

SECTION 15899

SYSTEM START-UP, FUELING SYSTEM

(Omaha Update 11/98)

(Waiver to Use MilStds and MilSpecs in Air Force Fuel Projects,
HQ AFCESA/CESM (01/29/96))

ATTACHMENTS: Checklist for Equipment Test

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PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section \=01330=\ SUBMITTAL PROCEDURES:

SD-01 Data\

System Start-up Plan\; *GA*\.

The Contractor shall submit a detailed written plan prepared by the system supplier for implementation of system start-up. The plan shall be submitted for Government approval [__] days prior to system start-up. The plan shall include a list of personnel by trade, list of key personnel, safety equipment, list of miscellaneous equipment such as two-way radios personnel transportation vehicles etc. and detailed procedures and schedules. The Contractor and system supplier shall be responsible for implementing system start-up in coordination with ongoing base operations.

Certification of Entire System\; *FIO*\.

Prior to the acceptance of the newly constructed system by the Government, all installed mechanical and electrical equipment shall be inspected and approved by the Contracting Officer. The Contractor shall give the Contracting Officer [__] days notice in order to schedule the [Command Fuel Facilities Engineer and the Command Fuels Management Officer (who will act only as a technical consultants to the Contracting Officer and shall not have any contract authority)] [Government representatives] for participation in the inspection and equipment tests and final acceptance procedures and approval. Any deficiencies observed shall be corrected by the Contractor without cost to the Government.

NOTE: INSERT NUMBER OF DAYS NOTICE. USE THE COMMAND FUEL FACILITIES ENGINEER ON NAVFACENCOM PROJECTS. ON C.O.E. PROJECTS, SELECT GOVERNMENT REPRESENTATIVES AND INCLUDE IN MOU SPECIFIC AIR FORCE REPRESENTATIVES TO BE NOTIFIED WHEN DATES ARE SUBMITTED TO CONTRACTING OFFICER.

SD-09 Reports\

Test Reports\; *FIO*\.

Submit written test reports to the Contracting Officer prior to the final acceptance procedure. Information reported shall include:

- a. Elapsed operating time.
- b. Tank liquid level readings.
- c. System flow rate and meter readings.
- d. System pressure gage readings.
- e. Number identification of pumps running.
- f. Pump RPM, amperage, and voltage.
- g. Condition of fuel samples.
- h. Hydrant control valve performance (including flow rate and pressure) during emergency shutoff, downstream valve closure, and relief operation.

Final Reports\; *FIO*\.

A final report shall be submitted which will include the final settings of the valves and switches and a copy of the strip chart graphs with an explanation of what the graph indicates and what the system is doing.

PART 2 PRODUCTS

2.1 DESIGN CONDITIONS

Temporary flushing lines and equipment shall be equal in strength, stability, and materials to the associated permanent components. However, spools may be carbon steel. Additional design conditions shall be as specified in Section \=15050=\ MECHANICAL EQUIPMENT, FUELING.

2.2 SOURCES OF MATERIAL AND EQUIPMENT

2.2.1 Material and Equipment

The Contractor shall provide material, equipment and labor not specified to be Government-furnished and required for proper start-up of the system. Equipment shall include but not be limited to the following:

- a. Temporary strainers.
- b. Pipe spools.
- c. Flow meters.
- d. Pressure gages.
- e. Electronic sensors and seven channel strip recorders for pressure and flow recording. This equipment shall be used to monitor and record the system during the "Equipment Test" and "Performance Testing" portions of this Specification Section. Recorded data shall be used by the Contractor and equipment factory representatives to achieve final control valve and equipment adjustments. Recorded data shall include:

- (1) Fueling pumps discharge pressures.
- (2) Supply Venturi flow rates.
- (3) Hydrant Control Valve pressures.
- (4) Back Pressure Control Valve upstream pressures.
- (5) Back Pressure Control Valve downstream pressures.
- (6) Return Venturi flow rates.

f. The Contractor must have on hand sufficient filter elements and coalescer cartridges to adequately clean the system. During cleaning operation, Contractor shall provide a flow versus pressure drop graph for

each filter separator. Graph format shall be as shown at end of this Section. Contractor shall change coalescers and cartridges upon reaching a differential pressure of 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 (600 GPM). A minimum of one complete set of coalescer elements and separator cartridges for each filter separator shall be turned over to the Government after new coalescer elements and separator cartridges are installed in each filter separator vessel after completion of acceptance testing.

2.2.2 Government-Furnished Material and Equipment

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

2.2.2.1 Aircraft Turbine Fuel

The Government will provide the fuel necessary for system testing. The Contractor shall notify the Contracting Officer a minimum of sixty(60) days in advance of the requirements. Additional fuel will be provided by the Government as required for satisfactory flushing of the system. Upon satisfactory completion of the flushing and cleaning operations, the Government will supply the additional quantities of fuel required to complete the other work under this section. 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 operating 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 equipment. Fuel delivered to the system shall remain the property of the Government and the Contractor shall reimburse the Government for shortages not attributable to normal handling losses. The Government shall be reimbursed for fuel lost as a result of defective materials or workmanship. An empty Operating Tank shall never be filled at a velocity greater than 3-feet per second in the fill line until fuel is 3-feet above the fill nozzle.

2.2.2.2 Tank Trucks

Refueler tank trucks and operation of same will be furnished by the Government.

2.2.2.3 Hydrant Hose Trucks

The Government will furnish and operate the hydrant hose trucks required for ground refueling and defueling of aircraft at hydrant pits.

2.2.2.4 Utilities

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

2.2.2.5 Defuel Cart

The Government will provide a defuel cart for the defueling operation on systems using pantographs for these fueling and defueling operations.

NOTE: SELECT DEFUEL CART FOR SYSTEMS USING HYDRAULIC PANTOGRAPHS.

2.2.2.6 Pantographs

The Government will provide and operate pantographs for systems not providing enough pantographs to accomplish the full flow startup.

