



GREEN
FUEL
CATALYST

Installation Manual

Fuel catalyst FHD5 to FHD25

For Liquid Fuel Systems

Made in USA



Patented Fitch® fuel catalyst technology

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1.INTRODUCTION

1.1 About

Patented Fitch® catalyst technology consists of a Heterogeneous Metallic Alloy Composition (HMAC) which reduces activation energy of the chemical combustion reaction. Catalyst reverses the naturally occurring hydrocarbon fuel biodegradation (Oxidation-Reduction) process by inducing selective hydrogen abstraction and redistribution (Hydrogenation) that promotes selective Oxidation (formation of Alcohols, Aldehydes). Catalyst cracks the aromatic (less-reactive) compounds forming oxygen containing molecules with greater energy yield and higher combustibility.

1.2 Intended Use

Fuel catalyst is a permanent fuel treatment that reforms fuel (diesel, gasoline, or residual fuel oil), creating a more combustible, clean burning product. Catalyst can be incorporated into an Existing Fuel System. Catalyst provides at least 2% fuel consumption reduction along with improved fuel lubricity.

Catalyst has no moving parts, no additives, no magnets, no electrical hook-ups, and does not require any special maintenance, lasting for 10,000 operating hours.

1.3 Approvals and Certification

UL Listed

Manufacturers Declaration of conformity according to PED 2014/68/EU Annex II – Table 1 for flammable gases and Table 3 for flammable liquids standards.

1.4 Disposal

To see the catalyst chemical composition, please go to section 7.1 (Material safety data sheet). Collect it separately in accordance with local rules.

2.SAFETY

Catalyst installation into fuel system is simple. All that is required, is to have a few hand tools and close following to the instruction manual guide. However, it is essential to do the installation carefully and safely. We recommend that you read the next few lines with the uttermost attention.

2.1 Fire Protection

Every installation must conform to local and/or provincial and/or international piping and fire codes.

2.2 Safety Equipment

During the installation make sure that involved personnel is properly protected, and is wearing PPE (personal protective equipment) such as, but not limited to, protective clothing, helmet, safety shoes, goggles, welding shield, safety gloves. Check your material safety data sheet for any instructions or suggestions.

2.3 Qualified Personnel

Catalyst may only be installed, commissioned, operated and maintained by properly trained and authorized personnel. This document is provided to help you establish operating conditions, which will permit safe and efficient use of this product.

2.4 Warning

Do not run catalyst in excess of the housing tank label. Do not open catalyst housing when system is under pressure; always relieve all pressure and use bypass piping before opening catalyst housing lid. Stop all flow through the catalyst by properly shutting off the on/off valves before opening the catalyst lid. The catalyst unit if under pressure may cause serious injury or death.

Ignoring safety rules may create a hazard to your health and to those around you!

3.GENERAL EQUIPMENT INFORMATION

Catalyst assembly is designed to meet the toughest hydrocarbon treatment conditions while providing maintenance personnel with an equipment that is easy to handle and maintain.

