

DO NOT CHANGE WITHOUT MSHA APPROVAL

DIESEL POWER SYSTEM PERMISSIBILITY CHECKLIST

Drawing No.: M130-015-01

Revision: 02

NOVEMBER 2003

(12 Pages)

DRY SYSTEMS TECHNOLOGIES®
DST DRY SYSTEM® MODEL M-130 DIESEL POWER PACKAGE
MSHA PART 7F DIESEL POWER PACKAGE APPROVAL No 7F-015-0

DEUTZ-MWM D916-6 DIESEL ENGINE
94 HP - 2300 RPM - MSHA PART 36 ENGINE CERTIFICATION No 31/ D57
94 HP - 2300 RPM - MSHA PART 7 ENGINE APPROVAL No 7E-A001

ARRANGEMENT
M-130

DRY SYSTEMS TECHNOLOGIES

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Revision: 02 Date: November 2003

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Technology for safer and cleaner use of diesel equipment in underground coal mines

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A. Diesel Engine

1. It has been determined that the area, in which tests are to be performed, is in FRESH AIR.
2. The machine is a is equipped with a MSHA Part 7E, Category A approved six cylinder MWM Model D916-6 diesel engine.

B. Intake System

The Intake System of this M-130 Diesel Power Package includes an Intake Manifold, an Intake Pipe, an Intake Flame Arrestor, and an Intake Air Shut-down Valve with an actuating cylinder and two Mounting Flanges. The top view of the assembly is shown in Illustration 1

3. All components appear to be the same as shown on the Illustration No 1.
[WEEKLY]
4. The Intake Manifold, Item No 2, is securely attached to the MWM Diesel Engine, Item No 1, and
[WEEKLY] all fasteners are in place and tight. There is a gasket, Item No 3, at each of the six locations between the diesel engine and the intake manifold, labeled as Joint No 1.
5. There is no visible damage, or cracks on the Intake manifold.
[WEEKLY]
6. The Cover, Item No 4, is securely tightened to the end of the Intake manifold and all fasteners are in place and tight.
[WEEKLY]
7. The Intake Pipe, Item No 6, is securely tightened to the other end of the Intake Manifold with bolts and lockwashers. There is a gasket, Item No 5, between the intake pipe and the intake manifold, labeled as Joint No 2.
[WEEKLY]

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- 8. [] The Intake Flame Arrestor Assembly, Item No 7, is securely attached to the Intake Pipe, Item No 6, with bolts and lockwashers.
[WEEKLY]
- 9. [] Item No 11 is a Flameproof Port. The Flameproof Port is tightly installed into the pipe thread at the Intake Pipe. A hose is connected to the side of the Flameproof port. A plug and retaining ring are securely installed at the end of the housing. The Flameproof Port is depicted on Illustration No 2.
[WEEKLY]
- 10. [] The Flange B, Item No 8, is securely attached to the Flame Arrestor with bolts and lockwashers.
[WEEKLY]

