PYROBAN®

Euromech 2G
Operator Manual

TO BE HELD BY END USER

Pyroban – your partner in Explosion Protection

Thank you for choosing Pyroban to explosion protect your materials handling equipment. We have been converting materials handling equipment for use in hazardous areas for almost 50 years. We have the skills and expertise to protect all types of diesel and electric forklifts from the world's leading manufacturers.

Pyroban strive to be the first choice and trusted partner for explosion protection. We provide the right product and services to enable our customers and our people to succeed safely in their daily business.

SHOREHAM, UK

Our production and centre of excellence for diesel and electric materials handling equipment conversions offering a full design, conversion and manufacturing facility.

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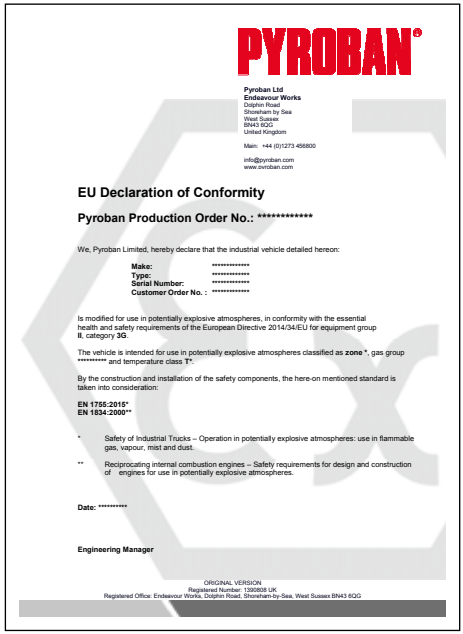
Section 2
Technical Specification and Certification

Euromech 2G protects diesel vehicles operating in hazardous environments classified as zone 1 and zone 2 in accordance with ATEX Directive 2014/34/EU.

Euromech 2G conversions cover all aspects of the vehicle components, functions, and modes of operation; employing appropriate protection concepts to each element in order to achieve ATEX Directive compliance.



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EU Declaration of Conformity

Pyroban Production Order No.: ************

We, Pyroban Limited, hereby declare that the industrial vehicle detailed hereon:

Make: ************
Type: ************
Serial Number: ************
Customer Order No. : ************

Is modified for use in potentially explosive atmospheres, in conformity with the essential health and safety requirements of the European Directive 2014/34/EU for equipment group **II**, category **3G**.

The vehicle is intended for use in potentially explosive atmospheres classified as **zone** *, gas group ********** and temperature class **T***.

By the construction and installation of the safety components, the here-on mentioned standard is taken into consideration:

EN 1755:2015*
EN 1834:2000**

* Safety of Industrial Trucks – Operation in potentially explosive atmospheres: use in flammable gas, vapour, mist and dust.

** Reciprocating internal combustion engines – Safety requirements for design and construction of engines for use in potentially explosive atmospheres.

Date: **********

Engineering Manager

ORIGINAL VERSION
Registered Number: 1390808 UK
Registered Office: Endeavour Works, Dolphin Road, Shoreham-by-Sea, West Sussex BN43 6QG

In most cases the vehicle will be placed on the market by the OEM. The EU Declaration of conformity and CE marking plate on the vehicle will be issued by the OEM and NOT Pyroban. Please refer to the OEM manual for guidance on CE conformity if OEM is placing the complete machine on the market.

In some cases Pyroban place the equipment on the market and are therefore considered the manufacturer of the complete machine. Only if Pyroban places the equipment on the market will Pyroban issue an EU Declaration of Conformity. Example certificate shown below.

Section 3
Relation to other documents

Legal requirement

The vehicle will be fitted with an identification marking label similar to that shown below. The label defines the conversion specification and vehicle details.

Refer to the label on the vehicle for specific details.

