PETROBRAS	DATA SHEET	N°:	I-FD-5250.00-22313-561-PEI-401
	CLIENT: REGAP		SHEET: 1 de 7
	PROGRAM: U-0310 CAPACITY INCREASE		
	AREA: U-0310 - DIESEL HYDROTREATING UNIT		
PRGE REGAP/ES/PROJ	TITLE: UNSTABLE FILTER - 310-Z-03		INTERNAL
			SRGE/ERGE

REVISION INDEX

REV.	DESCRIPTION
0	ORIGINAL ISSUE
A	REVISED NOTE 26 AND ALLOWABLE DROP PRESSURE (DIRTY)
B	REGAP REVIEW. TAG CHANGED TO 310-Z-03. ADDED NOTES 31, 32 AND 33.
C	CANCELLED NOTE 27

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	11/07/2025	10/09/2025	10/06/2026	01/10/2026					
PROJECT	EPRGN/HT	EPRGN/HT	EPRGN/HT	EPRGN/HT					
EXECUTION	CDV1	CDV1	CJR2	CJR2					
CHECK	BRC4	BRC4	REVM	REVM					
APPROVAL	UP6G	UP6G	UP70	UP70					

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PETROBRAS PROPERTY AND MAY NOT BE USED FOR PURPOSES OTHER THAN THOSE SPECIFICALLY INDICATED HEREIN. FROM STANDARTIZED BY STANDARD PETROBRAS N-381- REV.F ANEX A - SHEET 01/08

PETROBRAS	DATA SHEET	N°: I-FD-5250.00-22313-561-PEI-401	REV. C
	AREA: U-0310 - DIESEL HYDROTREATING UNIT		SHEET: 2 de 7
	TITLE: UNSTABLE FILTER - 310-Z-03		INTERNA
			SRGE/ERGE

SERVICE UNSTABLE FILTER				
FILTER ELEMENT:	☐ BASKET	☐ CARTRIDGE	☑ OTHERS	
TYPE:	☐ SIMPLEX	☐ DUPLEX	☑ MULTIPLE	
TOTAL QUANTITY: NOTE 1		RESERVE 0		

OPERATING CONDITIONS

FLUID: DIRECT DISTILLATION DIESEL			
CORROSIVE/TOXIC COMPOUNDS: NOTE 2		CONCENTRATION: NOTE 2	
MAXIMUM FLOW PER FILTER m³/h: 147,4 (NOTE 24)			
TYPE OF SOLIDS RETAINED: INORGANIC PARTICLES, GUMS, COKE FINES (NOTE 3)			
MAXIMUM FILTRATION RATE, m³/(m².h) NOTE 4			
	NORMAL	MINIMUM	MAXIMUM
TEMPERATURE, °C	112	-	190
PRESSURE (g)., kgf/cm²	4,0	-	5,1
VISCOSITY @ 112 °C, Cp: 0,95			
DENSITY @ 112 °C, kg/m³: 808,9			
MAXIMUM PRESSURE LOSS ALLOWED (CLEAN), kgf/cm²: NOTE 8			
MAXIMUM PRESSURE LOSS ALLOWED (DIRTY), kgf/cm²: 1,0			
MINIMUM PARTICLE SIZE RETAINED, µm: 25 (NOTE 5)			

DESIGN CONDITIONS

FILTER BODY	PRESSURE (g)., kgf/cm²: 7,5
	TEMPERATURE, °C: 230
FILTER ELEMENT	PRESSURE LOSS (Flow Direction), kgf/cm²: 3,0
	PRESSURE LOSS (Backwash Direction), kgf/cm²: NOTE 6

LIMPEZA

CLEANING MODE:	☑ BACKWASH	☐ MANUAL	☑ OTHERS
FLUID: COKE DIESEL AND TREAT LIGHT CYCLE OIL LCO (NOTE 1)			
FLOW, m³/h: NOTE 24			
TEMPERATURE, °C:			
MAXIMUM UPSTREAM PRESSURE (g), kgf/cm²: NOTE 7			
MAXIMUM PRESSURE LOSS (g) (Backwash Direction), kgf/cm²: NOTE 8			
FREQUENCY/DURATION NOTE 9			

NOZZLES

ITEM	QUANT	DIAM, in	SERVICE	OBSERVATION

NOTES

1- This data sheet refers to the supply of 01 (one) unstable filtration system, identified by TAG 310-Z-03. The system shall consist of at least 02 (two) pressure vessels equipped with filter elements, as well as all accessories necessary for its safe and proper operation, including valves, pressure relief valves (PSVs), instrumentation, controls,panels, connections, supports and other components required for the perfect functioning of the system. The sizing of the number of pressure vessels and respective filter elements that make up the system is the scope of the supplier for the process conditions informed.