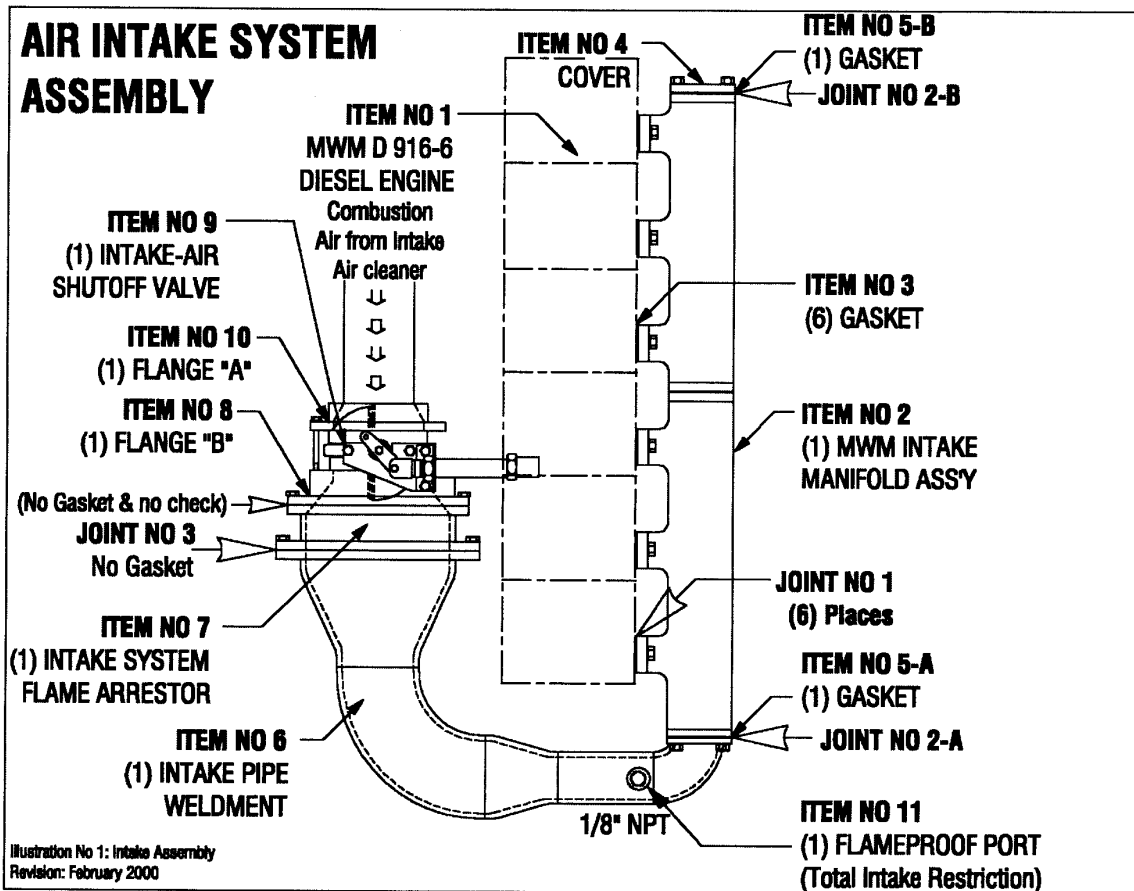


Illustration No 1 depicts the assembled Intake System.

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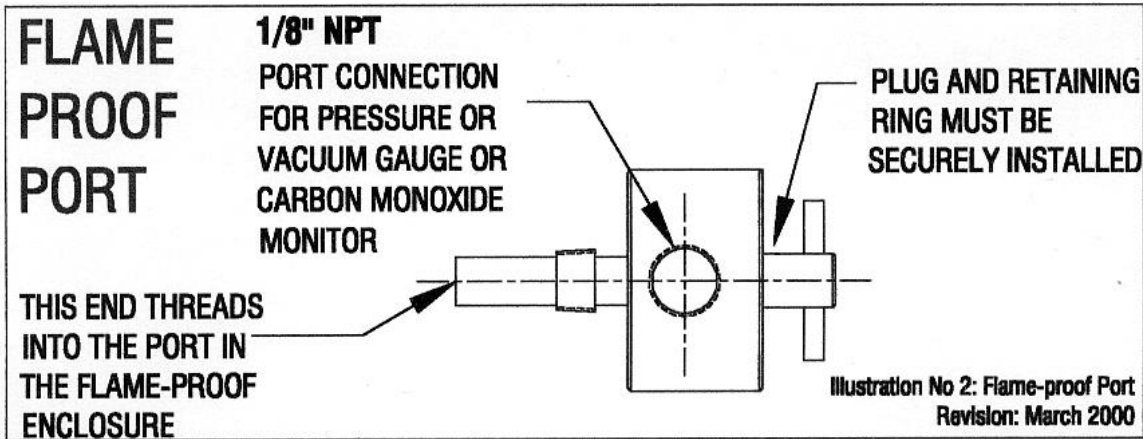