PART 3 EXECUTION

3.1 PREPARATIONS FOR FLUSHING

Upon completion of the system to the satisfaction of the [Contracting Officer and the Command Fuel Facilities Engineer] [Contracting Officer], the Contractor shall make the following preparations for flushing the system.

NOTE: SELECT CONTRACTING OFFICER AND THE COMMAND FUEL FACILITIES ENGINEER ON NAVFACENCOM PROJECTS. ON C.O.E. PROJECTS, SELECT CONTRACTING OFFICER AND INCLUDE IN MOU SPECIFIC AIR FORCE REPRESENTATIVES TO BE NOTIFIED WHEN DATES ARE SUBMITTED TO CONTRACTING OFFICER.

3.1.1 Protection of Equipment

The following items shall 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, including hydrant pit control valves if flushing outlets into tank trucks.
- b. Sensors which are exposed to the fluid.
- c. Coalescer and separator elements in filter separators.
- d. Venturi Tubes and Pressure Indicating Transmitters.
- e. Meter.

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

3.1.2 Strainers

Temporary 40 mesh cone type strainers shall be installed in the suction line ahead of each fueling pump for first pass only. Any damaged strainers shall be replaced by the Contractor at no additional cost to the Government.

3.1.3 Water Draw-off

Remove any accumulated water from Operating Tanks' sumps and bottoms.

3.2 FLUSHING

Flushing procedures shall precede cleaning procedures. The transfer line, pump house piping, apron loop, supply and return lines to the operating tanks, hydrant laterals, product recovery lines and [pantographs] [hydrant hose truck] lines shall be flushed with fuel until the fuel being delivered is free of construction debris to the satisfaction of the Contracting Officer. Samples of fuel shall be taken and tested by the designated government agency and shall be free of gross contamination, maximum of 8.0 mg/gallon solids and free water not to exceed 2 ml per quart.

NOTE: SELECT PANTOGRAPHS OR HYDRANT HOSE TRUCK.

3.2.1 Fueling System Piping

The flushing of apron system pipelines shall be accomplished by pumping fuel from one of the operating tanks through the fueling system piping and back to another tank. Air shall be bled from system high points. The procedure shall be continued until the fuel being delivered into the tanks is acceptable to the Contracting Officer. After the system has been flushed to the satisfaction of the Contracting Officer, the Contractor shall remove any water remaining in the low point drains and remove any accumulated water from Operating Tank sumps and bottoms by means of the Water Draw-off systems. Cone strainers shall be kept clean in order to insure maximum flow rate. Upon completion of the first flushing operations, the cone strainers shall be removed from the system. In addition, baskets from all strainers shall be removed and cleaned.

3.2.1.1 Transfer Line

Flushing of the transfer line shall occur during the filling operations. Samples of the incoming fuel shall be taken at the point of connection with bulk storage supply line. These samples shall be taken at one hour intervals and shall be tested by the designated government agency and turned over to the Contracting Officer.

3.2.1.2 Pump House Piping

Remove equipment as specified in paragraph Protection of Equipment. Perform the following flushing operations by withdrawing fuel from one operating tank and returning it to another tank. Circulate 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 the [pantograph,] [hydrant hose truck,] checkout connection and the single point receptacle. Position manual valves to circulate fuel through the checkout connection and back to the transfer line. Flush the checkout lines using one fueling pump.

NOTE: SELECT PANTOGRAPH OR HYDRANT HOSE TRUCK.

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

3.2.1.3 Apron Loop Piping

Remove equipment as specified in paragraph Protection of Equipment. Position manual valves to circulate fuel through the apron loop and back to the operating tank. Begin flushing the apron loop at a flow rate of 600 gpm. Increase flushing flow rate one pump at a time to the maximum available number of pumps for a minimum of 8 hours.

3.2.1.4 Hydrant Outlets

Position a tank truck at the hydrant outlet and flush each hydrant lateral. Sample the fuel at the connection to the truck.

3.2.1.5 Product Recovery Tank Lines

During the flushing of apron loop 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 pump to drain it by returning the fuel to storage.

3.2.1.6 Pantographs

Utilize the pantograph check-out connection and single point receptacle to flush each pantograph. Sample the fuel at the pressure fueling nozzle with the kit provided for this purpose.

NOTE: DELETE THIS PARAGRAPH IF PANTOGRAPHS ARE NOT REQUIRED.

3.3 CLEANING

After initial flushing is completed, the pump house and apron loop piping shall be cleaned in accordance with the procedure specified hereafter. Operating Tanks shall be isolated from system and cleaned as specified in Section \=15177=\ PETROLEUM TANK CLEANING.

3.3.1 Preparation for Cleaning

Filter elements shall be installed in the filter separators. Adjust filter separator flow control valve. Valves and equipment removed for flushing shall be reinstalled. Cone strainers shall be removed. Operating Tanks shall be drained, vapor freed and cleaned. Transfer the contents from one operating tank to the other for the purposes of cleaning.

3.3.2 Cleaning Requirements

Cleaning shall continue until Contracting Officer certifies that the fuel passes the color and particle assessment method as defined in T.O. 42B-1-1 or contains 2 milligrams per gallon or less of particulate. Fuel shall also contain 10 parts per million or less of free water. Sampling and testing shall be done by the [Air Force] [independent testing laboratory]. [Also take fuel samples on Pantograph(s).] [Also take samples at Hydrant Hose Truck Check-out Station and the truck fill stand.]

NOTE: ON C.O.E. PROJECTS, IF AIR FORCE IS TO DO SAMPLING AND TESTING, INCLUDE IN MOU. SELECT PANTOGRAPH OR HYDRANT HOSE TRUCK CHECK-OUT STATION.

3.3.3 Cleaning Procedure

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

3.3.3.1 Transfer Line

Continue to receive fuel and circulate it until fuel samples taken at the tanks meet the requirements of paragraph 3.3.2.