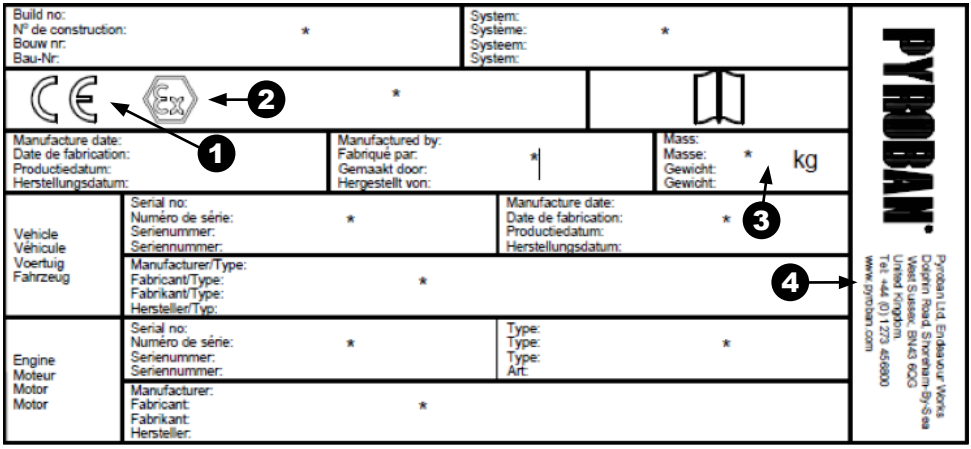
If in doubt, refer to the person in authority.

1. CE marking to show the truck meets the requirements for EU legislation. This will only be included on the label if Pyroban are considered the manufacturer of the truck. Otherwise refer to the OEM manual for the CE marking and declaration if they are considered the manufacture of the truck.

2. The Ex mark denotes the equipment is explosion protected, It will be followed by details of the protection level.

3. Weight of the truck will only be applied to the label plate if Pyroban are considered the manufacturer of the truck. Refer to point 1 above.

4. The address is only required on the label if Pyroban are considered as the manufacturer of the truck.



Section 4
Contents, list of images, icons and attachments

Symbols Used

The terms DANGER, WARNING, CAUTION, NOTE, ENVIRONMENT NOTE and CHANGE TO OEM MANUAL are used in these operating instructions for notes on particular hazards or for unusual information that needs to be highlighted.

DANGER!

Means that failure to comply can cause risk to life and/or major damage to property.

WARNING!

Means failure to comply can cause risk of serious injury and/or major damage to property.

CAUTION!

Means that failure to comply can cause risk of material damage or destruction.

NOTE!
Means that particular attention is drawn to combinations of technical factors which may not be evident even to a specialist.

ENVIRONMENT NOTE
The instructions listed here must be complied with as otherwise environmental damage may result.

CHANGE TO OEM MANUAL
This is advice to the user that the Pyroban conversion has altered or changed the way the part is used or serviced. This change will conflict with the OEM manual. This label also will appear on the component.

Section 5
Introduction

Your converted Pyroban 2G vehicle is designed to deliver optimum safety whilst integrated with the original equipment manufacturers (OEM) machine.

Your equipment features Pyroban Euromech 2G protection for vehicles operating in hazardous environments classified as Zone 1 in accordance with ATEX Directive 2014/34/EU.

The vehicle conversion is carried out in accordance with the latest requirements as specified within the European Standard EN1755:2015. Industrial Trucks - Safety requirements and verification - Supplementary requirements for operation in potentially explosive atmospheres.

Pyroban Euromech 2G conversions cover all aspects of the vehicle/equipment components, functions, and modes of operation; employing appropriate protection concepts to each element in order to achieve ATEX Directive compliance.

To prevent ignition of the hazardous area, Euromech 2G will shut the vehicle down in the event of a high surface temperature or frame leakage being detected, and will prevent inlet or exhaust explosions transmitting to atmosphere through integral flame arresters. The Euromech safety control will also detect engine over-speed if a gas & air mixture is ingested and shut the engine down.