ILLUSTRATION No 2 depicts a Flame-proof Port

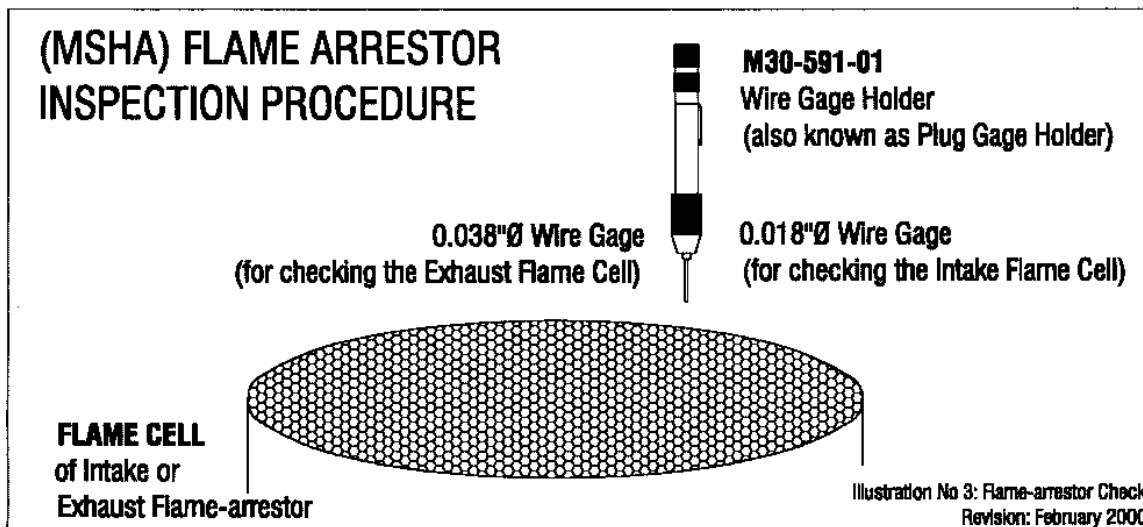
- 11. [] A 0.004" Feeler Gage cannot be inserted at the joint, labeled as Joint No 3. The Joint between the Flame Arrestor and Flange B does not require inspection.
[WEEKLY]
- 12. [] Once every six-month, remove the bolts and remove the Intake Flame Arrestor. The core of the Flame Arrestor consists of a 1" thick stainless steel crimped ribbon element. There is no apparent damage and a .018-inch plug gage will not pass through any of the triangular openings. The proper procedure is outlined on Illustration No 3. Reinstall the Intake Flame Arrestor. Re-install, tighten bolts and lockwashers.
[Six Month]
- 13. [] Visually inspect the entire intake system for damage. There are no loose connections, cracks, missing plugs on ports or missing components.
[WEEKLY]
- 14. [] The Intake Air Shut-off Valve, Item No 9, is securely attached between the Flange B, Item No 8, and Flange A, Item No 10, with hex bolts and lockwashers.
[WEEKLY]
- 15. [] If the Air Compressor intake is tied into the intake system of the engine, the Air Compressor supply connection must be located Out-by of the Flame Arrestor and In- by of the Intake Air Cleaner.
[WEEKLY]

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1. Remove the Flame Arrestor Assembly
2. Place the Flame Arrestor Assembly on a flat surface with a contrasting background under the flame arrestor, such as brattice cloth or clean white cloth.
3. Adequate lighting is required. Cap lamp lighting is not sufficient.
4. Visually inspect each side of the Flame Arrestor for openings or spaces obviously greater than the triangular openings of the core. These kinds of openings may have been caused by prying a screwdriver or another such object against or through the Flame Arrestor core during manufacturing or mine maintenance.
5. Visually inspect each side of the core for places where the windings of the flame arrestor core appear to be separated such that gaps can be seen. If such gaps exist, they must be checked as following:
 - a.) The only measuring tool considered acceptable for performing this evaluation is a 0.018 inch diameter or 0.038 inch diameter calibrated plug gauge, sometimes called wire gauge. The Plug Gauge is to be mounted in a Gauge Holder weighing about 1.0 to 1.5 ounces and projecting at least 1.0 inch out of the end.
 - b.) Grasp the gauge holder lightly between the index finger and the thumb. Place the wire tip at the point in question, making sure the plug gauge is vertical. Using only the weight of the gauge and holder see if it will enter the apparent gap. Do not attempt to wiggle the gauge through the opening.
 - c.) If the plug gauge enters the opening, the flame arrestor core must not be used on permissible equipment.
 6. Visually inspect the triangles in the flame arrestor core (both sides) for triangles that appear to be larger than the rest. If such conditions exist, these openings must be checked as previously described in section 5 a, b and c.
 7. Finally, if the flame arrestor core passes all the above evaluations, a final check should be performed on at least 5 triangles on each side of the core with the procedure described in section 5 a, b and c. In performing this check, the tip of the plug gauge must be placed against a specific triangular opening. If this special care is not taken, the evaluation will be invalid.

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C. Exhaust System

The Exhaust System of this Diesel Power Package includes a water-cooled Manifold, a water-cooled Elbow, a water-cooled Catalyst, an second water cooled Elbow, water cooled Bellows, a water-cooled Inlet/Outlet Box, a Heat Exchanger, a Flame Arrestor, an Exhaust Connecting Pipe, and a Filter Housing with a Disposable Paper Element DPM Filter.