3.3.3.2 Pump House Piping

Pump house piping shall be cleaned as follows:

a. Position manual valves so that fuel is withdrawn from one operating tank, circulated through one fueling pump and filter separator, then returned to the operating 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. Provide a temporary connection between the [pantograph] [hydrant hose truck] connection and the nozzle adaptor. Position valves to circulate fuel through the checkout connection and back to the return line. Clean the checkout lines using two fueling pumps.

NOTE: SELECT PANTOGRAPH OR HYDRANT HOSE TRUCK CHECKOUT.

d. Connect truck fill station to a tank truck and clean the line.

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

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

3.3.3.3 Apron Loop Piping

Apron loop piping shall be cleaned as follows:

a. Position manual valves to circulate fuel through the apron loop and back to the operating tank through the receiving filter separators.

b. Initially pump fuel through the apron loop at a flow rate of 600 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 1200 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. Position a tank truck at the hydrant outlet and clean each hydrant lateral, one at a time.

e. Periodically take samples from all sample connections. Cleaning shall continue until the fuel meets specified requirements of paragraph 3.3.2.

3.3.3.4 Product Recovery Lines

Repeat the process described under initial flushing until samples taken at the connection of the pipe line back to storage meet the requirements.

3.3.3.5 Pantographs

Repeat the process described under initial flushing until samples taken at the pressure fueling nozzle meet the requirements.

NOTE: DELETE IF PANTOGRAPHS ARE NOT USED.

3.4 CONTROL VALVE [AND PANTOGRAPH] ADJUSTMENT

All control valve settings shall be checked and field adjusted from the factory settings at start-up as necessary to provide a smooth operation. The filter separator control valves and fueling pump non-surge check valve [and needle valve on Pantograph venturi] shall be checked and adjusted as follows:

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

3.4.1.1 Run one pump at a time and adjust rate of flow feature (650 gpm).

3.4.2 Control Valves on Issue Filter Separator Downstream Side

3.4.2.1 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.

3.4.2.2 Start the pump and adjust the filter separator control valve for the rated flow capacity of the filter separator (600 gpm).

3.4.2.3 Repeat above for each remaining filter separator.

3.4.3 Venturi Needle Valve

Venturi needle valve shall be adjusted to ensure a pressure equal to nozzle pressure at maximum flow possible. After initial setting, valve shall be locked in adjusted position.

NOTE: DELETE IF PANTOGRAPHS ARE NOT USED.

3.5 EQUIPMENT TESTS

After completion of flushing, cleaning, and control valve and electrical components adjusting operations, the tests specified hereinafter shall be performed. After cleaning is complete and prior to performance testing, field adjustment of automatic control valves and automatic pump controls while in operation shall be made only by the valve manufacturer's authorized field test engineer. For final adjustment of installed electrical control equipment the Contractor shall provide an experienced electrical engineer, factory representative of PCP manufacturer and factory representative of PIT and DPT manufacturers. Both the mechanical and electrical components shall be adjusted concurrently. Tests will be witnessed by the [Contracting Officer, the Command Fuel Facilities Engineer and the Command Fuel Management Officer]. [Contracting Officer and other Government representatives]. Contractor shall complete and submit to Contracting Officer the "CHECK LIST FOR EQUIPMENT TEST" provided hereinafter.

NOTE: SELECT CONTRACTING OFFICER AND THE COMMAND FUEL FACILITIES ENGINEER ON NAVFACENCOM PROJECTS. ON C.O.E. PROJECTS, SELECT CONTRACTING OFFICER AND OTHER GOVERNMENT REPRESENTATIVES. INCLUDE IN MoU IF THE COMMAND FUEL FACILITIES ENGINEER WILL PARTICIPATE IN INSPECTION OF EQUIPMENT TEST.

3.5.1 Operating Tank Low Level Alarm

Position valves to transfer fuel between operating tanks. Start one fueling pump and pump sufficient fuel out of the first operating tank to allow the

low level alarm (LLA) to stop the fueling pump. This procedure shall be repeated for each fueling pump and each tank until the low level alarm stops the fueling pump due to low liquid level in operating tank.

3.5.2 Fuel Delivery

Deliver fuel to each fueling point against a backpressure at the outlet of the hydrant control valve created by the tank trucks and hoses used during the tests. [The flow rate shall be not less than [600] gallons per minute for a 4-inch valve.] [The flow rate shall be not less than [1200] gallons per minute for a 6-inch valve.] Flow rates might be affected by aircraft capability.

NOTE: SELECT VALVE SIZE AND VERIFY FLOW RATE WITH COMMAND FUEL FACILITIES ENGINEER.

3.5.3 Fueling Pump Operation

Operation of all pressure and flow devices to start and stop the fueling pumps at the indicated pressure and flow rates shall be demonstrated by the Contractor in the presence of the Contracting Officer. The operating sequence shall be repeated with each of the pumps being selected as lead pump. For this test, the flow rates shall be measured. Flow rates and test results shall be recorded and witnessed by the Contractor.

3.5.4 Defueling Performance

To test the defueling operation in the "automatic" mode, the Government will furnish a defueling cart or a hydrant hose truck with a 300 gpm pump rated at 165 psi to pump fuel from a government furnished tank truck or bladder back into the system. While this defueling test is in operation, one 600 gpm transfer pump shall be operated providing flow into a tank truck through one hydrant control valve. Demonstrate capability of defueling into the system at the same time a fueling operation is in progress. Also test the defuel capability while in the "Flush" mode.

3.5.5 Emergency Shutdown

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 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.

NOTE: DELETE IF NOT PROVIDED.

3.5.6 Hydrant Control Valve

Each Hydrant Control Valve shall be operated to demonstrate the following:

a. Surge shut-down capability. (Surge from shut-off of on-board aircraft fill valve can be simulated by closing a fill line valve to the tank truck or bladder, use a three (3) second closure.)

b. Pressure control at setpoint, ± 2 psi (Requires use of a pressure gage at the pressure fueling nozzle).