1.2- The supplier may use the following technologies for the specified service:

1.2.1- Conventional backwash filter with liquid;
Backwash fluid: filtered feed.
Backwash volume: should not exceed 1% volume of the filtrate in a 24-hour period.
Properties:
- Temperature = 112 °C
- Viscosity = 0,9516 cP @112 °C
- Density = 808,9 kg/m³ @112 °C
- Destination: backwash transfer vessel, if requered

1.2.2- Gas backwash filter
Backwash fluid: nitrogen with the following characteristics:

System	Pressure (kgf/cm2 g)□				Temperature (°C)			
	Minimum	Normal	Maximum	Design	Minimum	Normal	Maximum	Design
Nitrogen (N2 7,5)	-	7,5	15,0	17,0	-	25	25	55
Nitrogen (N2 15)	-	15,0	-	17,0	-	25	25	55

The auxiliary backwash fluid to be used for complete filter cleaning is the same as defined in item (1.2.1).

Auxiliary backwash fluid volume: should not exceed 0.3% volume of the filtrate in a 24-hour period.

- Destination: Backwash transfer vessel, if necessary.

1.2.3 - Self-cleaning filter or scraper filter with rotating shaft inside the filter cartridge. If this option is selected, the requirements for the backwash fluid will be the same as those listed in item (1.2.1).

- Destination: Backwash transfer vessel, if necessary.

2- Contaminants:
Sulfur: 4546 mg/kg
Nitrogen: 1117 mg/kg

NOTES

3- Material to be filtered: inorganic particulates (microcrystals of iron oxides and iron sulfides), organic particulates (gum), and coke fines.
Solid content: <24 ppm by mass (normal); 91 ppm mass (max).

4. The maximum filtration rate is 7.0 (m³/h)/m².
If a lower filtration rate is adopted, it shall be submitted to Petrobras for approval, both regarding the total filtration area and the open area of the filter elements.

5- Solid separation: the following minimum removal efficiency curve shall be met:

Beta	Minimum removal efficiency, %massa	Particle size, micron
5000	99,98	40
1000	99,9	30
100	99,0	25
50	98,0	15
10	90,0	5

The expected solids removal performance for all particle sizes listed in the table shall be provided and verified through standardized test methods.

6. To be confirmed by the manufacturer, depending on the proposed filtration technology and backwash fluid, and based on the maximum backwash fluid pressure and the minimum pressure of the backwash transfer vessel.

7. Maximum upstream gauge pressure depends on the filtration technology to be applied:
For liquid backwash filter: 4,0 kgf/cm² – filtration differential pressure (normal filtration pressure).
For gas backwash filter: to be defined by the manufacturer (see Note 10).

8. Minimum, normal, and maximum pressure drop shall be defined by the manufacturer.

9- Backwash frequency: intervals between backwash cycles should be at least every 4 hours (complete cycle considering the backwashing of all individual filters in the assembly), considering the maximum particulate load (see NOTE 3). The filtration capacity shall be fully recovered after each backwash cycle.

10- Final destination of backwash fluid. – Waste tank: TQ-01AB, TQ-81/96 (existing system)
Normal pressure = 6,0 kgf/cm2
Normal operating temperature = 160 °C -190°C
Design pressure = 8,5 kgf/cm2m
Design temperature = 230°C
Maximum backpressure = 7,0 kgf/cm²

The manufacturer shall assess the need to include an intermediate backwash system and auxiliary systems as an intermediate destination, providing a backwash vessel (and auxiliaries), if required, between the filter and the final destination, operating at low pressures during backwash cycles.

Operation of the filters, backwash process, and discharge of the backwashed fluid from the vessel to the final destination shall be fully automated.

The number of process lines in the supply package shall be estimated by the filter manufacturer, based on the selected technology.

NOTES

11. The filter control panel shall be installed on a structure separate from the main filter structure, in order to avoid problems caused by vibration.

12. Automatic backwash system: Backwash cycles shall start automatically by a timer and/or differential pressure transmitters.
The backwash sequence may be manually initiated, if necessary, through a remote signal.
The manufacturer shall provide facilities to interconnect the filter control system with the existing DCS system at the refinery, including screen configurations.
The backwash sequence shall not be interrupted due to failures in automated valves, which shall have position indication on a remote panel.
The filter supply package shall include all necessary instrumentation, controls, and interconnection lines to allow fully automated filter operation and cleaning.

13. The manufacturer shall provide a PSV system (Pressure Safety Valve) capable of protecting all filter components against fire conditions.
The PSV set pressure shall comply with the filter design pressure.
For design purposes, a latent heat of vaporization of 37,9 kcal/kg shall be considered.
If the set pressure changes, consider 22,2 kcal/kg
Each filter element shall be provided with all the necessary facilities for its removal for maintenance during normal operation.

14- The manufacturer shall provide a separate quote for spare filter elements (if required by the technology).

15- The filter shall be designed considering medium-pressure steam purge operation, with the following conditions:
Pressure (kgf/cm²m): Normal: 16,5 Min.: 15,5 Max.: 19,0 Design: 21,0
Temperature (°C): Normal: 225 Min.: 200 Max.: 280 Design: 285

16- The filter shall be approved by Petrobras. Samples upstream (inlet) and downstream (outlet) of the filter shall be collected and analyzed to verify filtration efficiency.