Illustration No 4 depicts the Exhaust Manifold, Illustration 5 depicts the components between the MWM Engine and the Heat Exchanger and Illustration 6 depicts the components between the Heat Exchanger and the final exhaust with the 10" diameter Filter Housing.

- 16. [] All components appear to be the same as shown on Illustrations No 4, No 5 and No 6. There appears to be no visible damage.
[WEEKLY]
- 17. [] A water cooled Manifold, Item No 12, is securely attached to the exhaust ports of the engine and all fasteners are in place and tight. There is a gasket, Item No 13, at each of the six locations installed between the Exhaust Manifold and the MWM Diesel Engine, labeled as Joint No 4.
[WEEKLY]
- 18. [] A water-cooled Elbow, Item No 14, is securely attached to the outlet flange of the water cooled Exhaust Manifold, Item No 12, with hex bolts and lockwashers or studs, hex nuts and lockwashers. There is a gasket, Item No 17, between both components, labeled as Joint No 5.
[WEEKLY]
- 19. [] Item No 15 is a Flameproof Port. The Flameproof Port is tightly installed into the pipe thread of the Elbow, Item No 14. A hose is connected to the side of the Flameproof port. A plug and a retaining ring are securely installed at the end of the housing. (Same as shown on Illustration No 2)
[WEEKLY]
- 20. [] Item No 16 is the water-cooled Catalyst Assembly. It is securely attached to the water-cooled Elbow, Item No 14, with hex bolts and lockwashers. The vent connection is located at the top of the Catalyst assembly.
[WEEKLY]
- 21. [] Item No 18 is a second water-cooled Elbow. It is securely attached to outlet of the water-cooled Catalyst with hex bolts and lockwashers.
[WEEKLY]
- 22. [] A 0.004" Feeler Gauge cannot be inserted at the two joints between the water-cooled Catalyst and each of the two water-cooled Elbows, labeled as Joint No 6 and Joint No 7. There are no gaskets used on these joints.
[WEEKLY]

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23. [] Item No 19 is a water-cooled Bellows Assembly. It is securely attached to the outlet of the water cooled Elbow, Item No 18, with hex head bolts or socket head bolts and lockwashers. As alternate fastener arrangement, threaded studs, hex nuts and lockwashers may be used. The other end of the Bellows Assembly is securely attached to the Inlet/Outlet Box, Item No 21, with socket head or hex head bolts and lockwashers. As alternate fastener arrangement, threaded studs, hex nuts and lockwashers may be used.
- [WEEKLY]
24. [] A 0.004" Feeler Gage cannot be inserted at the two joints between the water-cooled Bellows, the Inlet-Outlet Box and the water cooled Elbow, labeled as Joint No 8 and Joint No 9. There are no gaskets used on these joints.
- [WEEKLY]