3.5.7 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 following:

Operation and closure of the water slug shut-off feature on the Filter Separator Control Valve.

3.5.8 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. Place Fuel Transfer Pump in the "Automatic" position to demonstrate capability of valve to open when fuel level drops below set point.

3.6 PERFORMANCE TESTING

Testing as performed under the above paragraphs shall be considered to be part of the performance testing after the Contractor has made the required adjustments to the various equipment and controls and demonstrates to the satisfaction of the [Contracting Officer and the Command Fuel Facilities Engineer] [Contracting Officer], that these portions of the systems are working as specified. The Contractor shall notify the Contracting Officer 15 calendar days in advance of the test to permit arrangement for the use of Government-furnished items.

NOTE: SELECT CONTRACTING OFFICER AND THE COMMAND FUEL FACILITIES ENGINEER ON NAVFACENCOM PROJECTS. ON C.O.E. PROJECTS, SELECT CONTRACTING OFFICER AND INCLUDE IN MOU IF COMMAND FUEL FACILITIES ENGINEER OR HIS DESIGNATED WITH ASSIST CONTRACTING OFFICER REGARDING APPROVAL OF FINAL PERFORMANCE TESTING.

3.6.1 Final Performance Test

The final performance test shall consist of performance of the fueling system during actual fueling and defueling of an aircraft. The maximum rated capacity of the system shall be tested by using several aircraft simultaneously. If it is not possible to use the number of aircraft required to receive the full flow, the test shall be supplemented through the use of refueling trucks or bladders. Record required data necessary to prepare "Test Reports" specified in paragraph Test Reports.

3.6.1.1 Satisfactory Performance

In the event a portion of the system or any piece of equipment fails to meet the test, the Contractor shall make the necessary repairs or adjustments and repeat the Performance Test until satisfactory performance is obtained. The determination of satisfactory performance shall be made by the [Contracting Officer and the Command Fuel Facilities Engineer] [Contracting Officer].

NOTE: SELECT CONTRACTING OFFICER AND THE COMMAND FUEL FACILITIES ENGINEER ON NAVFACENCOM PROJECTS. ON C.O.E. PROJECTS, SELECT CONTRACTING OFFICER AND INCLUDE IN MOU IF COMMAND FUEL FACILITIES ENGINEER OR HIS DESIGNATED REPRESENTATIVE WILL PARTICIPATE IN PERFORMANCE TESTING.

3.6.2 Final Acceptance

The system shall be filled with fuel and shall be operable and leak-free prior to acceptance. Anything wet with fuel is considered to be leaking.

3.6.2.1 Operating Tank High Liquid Level Shut-Off Valve Test and Adjustments

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

3.6.2.2 Tank Level Indicator Adjustments

Also during the final filling of operating 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.

3.6.2.3 Water Draw-Off System Test

During the performance testing, Water Draw-off Systems shall be filled from Operating 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 Operating Tank.

CHECK LIST FOR EQUIPMENT TEST

(To be completed after flushing, cleaning and control valve and electrical component adjustments)

PROJECT: _____

LOCATION: _____

FUEL PUMP NO.	OPERATING TANK NO. 1	
	SHUTDOWN ON LOW LEVEL	
	YES	NO

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

FUEL PUMP NO.	OPERATING TANK NO. 2	
	SHUTDOWN ON LOW LEVEL	
	YES	NO

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

ITEM 3 - FUELING PUMP OPERATION - AUTOMATIC MODE

SELECTED MICROPROCESSOR 1

SELECTED LEAD PUMP FP-1

[] **ACTUATION POINTS**

Measuring Device	Lead Pump Start	Second Pump Start	Third Pump Start	Fourth Pump Start	Fourth Pump Stop	Third Pump Stop	Second Pump Stop	Lead Pump Stop
PIT-1	<u> </u> PSIG [60]	<u> </u> PSIG	<u> </u> PSIG	<u> </u> PSIG	<u> </u> PSIG	<u> </u> PSIG	<u> </u> PSIG	<u> </u> PSIG
Issue Venturi DPT-1		<u> </u> GPM [≥ 560]	<u> </u> GPM [≥ 1180]	<u> </u> GPM [≥1780]	<u> </u> GPM [≥ 2480]	<u> </u> GPM [≥ 1800]	<u> </u> GPM [≥ 1200±]	
Return Venturi DPT - 3		<u> </u> GPM [≤ 40]	<u> </u> GPM [≤ 40]	<u> </u> GPM [≤ 40]	<u> </u> GPM [≤ 700]	<u> </u> GPM [≤ 700]	<u> </u> GPM [≥ 700]	

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

ITEM 4 - DEFUELING PERFORMANCE

FUELING PUMP NO.	AUTOMATIC MODE		
	FLOW RATE THRU ISSUE VENTURI (GPM)	FLOW RATE AT HYDRANT CONTROL VALVE (GPM)	FLOW RATE THRU RETURN VENTURI (GPM)

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

FLUSH MODE			
OPERATING TANK NO. _____ LEVEL-START	OPERATING TANK NO. _____ LEVEL-START	PRESSURE GAGE READING AT DEFUEL/ FLUSH VALVE	HYDRANT CONTROL VALVE NO.