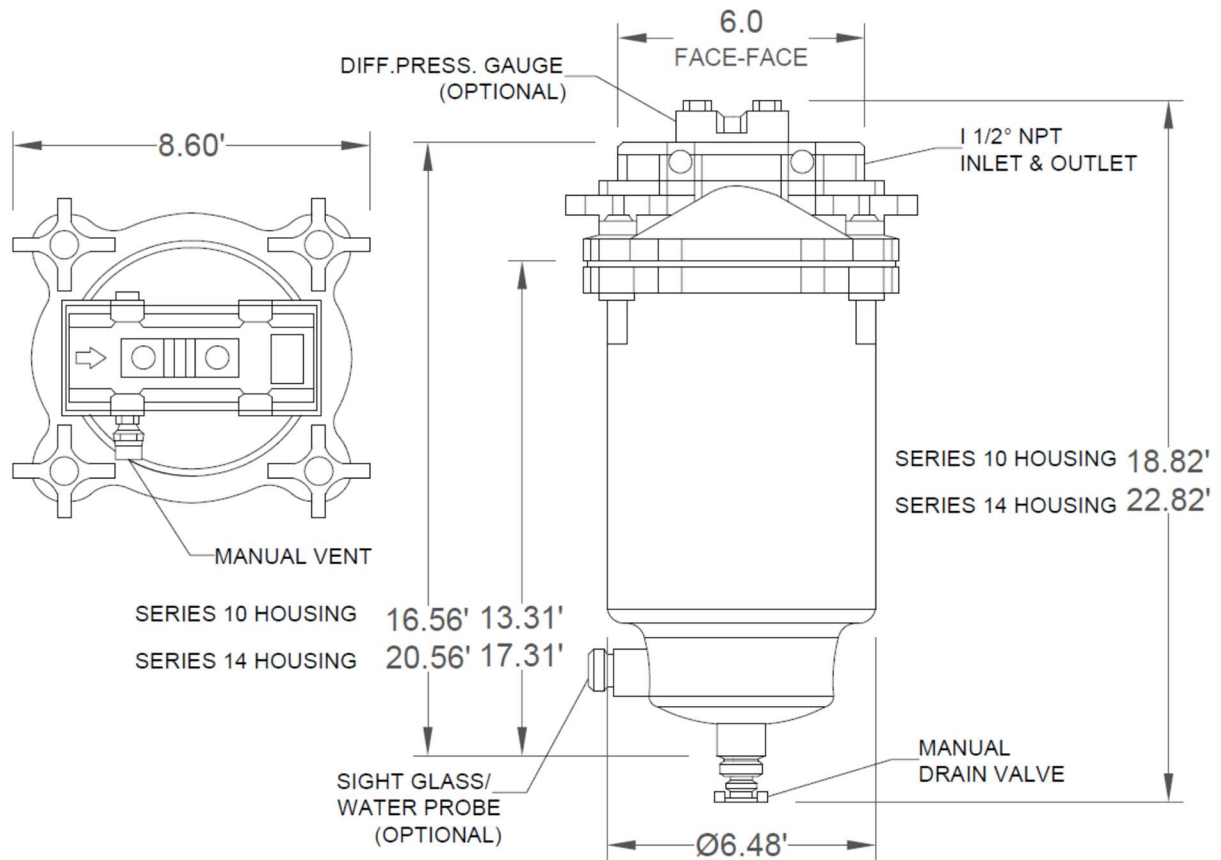
3.1 Housing Assembly Technical Specification for FHD5 to FHD25 Catalyst Models

- a) Die cast aluminum head
- b) Steel bowl assembly
- c) MAWP: 150 PSI / 10 BAR
- d) MAWT: 240° F / 115° C
- e) Viton "O" ring seal
- f) 1 ½ NPT Inlet and Outlet
- g) Black powder coated components
- h) "Locking ring collar" – no V-clamps
- i) Manual drain valve
- j) Manual vent valve



3.2 Housing Assembly Drawing for FHD5 to FHD25 Catalyst Models

Models FHD5 to FHD15 have the same dimensions as per Series 10 Housing (see the drawing below).
Models FHD20 to FHD25 have the same dimensions as per Series 14 Housing (see the drawing below).



3.3 Technical Data for Catalyst Model FHD5 to FHD25 Core

Catalyst model	Catalyst max. fuel treatment rate (LPM)		Core height	
	Diesel	HFO	Inches	cm
FHD5	19	13	2.6	6.6
FHD10	38	26	3.9	9.9
FHD15	57	40	5.3	13.5
FHD20	76	53	6.6	16.8
FHD25	95	66	8.0	20.3



3.4 Estimated Weight for Catalyst Model FHD5 to FHD25 (Core + Housing Assembly)

Catalyst model	LBS	KG
FHD5	32	14.5
FHD10	40	18.1
FHD15	50	22.7
FHD20	63	28.6
FHD25	73	33.1

Note:

Estimated wet weight may vary, due to different fuel physical characteristics. Also, the amount of catalyst elements inside the core may slightly vary.