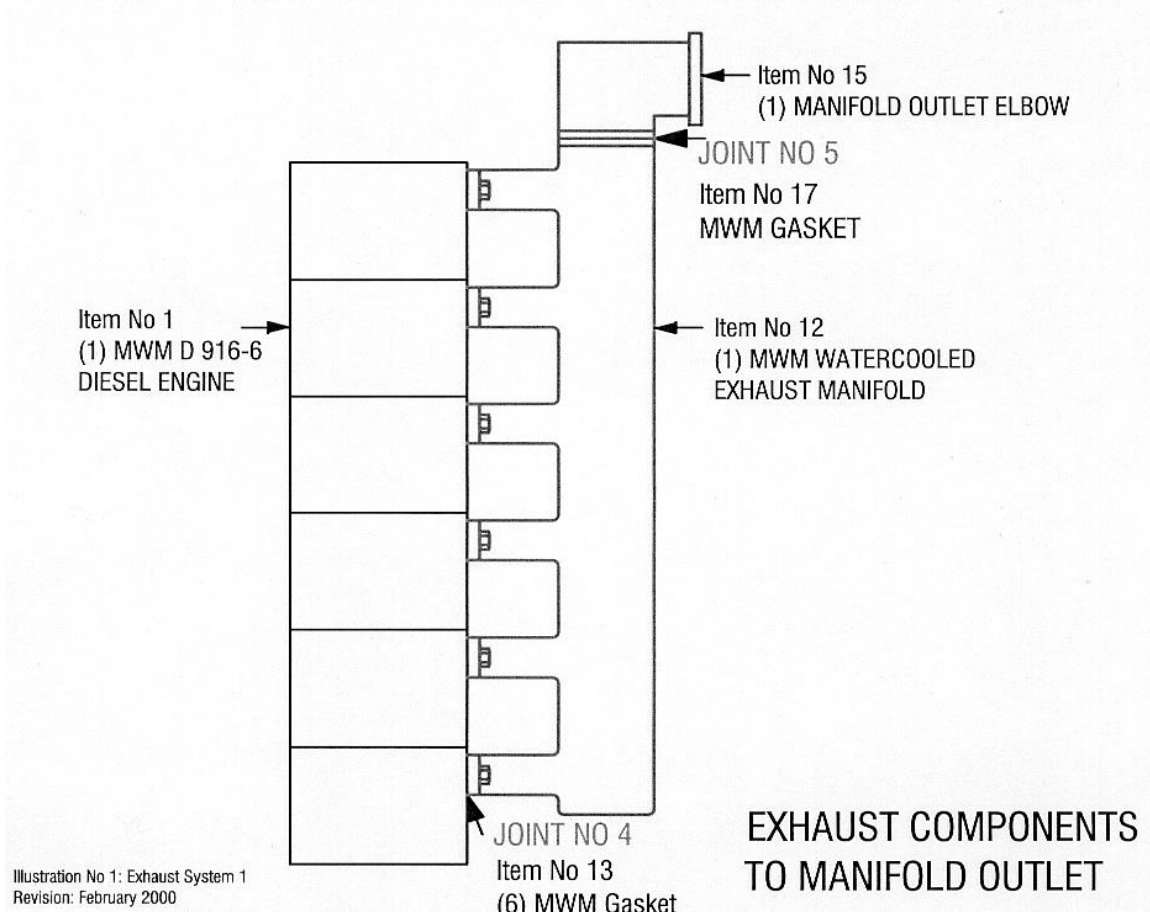


Illustration No 1: Exhaust System 1
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Illustration No 4 depicts the Water-cooled Manifold

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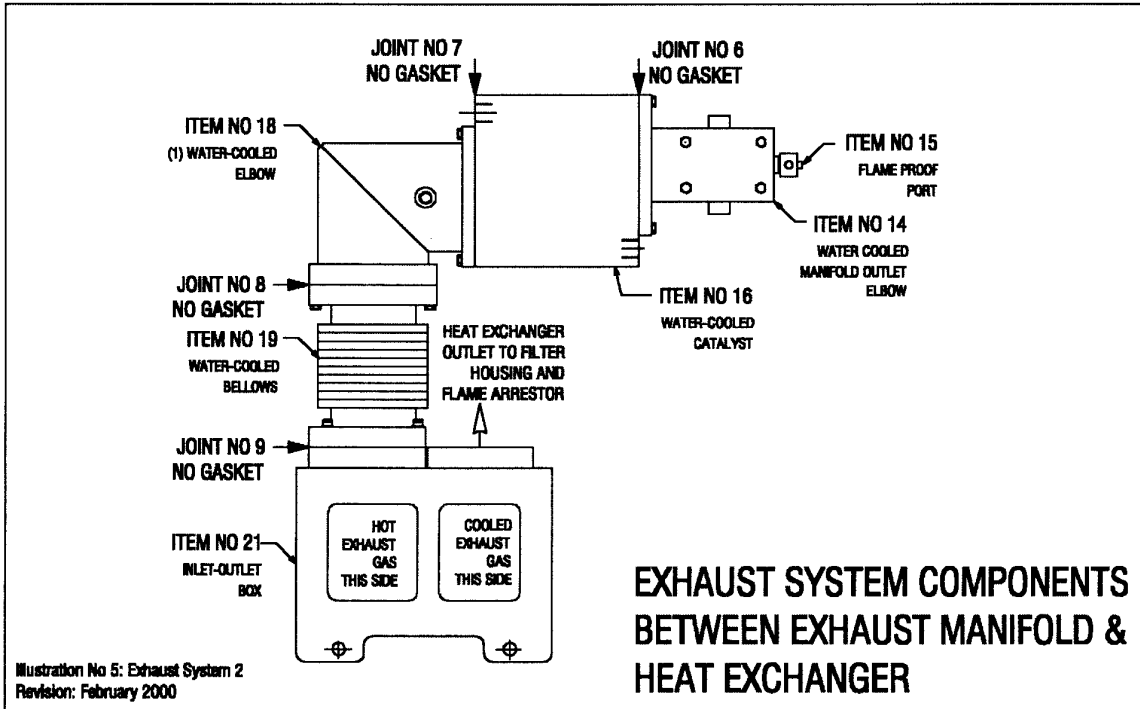