However, this level of protection will not be maintained unless the converted vehicle is operated and serviced in accordance with the vehicle manufacturers' instructions and the instructions defined in this manual.

It is important that this manual is read in conjunction with the original equipment manufacturers operating instruction.

Description of Use

Indoor and Outdoor use

Ambient temperature limits:
Refer to vehicle identification label

Humidity limits:
0% to 95% RH non-condensing

Pressure limits:
95kPa to 110kPa (712 to 825mmHg)

Storage temperature limits:
Refer to OEM manual

Please refer to original equipment manufacturer manual for vehicle description and climatic condition limitations.

Section 6
General Safety Prescriptions

General and Safety Information

It is essential that this operator manual is read and understood before operating the Pyroban equipment.

Person in Authority:

Person taking full responsibility for safety procedures and supervision of safety for employees under their control.

Safety points

DANGER!

If the Pyroban equipment fails to operate or if it shuts the vehicle down while operating, do not attempt to restart until permission has been granted by the person in authority. Do not restart Euromech 2G until this procedure has been completed and permission granted by the person in authority.

DANGER!

If there is any doubt as to the satisfactory condition of the vehicle or Pyroban equipment the person in authority must be consulted and any faults rectified before the vehicle may be used in the hazardous area.

WARNING!

Only suitably trained and competent personnel may carry out maintenance or repair work on the Pyroban equipment. All repair and maintenance must be in accordance with EN 60079-17 and EN 60079-19. Pyroban accepts no responsibility for work undertaken by non-Pyroban trained personnel.

WARNING!

All personnel are expected to employ safe working practices and observe their company safety policy and all relevant safety requirements, regulations and directives applicable to the country or locality in which the equipment is being used.

WARNING!

It is essential that the vehicle is maintained in accordance with the OEM instructions and schedule except where otherwise specified in this manual. Particular attention should be paid to the lubrication of all moving parts. Failure to do so could result in a mechanical ignition hazard.

WARNING!

If an audible noise or vibration is detected that could be indicative of bearing failure. Do not use the vehicle and contact the person in authority immediately.

WARNING!

Check for fluid leaks before vehicle start up. If a leak is detected do not use the vehicle and contact the person in authority immediately.

General Safety Prescriptions continued

WARNING!

Check the levels of all lubricants before vehicle start up. If any are below the minimum recommended level do not use the vehicle and contact the person in authority immediately.

WARNING!

Ensure where applicable hydraulic activation cylinders are kept free from the build up of dust and debris.

WARNING!

Protection Levels will not be maintained unless the consulted vehicle is operated serviced in accordance with the vehicle manufactures instructions and the instructions defined in this manual.

WARNING!

Products contain Non-metallic parts, separately certified parts and electronics that are relied on for compliance. If the product is to be used with a chemically aggressive environment. Contact Pyroban for verification that the hazardous are a compliance will not be compromised.

WARNING!

Enclosures added to the vehicle, as part of the hazardous area conversion, may obstruct a secondary exit / access point e.g. the rear window. A secondary exit / access point is a requirement under ISO 3691. Refer to the original equipment manufacturer for further information.

CAUTION!

Read and understand all notices and labels on the equipment before operating the vehicle.

CAUTION!

After maintenance or repair work, the person in authority must inspect and approve the Pyroban equipment before the vehicle is returned to service.

CAUTION!

If braking performance is suspect or if a squealing sound is heard when the brakes are applied, do not use the vehicle and contact the person in authority immediately.

CAUTION!

Do not remove connectors or plugs when the battery is connected. All connectors and plugs must be reconnected before reconnecting the battery.

CAUTION!

Water or high-pressure jets must not be used to clean the Euromech 2G components.

Section 6.1
Safety Warning

Safe Use

This equipment could present hazards if it is not operated according to this instruction handbook.