4.INSTALLATION

4.1 Unpacking

Unpack the fuel catalyst and discard any shipping materials.

4.2 Identification of the Catalyst Location

Fuel catalyst is to be installed in accordance with the requirements of the international and local piping/fire rules.

4.2.1 Access, Ventilation and Maintenance

All spaces where fuel catalyst is to be located are to be easily accessible. Such spaces are to be sufficiently ventilated to prevent accumulation of oil vapor. As far as practicable, materials of either combustible or oil-absorbing properties are not to be used in such spaces.

4.2.2 Hot Surfaces

To prevent the ignition of fuel oil, all hot surfaces, e.g. steam and exhaust piping, turbochargers, exhaust gas boilers, etc. likely to reach a temperature above 220°C (428°F) during service are to be insulated with non-combustible, and preferably non-oil-absorbent, materials. Such insulation materials, if not impervious to oil, are to be encased in oil-tight steel sheathing or equivalent. The insulation assembly is to be well installed and supported having regard to its possible deterioration due to vibration.

4.2.3 Arrangement of Fuel Oil Equipment and Piping

As far as practicable, fuel catalysts are to be located far from sources of ignition, such as hot surfaces and electrical equipment. In particular, they are not to be located immediately above nor near such ignition sources. The number of pipe joints is to be kept to the minimum. Spray shields are to be fitted around flanged joints, flanged bonnets and any other flanged or threaded connections in fuel oil piping systems under pressure exceeding 1.8 bar (1.84 kgf/cm² , 26 psi) which are located above or near units of high temperature, including boilers, steam pipes, exhaust manifolds, silencers or other equipment required to be insulated in accordance with 4.2.2, and also to avoid oil spray or oil leakage into machinery air intakes or other sources of ignition.

4.2.4 Leakage Containment and Drainage System:

4.2.4.1 Leakage containment. Fuel oil system components, such as fuel catalysts, which require occasional dismantling for examination, and where leakage may normally be expected, are to have drip pans fitted underneath to contain the leakage.

4.2.5 Valve Operation.

Valves related to fuel oil systems are to be installed in readily operable and accessible positions.

4.2.6 Multi-Pass Fuel Flow Through Catalyst

Fuel Catalyst location in the fuel supply line should be after fuel service tanks following the fuel filters and heaters. **Typically, this may mean installation of the catalyst after the booster pumps to ensure multi-pass fuel flow through catalyst.**

4.2.7 Clearance

Provide room for the housing to clear the cartridge during change-out. Minimum 50 cm base clearance is required.

4.2.8 Bypass Line

Always install the catalyst unit with bypass valves to allow for smooth cleaning or exchange and maintenance procedures. **Ensure that a fuel filter is always placed before the catalyst unit. Be sure to correctly identify the inlet and outlet connections to avoid piping the unit backwards. The unit will not perform properly if connections are reversed.**

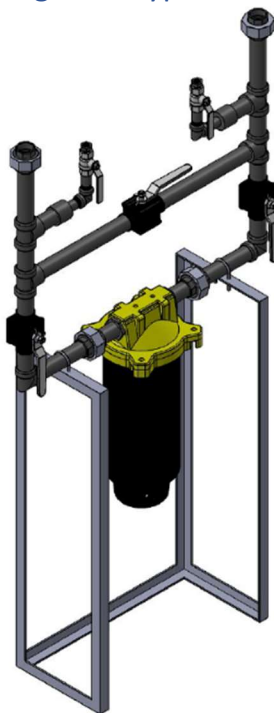
4.3 Installation

- a. Remove the housing protectors from the inlet and outlet connections. Make certain that connections are free of any debris.
- b. Place fuel catalyst in the desired location.
- c. Provide shut-off valves in the inlet and outlet piping as close to the unit as possible for isolating the unit from the system when catalyst core replacement is necessary.
- d. Connect the housing into the piping system with a minimum number of turns and fittings, pipe dope and Teflon tape especially on the inlet side.
- e. Provide room for the housing to clear the cartridge during change-out. Minimum 50 cm base clearance required.