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

ITEM 5 - EMERGENCY SHUTDOWN

AUTOMATIC MODE						
FUELING PUMP NO.	"EMERGENCY STOP" PUSHBUTTON NO.	EMERGENCY SHUT-OFF VALVE CLOSURE			FUELING PUMP STOP	
		YES	TIME (SEC)	NO	YES	NO
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

ITEM 5 - EMERGENCY SHUTDOWN

AUTOMATIC MODE						
FUELING PUMP NO.	"EMERGENCY STOP" PUSHBUTTON NO.	EMERGENCY SHUT-OFF VALVE CLOSURE			FUELING PUMP STOP	
		YES	TIME (SEC)	NO	YES	NO
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						

DATE: _____

TIME: _____

TEMPERATURE: _____ **F** _____

TEST CONDUCTED BY: _____

MANUAL MODE						
FUELING PUMP NO.	"EMERGENCY STOP" PUSHBUTTON NO.	EMERGENCY SHUT-OFF VALVE CLOSURE			FUELING PUMP STOP	
		YES	TIME (SEC)	NO	YES	NO
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

MANUAL MODE						
FUELING PUMP NO.	"EMERGENCY STOP" PUSHBUTTON NO.	EMERGENCY SHUT-OFF VALVE CLOSURE			FUELING PUMP STOP	
		YES	TIME (SEC)	NO	YES	NO
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						
FP-						

DATE: _____
TIME: _____
TEMPERATURE: _____ **F** _____
TEST CONDUCTED BY: _____

**ITEM 7 - FILTER SEPARATOR FLOAT CONTROL
VALVE MANUAL TEST**

FILTER SEPARATOR NO.			WATER SLUG FEATURE ON FILTER SEPARATOR CONTROL VALVE FUNCTIONED	
			YES	NO

DATE: _____

TIME: _____

TEMPERATURE: _____ **F** _____

TEST CONDUCTED BY: _____

ITEM 8 - OVERVILL VALVE TEST

PRODUCT RECOVERY TANK				
OVERFILL VALVE	CLOSED AT 80% FILL LEVEL		OPENED AS TANK LEVEL DROPS BELOW 80% FILL LEVEL	
	YES	NO	YES	NO

DATE: _____

TIME: _____

TEMPERATURE: _____ **F**

TEST CONDUCTED BY: _____

I Certify that the values recorded in Items 1-8 are accurate and correct.

DATE: _____

SIGNATURE: _____

ORGANIZATION: _____

I witnessed all tests required to produce values recorded in Items 1-8.

DATE: _____

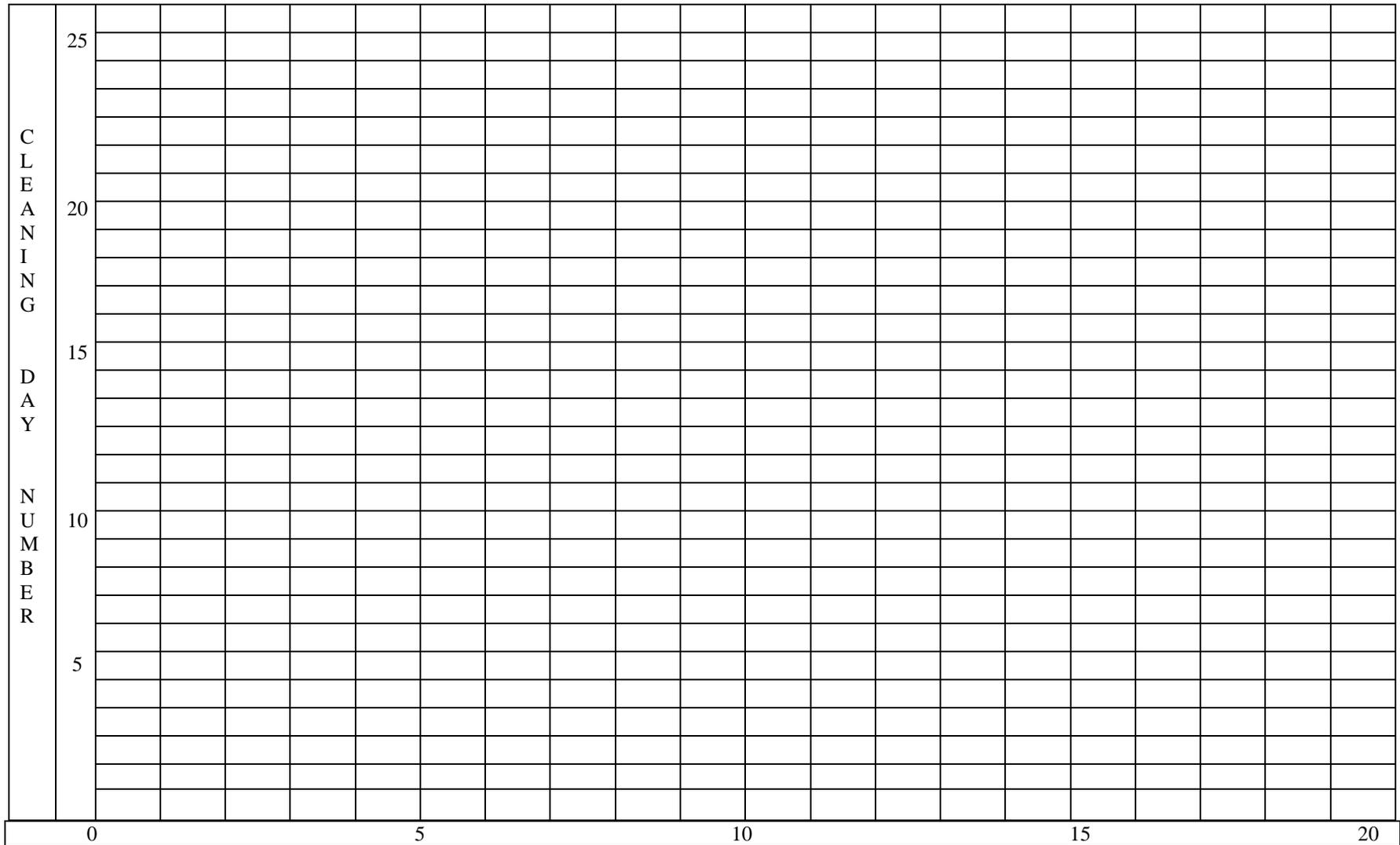
SIGNATURE: _____

ORGANIZATION: _____

PERSONNEL PRESENT DURING EQUIPMENT TEST

NAME	ORGANIZATION	COMMERCIAL PHONE NO.