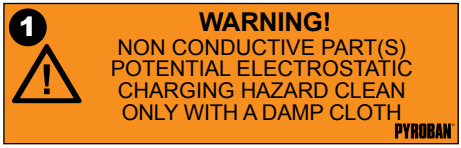
Due to the extent of the Pyroban conversion there are many changes from the original equipment manufacturers manual. Both the Pyroban and original equipment manufacturers manual must be read very carefully to establish any contradictions. If the operator has any concerns they should consult with Pyroban to ensure safe use of the equipment.

DANGER!

The truck must only be used in the assigned areas that meet the requirements established on the conversion certificate. Any use of the equipment outside this may not be covered by sufficient explosion protection.
Resale of the converted truck must also comply with the requirements established on the conversion certificate.

Section 6.1a
Warning & Attention Labels

1



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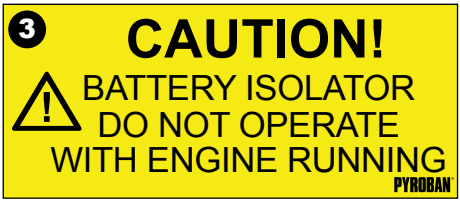

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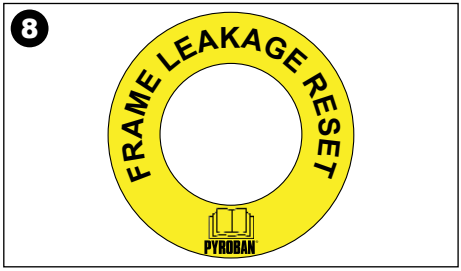

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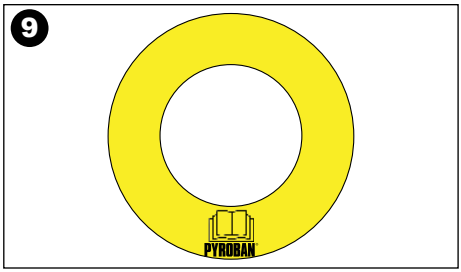

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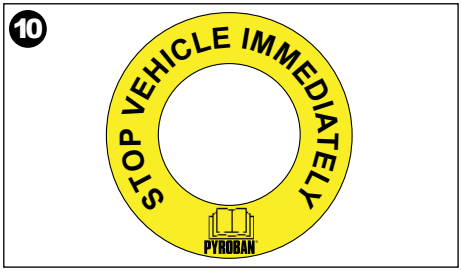

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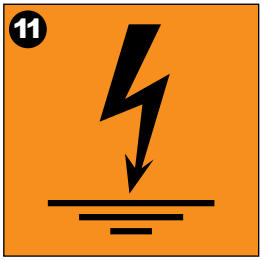


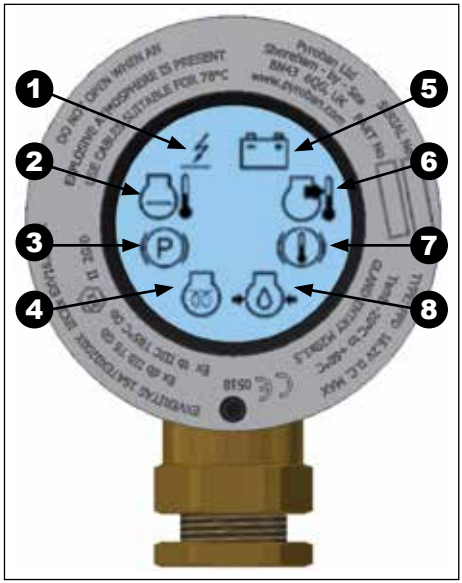
6.1a
Warning & Attention Labels continued