4.4 Other Information

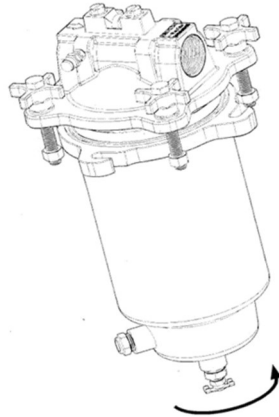
Fuel catalysts are designed to withstand the maximum working pressure of the system in which they are installed. Fuel catalysts must be installed with a bypass line to enable cleaning without disrupting the oil supply. For cleaning during operation, fuel catalysts are fitted with means of depressurizing before being opened and venting before being put into operation. For this purpose, valves and cocks for drainage and venting are provided. Drain pipes and vent pipes are to be led to a safe location. For leakage containment and drainage, see 4.2.4.

4.5 Sample Installation Drawing with Bypass Line



5. Operation and Service

It is recommended that the vent and drain valves be opened on a scheduled basis to permit the escape of entrapped air and accumulated water.



Since there are no moving parts, maintenance is limited to an occasional rinsing of the catalyst core using light fuel oil or detergent. This should be done in accordance with filter changes especially in heavy fuel oil.

The head gasket should be carefully inspected for signs of damage or deterioration each time the housing is opened. We recommend the gasket to be lubricated with petroleum jelly prior to installation.

Catalyst unit has no moving parts, no additives, no magnets, no electrical hook-ups, and is also maintenance free whenever used in applications for light fuel oil.

NOTE:

Whenever there is an application for HFO or any other similar fuel type, please follow the catalyst core cleaning instructions as per sections 5.1 'Core Cleaning Procedures', and 7.2 'Core Cleaning Plan'.

5.1 Core Cleaning Procedure

Catalyst unit must be cleaned when used with HFO every 1,000 operating hours or 3 months whichever comes first to maximize the catalyst lifetime.

WARNING! Operator should wear protective clothing including protective gloves and face shield when servicing the catalyst housing.

WARNING! Do not service catalyst housing when either the inlet or outlet valves are open or while unit is still under pressure.

WARNING! Do not loosen the bolts before draining. Failure to open the drain and properly vent the housing will result in pressurized liquid being trapped in housing. Pressurized liquid will spray out when the bolts are loosened which could cause serious injury and/or property damage.

WARNING! Do not operate the housing with damaged or worn parts. Serious injury and/or damage can occur. Inspect housing interior and all components for wear, corrosion or damage.

WARNING! Do not exceed operation limits that are listed in the housing label. Property damage, serious injury or death can result if limits are exceeded.

It is recommended that the vent and drain valves be opened on a scheduled basis to permit the escape of entrapped air and accumulated water.

Since there are no moving parts, maintenance is limited to an occasional rinsing of the cartridge using light fuel oil or detergent. This should be done in accordance with filter changes especially in heavy fuel oil applications.

5.1.1 Shutdown Procedure

- a) Turn on bypass to take the unit out of the supply loop prior to opening catalyst housing.
- b) Close inlet and outlet valves. Inlet or pressure side should always be closed first.
- c) Open and leave open vent valve to reduce internal pressure to zero. Make sure the valve is piped such that escaping fluids do not cause personal injury and/or property damage.
- d) Open bottom drain. If proper venting has been provided, gravity will move fluid through the drain. After housing has drained, close drain valve.
- e) Loosen all cover bolts and remove from cover. Check for wear and/or damage.
- f) Open cover lid.

5.1.2 Catalyst Core Cleaning

- a) Follow the shutdown procedure (See section 5.1.1)
- b) Remove the catalyst core by pulling it upwards.
- c) Inspect O-ring for wear and replace if necessary, to ensure a good seal to reduce by-pass.
- d) Clean the insert in light oil or kerosene
- e) Insert the cleaned catalyst core back in to the housing.