Illustration No 5 depicts the Exhaust System between the Diesel Engine and the Heat Exchanger

- 25. [] Illustration No 6 shows the Exhaust system components from the Heat Exchanger Assembly to the exhaust outlet using the 10" Filter Housing and the extended Exhaust Elbow.
- 26. [] There appears to be no external damage to these components.
 [WEEKLY]
- 27. [] Item No 22 is the Heat Exchanger and Item No 21 is the Exhaust Inlet-Outlet Box. Both components are securely held together with hex head bolts or socket head cap screws and lockwashers and threaded studs, hex nuts and lock washers. A Copper Gasket, Item No 23, is installed between both components, labeled as Joint No 12.
 [WEEKLY]
- 28. [] Item No 24 is the Exhaust Pipe Assembly. It is securely attached to the Inlet-Outlet Box, Item No 21, with hex head bolts or socket head cap screws and lockwashers. As alternate fastener arrangement, threaded studs, hex nuts and lockwashers may be used. A Copper Gasket, Item No 25, is installed between the two components, labeled as Joint No 11.
 [WEEKLY]

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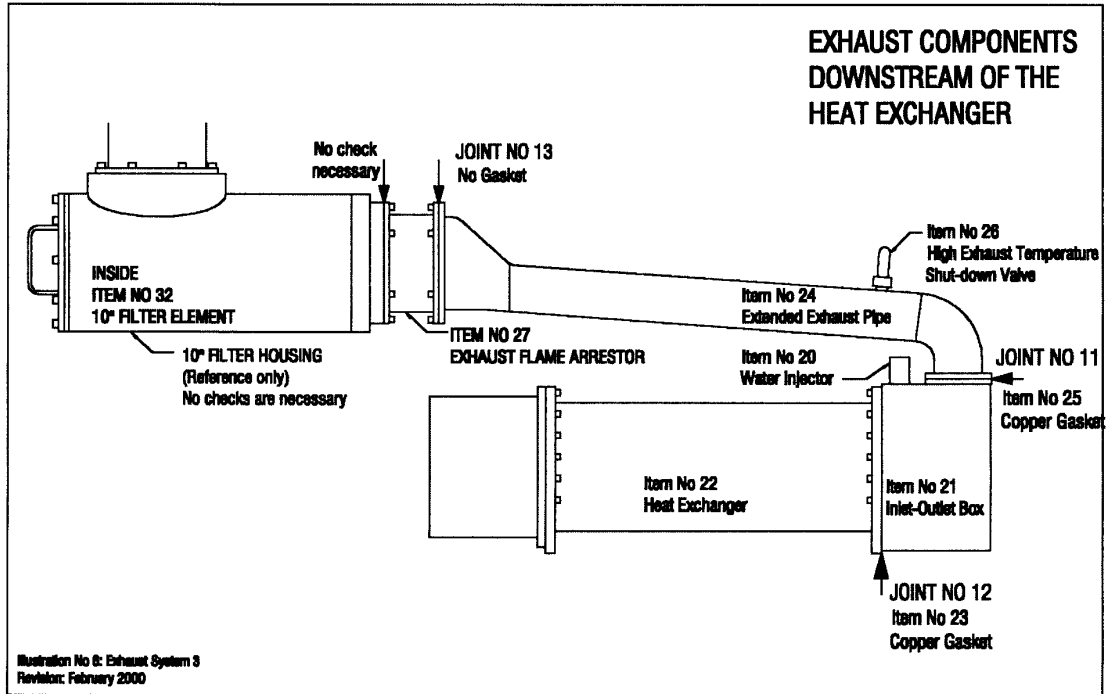


Illustration No 6 depicts the Exhaust System from the Heat Exchanger to the exhaust discharge with the 10" Filter Housing and the extended Exhaust Elbow