REMARKS:

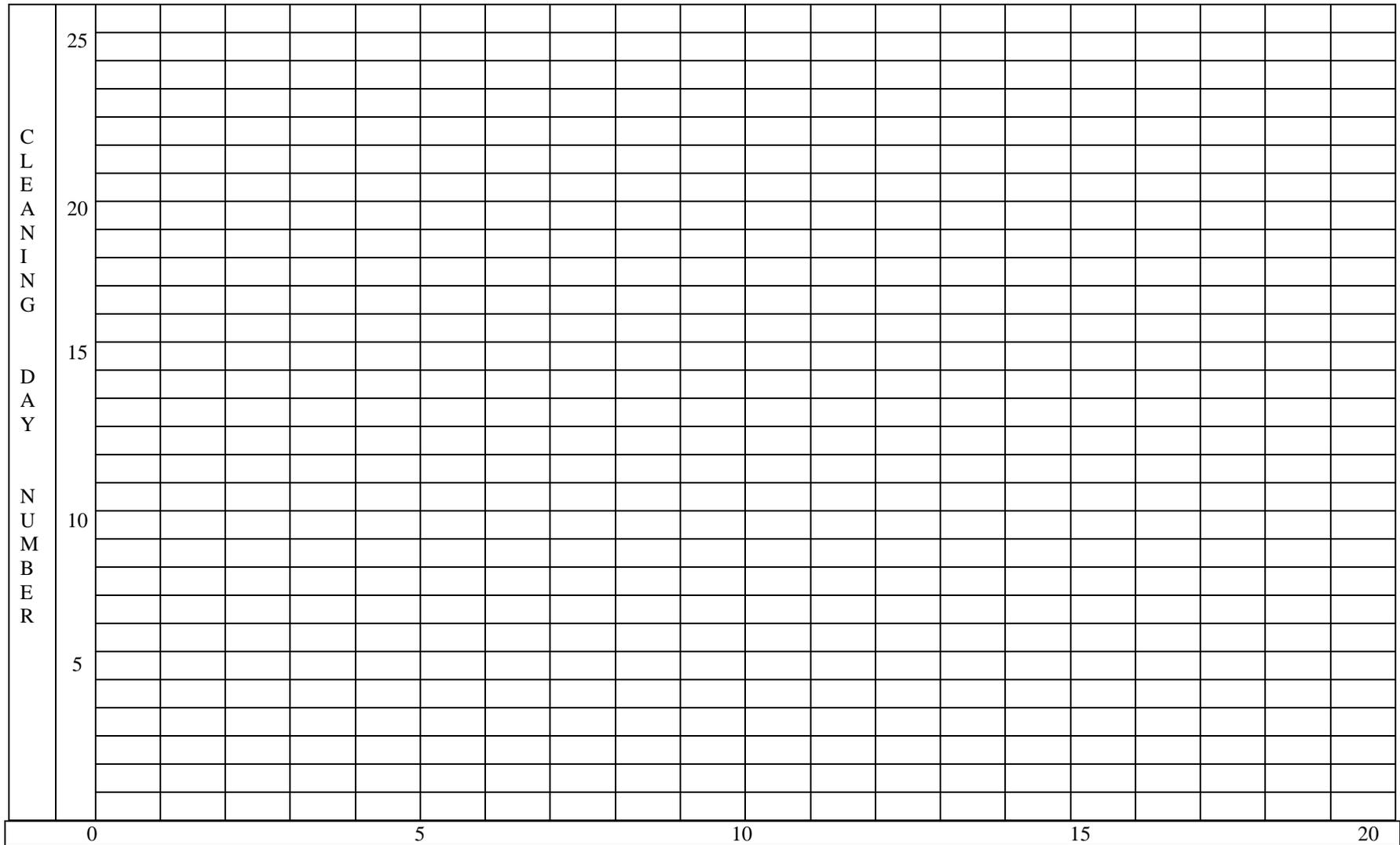


**PRESSURE DROP IN POUNDS PER SQUARE IN (PSI)
CLEANING OPERATION DAILY FLOW VS. PRESSURE DROP GRAPH FOR FILTER SEPARATOR NO. FSI-1**

* ELEMENT CHANGE CRITERIA: (1) When pressure drop across filter separator reaches 15 PSI
 (2) When pressure drop is less than previous plot or fails to increase properly

