet with fuel is considered to be leaking.

[3.10.6.1 Tank High Liquid Level Shut-Off Valve Test and Adjustments

During the final filling of tanks, check the tank automatic high liquid level shut-off valve for proper functioning at least three times by lowering the fuel level and refilling again. Adjust valve to achieve a safe fill level.

][3.10.6.2 Tank Level Indicator Adjustments

Also, during the final filling of tanks, adjust and calibrate the tank level indicators including the final setting of the high high level (HHLA) and high level (HLA) alarms. Since the HHLA is at a point higher than the High Liquid Level Shut-Off Valve float set point, an artificial method of simulating HHL must be used.

][3.10.6.3 Water Draw-Off System Test

During the performance testing, fill Water Draw-off Systems from tank sump to ensure proper operation. After filling system, allow time for fuel/water mixture to separate. Verify liquid separation through system's sight glasses. Proper operation includes capability to drain separated water and capability to pump separated fuel back to a full tank.

] -- End of Section --