29. [] Item No 26 is a High Exhaust Gas Temperature Shut-down Valve. The Valve is tightly installed into the pipe thread on top of the Exhaust Pipe, Item No 24.
 [WEEKLY]
30. [] Item No 27 is the upstream (Exhaust) Flame Arrestor. Hex head bolts, hex nuts and lockwashers with lockwashers securely hold Flame Arrestor, Item No 27, to the outlet flange of the Exhaust Pipe, Item No 24.
 [WEEKLY]
31. [] Item No 28 is the Exhaust Particulate Filter Housing. Hex head bolts and lockwashers securely hold the Filter Housing to the Flame Arrestor, Item No 27.
 [WEEKLY]
32. [] Once every twelve-month, remove the bolts and remove the Flame Arrestor. The core of the Flame Arrestor consists of a 4" wide stainless steel crimped ribbon element. There is no apparent damage and a .038-inch plug gauge will not pass through any of the triangular openings. The proper procedure is outlined on Illustration No 3. Re-install the Flame Arrestor. Tighten all bolts.
 [Twelve Month]

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33. [] A 0.004" Feeler Gage can not be inserted between the Flame Arrestor and the Exhaust Elbow
[WEEKLY] labeled as Joint No 13, on Illustration No 6. There is no gaskets used on this joint.

D. Exhaust Filter Assembly

34. [] The Exhaust Particulate Housing and Lid are shown on Illustrations 6 but are not part of the
permissible diesel power package. No checks are needed.
35. [] The Filter Element, Item No 32, must be marked "DST M40" or "PAAS M40" or "M33 300F"
[WEEKLY] on the end of the filter.
36. [] Remove the Filter Element, Item No 32 from the housing. Wear gloves and avoid direct contact
[WEEKLY] with diesel soot. Visually inspect the inlet side of the Filter Element
37. [] Reinstall a Filter Element, Item No 32 (Replace with a new Filter Element if necessary) and the
[WEEKLY] Lid, Item No 30.
38. [] Item No 33, its location shown on the Schematic in Illustration No 7, is a Flameproof Port for
[WEEKLY] the total exhaust gas backpressure. It is located in the water-cooled Elbow, Item No 14. The
Flameproof Port is tightly installed into the pipe thread. A hose is connected to the side of the
Flameproof port and a plug is securely installed with a retaining ring. The hose is connected to
the side of the component and a plug is securely installed with a retaining ring.
39. [] Item No 34, its location shown on the Schematic in Illustration No 7 is another Flameproof
[WEEKLY] Port for monitoring the pressure upstream of the Heat Exchanger. It is located at the inlet
section of the Inlet-Outlet Box, Item No 21. The hose is connected to the side of the
component. A plug and a retaining ring are securely installed at the end of the housing.
40. [] Item No 35, its location shown on the Schematic in Illustration No 7, is another Flameproof
[WEEKLY] Port for monitoring the pressure downstream of the Heat Exchanger. It is located at the outlet
section of the Inlet-Outlet Box, Item No 21. The hose is connected to the side of the
component. A plug and a retaining ring are securely installed at the end of the housing.
41. [] Item No 28, its location shown on the Schematic in Illustration No 7, is the Exhaust Gas
[WEEKLY] Temperature Sensor. It is located in the Exhaust Pipe, Item No 24. The connection is secure
and tight.
42. [] Item No 27, its location shown on the Schematic in Illustration No 7, is the High Coolant
[WEEKLY] Temperature Shut down Valve. The Sensor is tightly installed near the engine's thermostat
housing.

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E. Engine Shut-down Devices

43. [] There are two Temperature Shutdown Valves, one for the high coolant temperature and one for the high exhaust gas temperature. Both Valves are installed.
[Weekly]
44. [] Test both temperature shutdown sensors as described below: Test every six months.
[Six Month]
- a. () Remove the water sensor. Place sensor into a water/ethylene glycol mixture and heat. The valve must open at 200-210° F and shut the engine down.
- b. () Remove the gas temperature sensor with integral well. Do not remove from the well. Place sensor and well into a non-flammable liquid, such as non-flammable transmission or hydraulic fluid, and heat. The valve must open at 275-285° F and the engine must shut down.
45. [] Reinstall both sensors.
46. [] With the throttle pedal fully depressed and the transmission disengaged, the engine speed indicated on the gauge in the operators cab does not exceed 2420 RPM
[WEEKLY]
47. [] Run engine at high idle speed of 2420 RPM. The total intake vacuum shown on the gauge in the operator's cab must not exceed 20 inches H₂O.
[WEEKLY]
48. [] Run engine at high idle speed of 2420 RPM. The total exhaust backpressure shown on the gauge in the operators cab must not exceed 40 inches H₂O.
[WEEKLY]
49. There are three optional pressure differential gauges located inside the engine compartment. The following inspection will be performed at high idle speed of 2300-2420 RPM, the transmission disengaged and the throttle pedal fully depressed.
- [] A. Gauge B measures the intake flame arrestor differential pressure. The minimum reading is at least 1.0" H₂O. A reading of less than 1.0" H₂O requires disassembly to check the flame arrestor.
[WEEKLY]
- [] B. Gauge C measures the exhaust flame arrestor differential pressure. The minimum reading is at least 1.0" H₂O. A reading of less than 1.0" H₂O requires disassembly to check the flame arrestor
[WEEKLY]
50. [] With the engine running at low idle speed, engage the engine stop switch on the in the operators compartment. The Engine must shut down IMMEDIATELY.
[WEEKLY]