5.1.3 Start-Up Procedure

- a) Clean and inspect closure O-ring and O-ring groove. Lubricate O-ring heavily with suitable lubricant for O-ring material and media.
- b) Close cover lid.
- c) Tighten all collar bolts to 50 in lbs (23 kg). Do not apply excessive torque to the swing bolts as permanent damage to the housing or bolting hardware may result.
- d) Close the housing drain and open the system vent, if provided.
- e) Check inlet valve and make sure it is still open, and fill housing slowly. Don't allow fluid to spray from the vent!
- f) When all air is expelled from the vent and liquid begins to bleed from the vent, close the system vent.
- g) Open the bypass valves to resume normal operation.

5.2 Core Replacement Procedure

Fuel catalyst core lifetime is 10,000 operating hours. After 10,000 operating hours it is recommended to check the efficiency of the catalyst. If the efficiency of the catalyst is low it is recommended to change the catalyst core. To order new core please contact your local GFC distributor. Once you have received the new catalyst core, please follow the next few lines in order to successfully change the catalyst core.

- a) Follow the shutdown procedure (See section 5.1.1)
- b) Remove the used catalyst core by pulling it upwards.
- c) Inspect O-ring for wear and replace if necessary, to ensure a good seal to reduce by-pass.
- d) Place the new catalyst core inside the catalyst housing
- e) Follow the Start-Up Procedure (See section 5.1.3)

6. Routine Safety Checks

6.1 Daily Basis

Catalyst shall be visually checked daily, and any irregularities or deficiencies shall be followed-up and be reported to the responsible engineer.

The checks shall be performed visually with due consideration of the following indicators:

- ✓ Leakages
- ✓ Other observations applicable

6.2 Quarterly

Catalyst shall be visually checked quarterly, and any irregularities or deficiencies shall be followed-up and be reported to the responsible engineer.

The checks shall be performed visually, and if applicable also mechanically with due consideration of the following indicators:

- ✓ Leakages
- ✓ Core cleaning plan
- ✓ Fittings
- ✓ Bolts
- ✓ Valves
- ✓ Gaskets
- ✓ Housing
- ✓ Other as applicable

6.3 Other

It is recommended to check the catalyst for any irregularities or deficiencies 30 minutes after the main engine/burner has been started.

7. Appendix

7.1 Material Safety Data Sheet

- To be supplied with equipment

7.2 Core Cleaning Plan

Please use provided core cleaning plan as outlined below in order to control catalyst core cleaning schedule.

Activity	Catalyst model	Engine operating hour figures	Date	Initials of responsible person	Signature
<i>Installation</i>					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					
Core cleaning					

Core cleaning must be done accordingly to core cleaning procedures. See section 5.1 of the installation manual!

7.3 Installation check list

Before completing installation of the unit, inspect the entire installation area. Check and mark the items when completed.

Nr.	Description	<input checked="" type="checkbox"/>
1	Check for properly secured catalyst housing to the piping	
2	Check for properly secured Inlet and outlet connections	
3	Check for properly installed bypass valves	
4	Check ventilation and drain valves (both must be closed)	
5	Check for broken or damaged piping, if found, repair or replace immediately	
6	Check if catalyst core is properly inserted in to the housing	
7	Check if catalyst housing head is properly closed	

Responsible person: _____
(Name and Signature)

(Date)

7.4 Symbols, abbreviations, and convention

°C	Degrees Celsius
°F	Degrees Fahrenheit
ASME	American Society of Mechanical Engineers
CU.	Cubic
FT.	Feet
GFC	Green Fuel Catalyst
HFO	Heavy Fuel Oil
HMAC	Heterogeneous Metallic Alloy Composition
kgf	kilogram-force
LBS	Pound
LPM	Liters Per Minute
M.	meter
MAWP	Maximum allowable working pressure
MAWT	Maximum allowable working temperature
MAX.	Maximum
MIN.	Minimum
MSDS	Material Safety Data Sheet
nom.	nominal
PSI	Pound per Square Inch
Temp.	Temperature
thk.	thickness

8.Important Notes

For any questions, please contact your local distributor.

Any variations from these instructions should also be pre-approved by manufacturer.

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