REF	Label Text	Reason
1	**WARNING!** NON CONDUCTIVE PART(S) - POTENTIAL ELECTROSTATIC CHARGING HAZARD - CLEAN ONLY WITH A DAMP CLOTH	To prevent the build up of static.
2	PYROBAN LOGO AND BOOK SYMBOL	This is advice to the user that the Pyroban conversion has altered or changed the way the part is used or serviced. This change will conflict with the OEM manual.
3	**CAUTION!** BATTERY ISOLATOR DO NOT OPERATE WITH ENGINE RUNNING	Location and warning for the battery isolator.
4	**WARNING!** ENCLOSURES MUST NOT BE OPENED, OR ANY EQUIPMENT DISCONNECTED WHILE INSIDE HAZARDOUS AREA	The equipment will not be protected from gas or dust in the hazardous area.
5	**WARNING!** REMOVE CABLE TIE FROM EARTH STRAP BEFORE PLACING TRUCK IN SERVICE / ENSURE STRAP IS IN CONTACT WITH THE FLOOR	Warning to ensure that the truck is grounded.
6	**WARNING!** CLEAN MACHINE EVERY DAY TO BE SURE THAT NO DUST LAYERS CAN BE FORMED	Dust layers above 5mm can affect the T-class of the truck.
7	**WARNING!** OPEN ONLY IN A NON HAZARDOUS AREA	The equipment will not be protected from gas or dust in the hazardous area.
8	FRAME LEAKAGE RESET AND BOOK SYMBOL	Reset key because the electro-static resistance across the truck is too dangerous for the hazardous area. Refer to section 9.1e.
9	BOOK SYMBOL	Auxiliary fault light indication. Check manual for fault diagnostics.
10	STOP VEHICLE IMMEDIATELY AND BOOK SYMBOL	This will be because of an over temperature. Surface temperature above the T class of the truck is unsafe for use in the hazardous area.
11	CHASSIS TO GROUND POINT	The label is to indicate the chassis earthing points on the truck. There will be 2 points per machine located on opposite ends of the truck.

Section 6.1b
Euromech Safety Warning

Original vehicle display replaced with Pyroban instrumentation (including Pyroban system indicators).

Annunciator

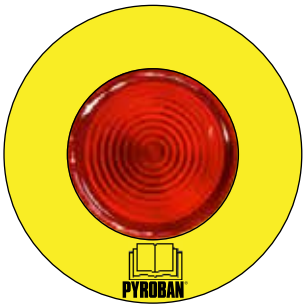


The LEDs are typically connected to indicate operation or faults as shown below:

1. Frame Leakage Detected
2. Coolant - Over-Temperature
3. Park Brake ON
4. Glow Plugs ON
5. Battery - Charging Failure
6. Exhaust Gas Over-Temperature
7. Brake Over-Temperature
8. Low - Oil Pressure

Shutdown warning lamp

Auxiliary Shutdown warning lamp



Section 6.1c
Function of Safety Device

Explosions can take place in any location where the three elements of the fire triangle are present:

1. An oxidizer - the oxygen in the atmosphere - is always present
2. A gas or liquid fuel
3. A source of ignition is always present

- Naked Flames
- Hot Surfaces
- Mechanically & Electrically Generated Sparks
- Electrostatic Discharge Sparks

Function of the safety device.

- Keeping surface temperature below the temperature class for the hazardous area. This is monitored by the system with temperature sensors placed of various locations on the equipment.
- Enclosures to withstand an explosion.
- Air inlet valve to stop over speed if gas is present.
- Exhaust gas cooling system to ensure the exhaust temperature does not exceed the Temperature-class
- Earthing of electrostatic charge which is a potential ignition source.
- Fork cladding in stainless steel to protect from impact sparks.
- Identification of electro-static charge risks which are fitted with the appropriate warning labels.

Section 6.1d
Safety Measures

Frame Leakage Dimple Key

Euromech 2G is supplied with a dimple key to reset the system in the event of a frame leakage shutdown. The key must be kept in a safe place and under the control of the person in authority.