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51. [] With the engine at idle speed of 650-850 RPM, activate the emergency shutdown valve. The engine must shut down IMMEDIATELY.
 [WEEKLY]

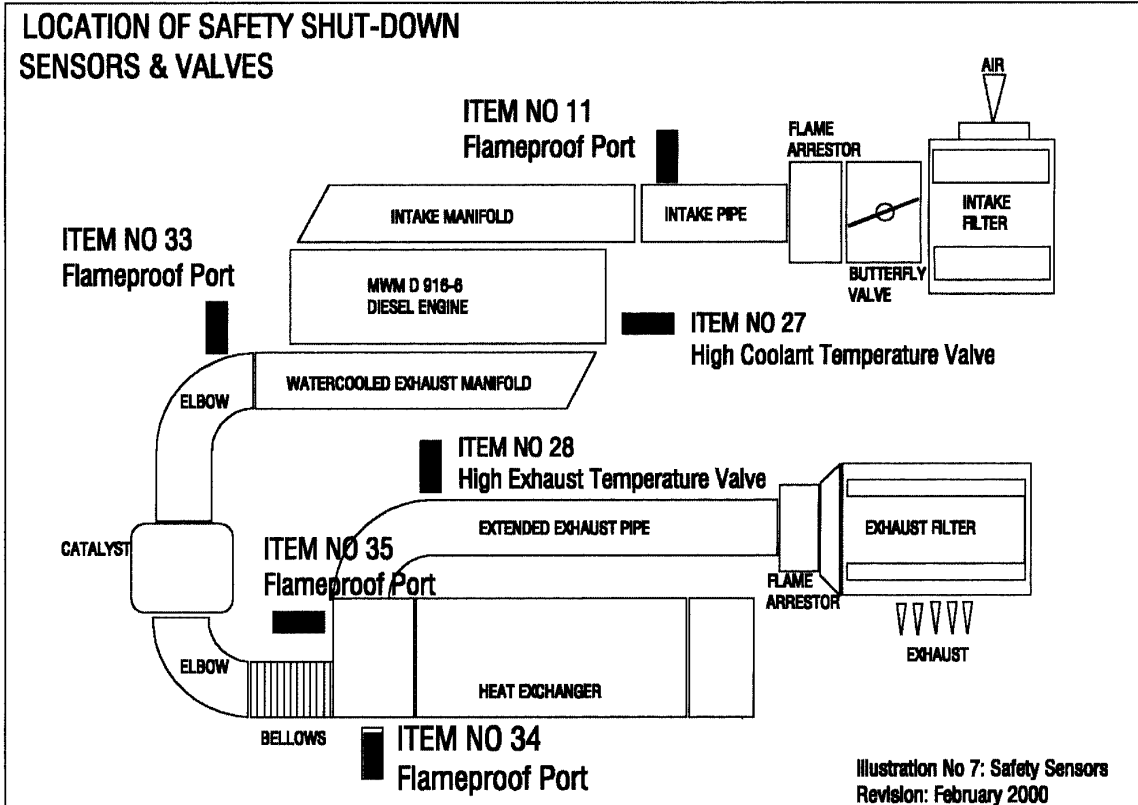


Illustration No 7: Safety Sensors
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Illustration No 7 depicts the location of the Shut-down sensors

Notes:

- [WEEKLY] DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR, SECTION 75.1914.
- [Six Month] DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED EVERY SIX MONTH IN ACCORDANCE WITH 30 CFR, SECTION 75.1914.
- [Twelve Month] DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED EVERY TWELVE MONTH IN ACCORDANCE WITH 30 CFR, SECTION 75.1914.

This Permissibility Checklist applies only to the Model M-130 Single Flame Arrestor DST Diesel Power Package attached to an MWM D 916-6 Diesel Engine. The Permissibility Checklist incorporates 51 separate checks.

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