STARTING DATE: _____

SIGNATURE: _____

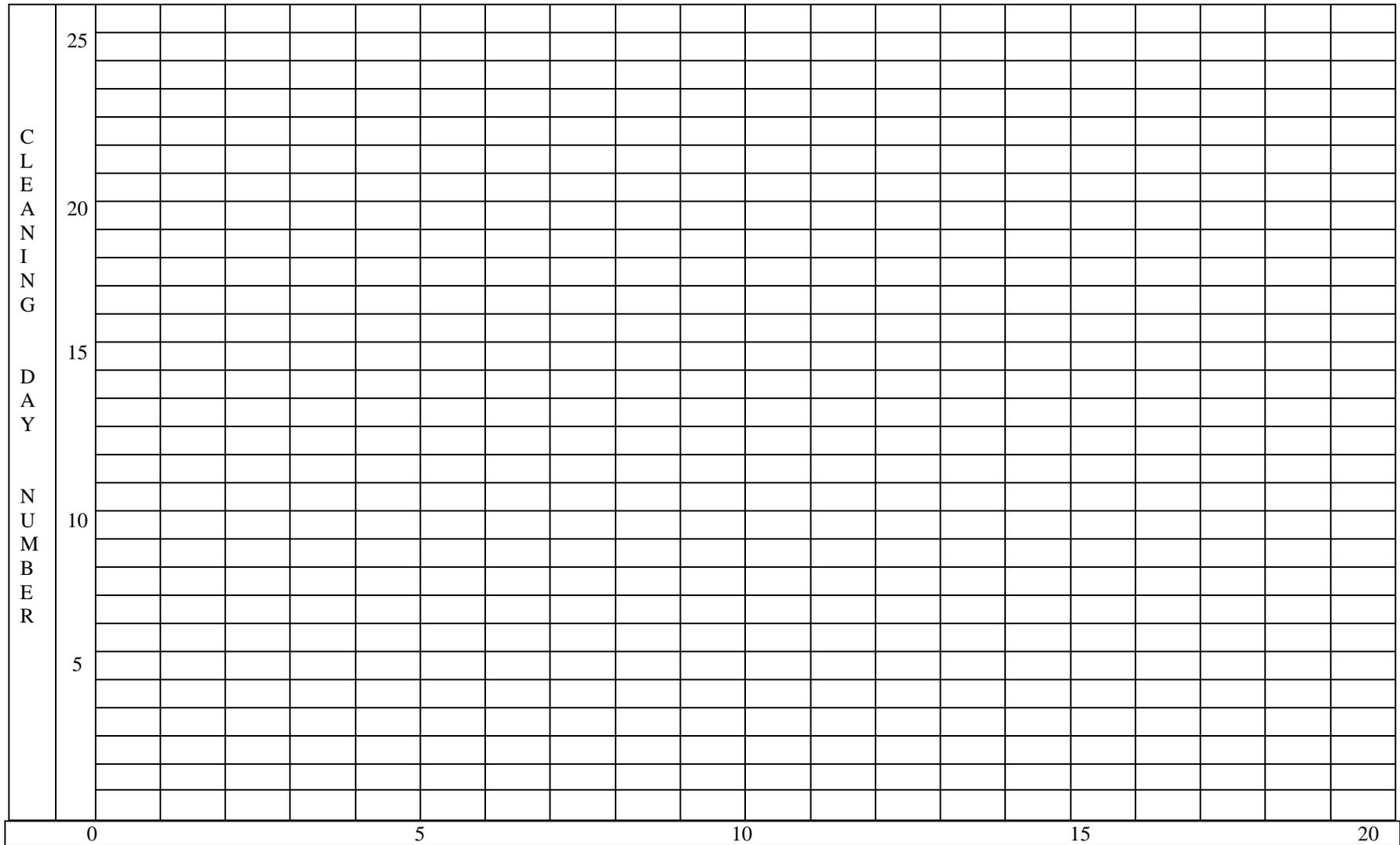


**PRESSURE DROP IN POUNDS PER SQUARE IN (PSI)
CLEANING OPERATION DAILY FLOW VS. PRESSURE DROP GRAPH FOR FILTER SEPARATOR NO. FSI-2**

* ELEMENT CHANGE CRITERIA: (1) When pressure drop across filter separator reaches 15 PSI
 (2) When pressure drop is less than previous plot or fails to increase properly