17-The manufacturer shall evaluate the possibility of inadvertent closing of some downstream valve of each module without simultaneous closing of the corresponding upstream valve. This evaluation shall consider all possible failures of the programmable logic system (PLC). Depending on the conclusion of this evaluation, the manufacturer shall provide a PSV to protect the filter against such overpressure events. The same type of analysis shall be carried out for the backwash system.

18- Temporary and removable filters shall be supplied and installed upstream of the main filters for retention of larger particulates during start-up procedures, in order to avoid damage to the main filters.

19- The filter shall be designed so that backwashing or the unavailability of a filter module, understood as a vessel containing filter element(s), does not compromise the filtration capacity or the operation of the system.

20- The filter elements shall be constructed using stainless steel mesh. If, for any reason, the manufacturer decides on another type of filter element, PETROBRAS must be consulted to evaluate the proposal.

21- The manufacturer shall inform the maximum flow rate (in relation to total area and the open area of the filter elements) considered in the filter design.

NOTES

22. The manufacturer's technical proposal shall include a reference list of similar services performed in the past 10 years, including information such as capacity, type of feed, solids content, and maximum filtration rate. A similar service shall be understood as previous experience in designing and supplying automatic backwash filtration systems with specific characteristics for the feed filtration of Hydrotreating (HDT) Units for Middle Distillates (Diesel and Aviation Kerosene).
Such feed filtration service for HDT units is considered critical, requiring specific technological knowledge related to the type of particulate material, its granulometry and particle size distribution, in order to ensure compliance with all necessary technical specifications so that the filtered feed does not cause differential pressure increases or thermal efficiency losses in reaction section equipment (exchangers, furnaces, and reactors), which could compromise the unit's operating campaign time.
The absence of prior experience may compromise fulfillment of technical specifications, such as backwash frequency, minimum retention efficiency, and maximum allowable differential pressure.

23. The filtration system shall be designed to operate at full design flow capacity under continuous operation. No reduction of design capacity shall be permitted, even during backwash cycles. The filter operation and backwash process shall be fully automatic. All valves connecting the individual filter vessels to the inlet, outlet, backwash fluid, and backwash discharge piping shall be automatically operated and feature position indication on a remote panel. A device to prevent vibration and shocks shall be provided to minimize valve deterioration. The manufacturer shall supply, for each individual filter vessel, manual block valves at the inlet and outlet, and vent and drain valves to allow the individual vessel to be opened and cleaned without interrupting the filtration system operation. A free area shall be provided for maintenance operations of the filtration system.

24- Volumetric flow rate at operating temperature (112°C).
Volumetric flow rate @ 20°C/4°C: 137 m³/h ; density @ 20°C/4°C: 0,870.

25. The Programmable Logic Controller (PLC) of the filtration system shall have a maximum failure rate of one every ten years.

26. Fluid classification according to NR-13: by PETROBRAS

~~27. Manufacturer shall provide training to the operation and maintenance team, as well as technical assistance during commissioning of the filter for unit startup and monitoring of the filtration system operation for at least 32 hours concurrent with unit start-up.~~

28- Material specification:
Carbon Steel SA-516 Gr 60/70
Corrosion allowance: 3mm

29 - Detailed information on the installed equipment can be obtained from the REGAP refinery.

30- If the manufacturer requires the particulate size distribution, this information must be obtained from REGAP.

31 - Performance criteria:

Considering that the filtration system is composed of multiple individual filters, the total volume of backwash must correspond to the sum of the volumes required for the individual backwashing of all the filter units that make up the system. The total daily volume consumed in backwashing shall be limited to 3.0 (three) m³/day. Technical proposals that exceed the limit established above will not be accepted.

NOTES

32 - The supplier shall deliver a complete Programmable Logic Controller (PLC), installed in an electrical panel suitable for building installation, with a protection rating of IP-54 or higher. The panel shall be fully assembled and sized to accommodate all filter control points, including: CPU, racks, power supply, input and output modules (analog, digital, and HART protocol), cables, connectors, terminals, circuit breakers, and other necessary components. All elements shall be ready for interconnection with the system's instruments and control devices. The supplier shall ensure the provision of spare parts for all applicable items, sufficient to support at least two operational campaigns (12 years), from the equipment acceptance date. The supplier shall be responsible for delivering all equipment, materials, software, and services required for the development, implementation, and commissioning of the PLC, ensuring its full functionality in accordance with the project's technical and operational requirements. Integration of the PLC with the Distributed Control System (DCS) shall be Petrobras' responsibility. Communication with the unit's DCS shall be provided through redundant communication modules using Ethernet, Modbus RTU (RS485 network), and TCP/IP, as well as analog and discrete input/output modules and HART multiplexers. Power supplies shall operate at 127 V AC, with two secure (UPS) power sources and one auxiliary source. All instrumentation used shall be connected to junction boxes segregated by signal type and shall comply with Petrobras Standard NI-1882 and the refinery's EG-80-01 criteria, in its latest applicable revision. All certifications required by the standards shall be presented.

33 - The filtration system shall be installed in a classified area. The area classification is: Zone 2, Group IIC, Temperature Class T3. All electrical equipment, instruments, and valves shall comply with this classification.