STARTING DATE: _____

SIGNATURE: _____

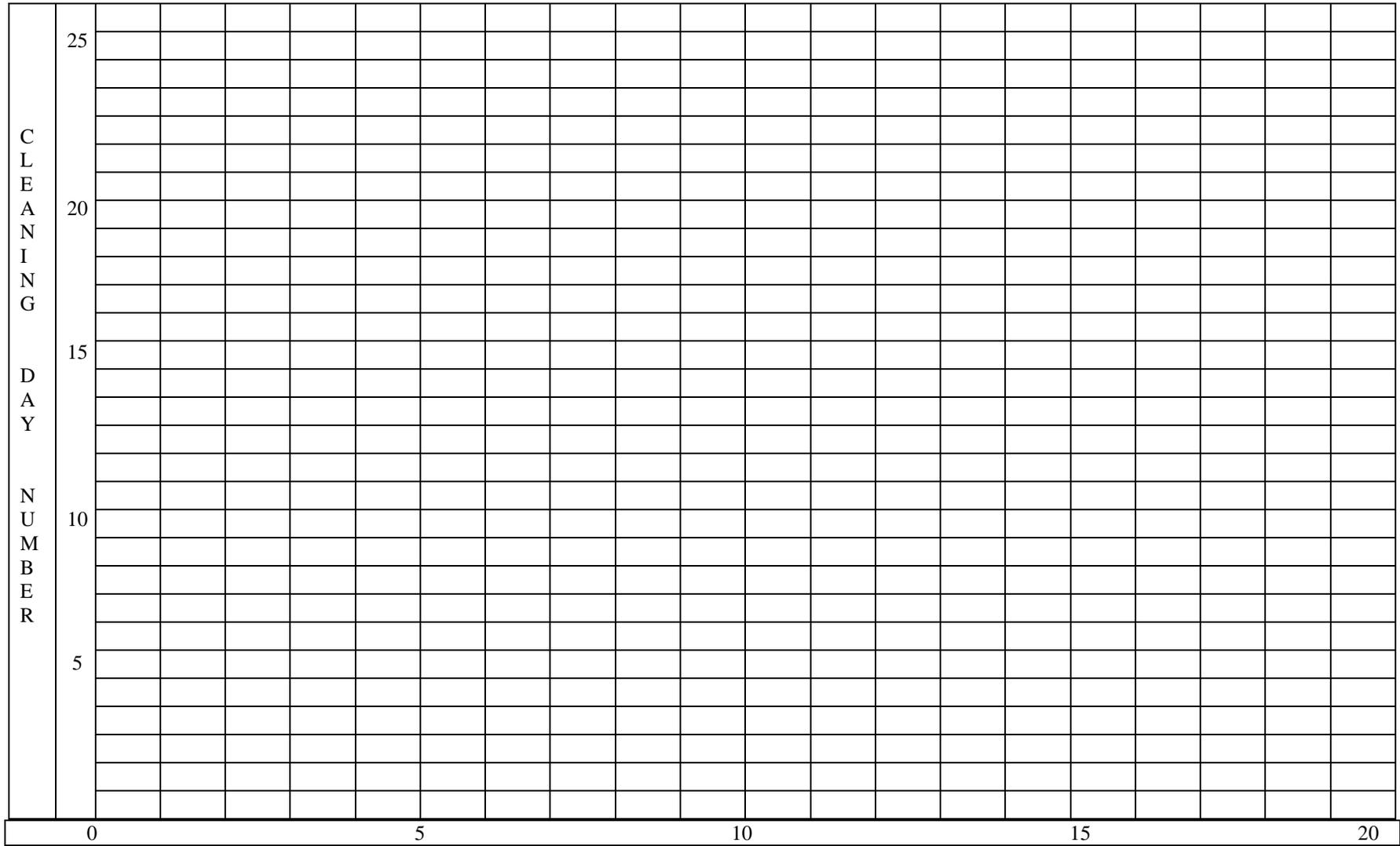


**PRESSURE DROP IN POUNDS PER SQUARE IN (PSI)
 CLEANING OPERATION DAILY FLOW VS. PRESSURE DROP GRAPH FOR FILTER SEPARATOR NO. FSI-3**

* ELEMENT CHANGE CRITERIA: (1) When pressure drop across filter separator reaches 15 PSI
 (2) When pressure drop is less than previous plot or fails to increase properly

STARTING DATE: _____

SIGNATURE: _____

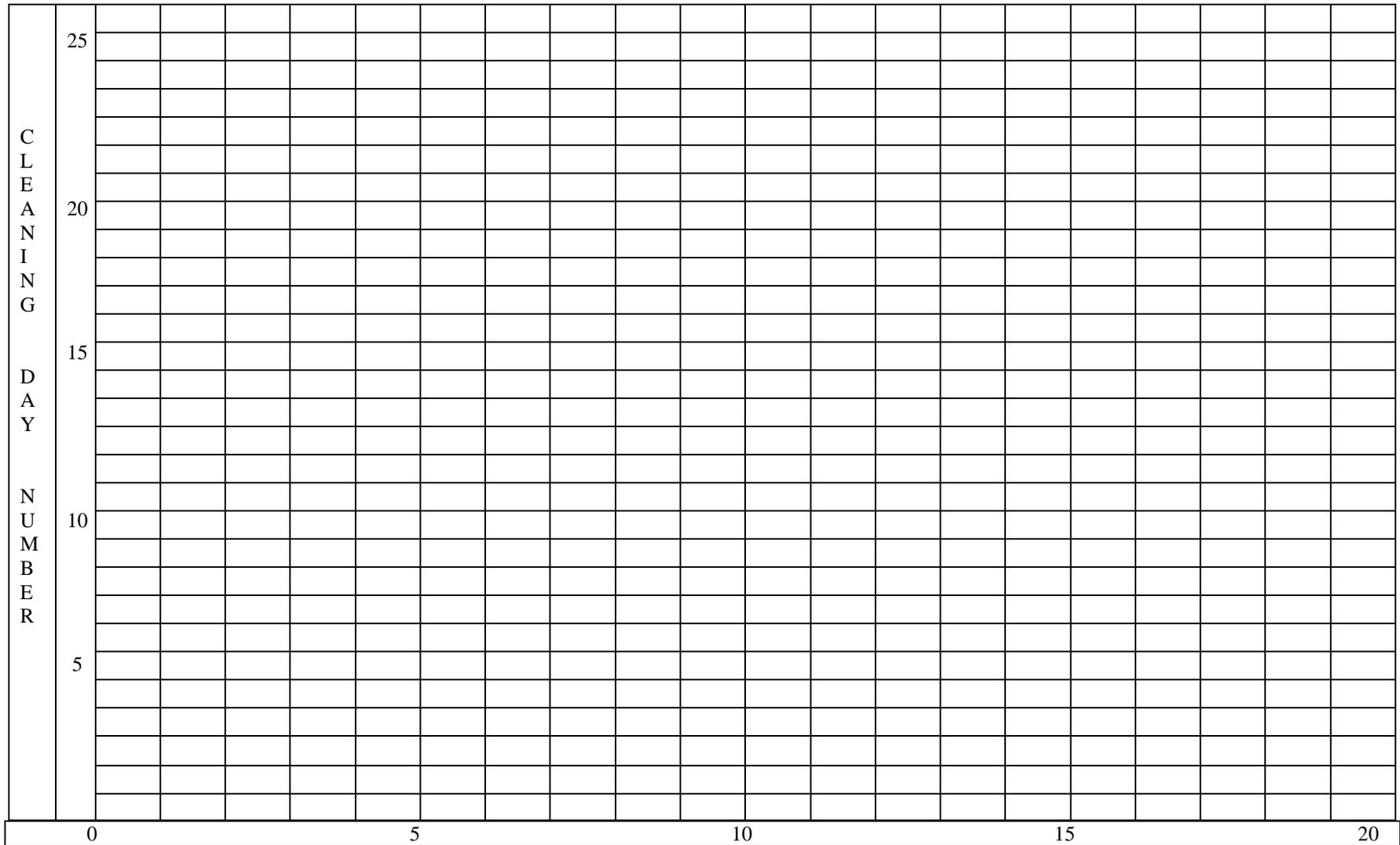


**PRESSURE DROP IN POUNDS PER SQUARE IN (PSI)
 CLEANING OPERATION DAILY FLOW VS. PRESSURE DROP GRAPH FOR FILTER SEPARATOR NO. FSR-4**

- * ELEMENT CHANGE CRITERIA: (1) When pressure drop across filter separator reaches 15 PSI
 (2) When pressure drop is less than previous plot or fails to increase properly

STARTING DATE: _____

SIGNATURE: _____



**PRESSURE DROP IN POUNDS PER SQUARE IN (PSI)
CLEANING OPERATION DAILY FLOW VS. PRESSURE DROP GRAPH FOR FILTER SEPARATOR NO. FSR-5**

- * ELEMENT CHANGE CRITERIA: (1) When pressure drop across filter separator reaches 15 PSI
 (2) When pressure drop is less than previous plot or fails to increase properly

STARTING DATE: _____

SIGNATURE: _____