(To be held by the person in authority)

Sections 6.1e + f
Additional Safety Information

Footwear

All footwear to be worn by the operator shall comply with ISO 20344.

6.1f
Protective Clothing

All protective clothing to be worn by the operator, including gloves to comply with EN1149-5.

Section 6.1g
Additional Safety Information

Requirements for conductive or dissipative floors

WARNING!

Trucks should only be operated in hazardous areas with dissipative floors.

NOTE!
Information on the requirements for conductive or dissipative floors can be found in CLC/TR 60079-32-1.

Section 6.1h
Additional Safety Information

Electro-static charging

Plastic parts which are subjected to a highly efficient charging mechanism such as frequent contact with the operator could be a possible dangerous electrostatic charging of nonconductive parts on the truck.

There is a danger of electrostatic charging of no conductive parts of the vehicle for example: operator contact with flexible doors and strip curtains. If flexible doors have been fitted by Pyroban they will be dissipative to reduce electrostatic charging risks. Please contact Pyroban for repairs and maintenance.

WARNING!

Some of these products can contain hatching markings that can reduce visibility when operating the truck. Always ensure that operator visibility is not compromised.

Section 6.1i
Additional Safety Information

Earthing Straps & Conductive Tyres

Check the condition of earthing straps and dissipative tyres. Earthing straps should be in full contact with the ground. The location for the earth straps are marked with label 11 to indicate the grounding points, typically in two different locations on the truck.Tyre treads should be free from metal particles and undamaged. Pneumatic tyres should be inflated to the manufactures advised pressure.

WARNING!

As part of daily operation earthing straps and tyres should be checked for contamination. If the excessive contamination is suspected the conductivity should be checked by a suitably qualified person.

Earthing strap

Dissipative tyre

Section 7
Description of the Product

System Components and Operation

The components shown are typical and may vary slightly in appearance from those on your vehicle but they operate as described in this manual. Make yourself familiar with the location of these items before attempting to start the vehicle.

Key switch

Euromech 2G vehicles utilise the original vehicle key switch and associated functionality. Refer to the original vehicle instructions for location and operation.

Vehicle Instrumentation

The original vehicle instrumentation is replaced with a combination of LED warning and status indicators and mechanical gauges. As far as practical the original display functions will be maintained, but in a different form. No safety critical functions will be removed.

In addition to original instrumentation, the vehicle will be fitted with a number of Euromech warning and status indicators (LED) relevant to the number and type of monitoring devices installed.

The LEDs are housed inside a flameproof enclosure (annunciator). Mechanical gauges will be mounted on the dashboard (mechanical fuel gauge is located within the fuel tank, possibly under the bonnet).

Mechanical gauges for coolant temperature, fuel level, and oil pressure (optional)

Section 7
Description of the Product continued

Annunciator
Fault indicator for the Euromech 2G system

WARNING!

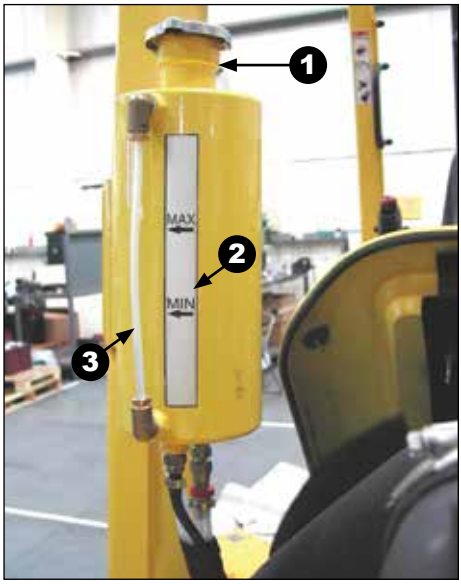
WARNING – DO NOT OPEN WHEN AN EXPLOSIVE GAS ATMOSPHERE IS PRESENT.

Coolant Reservoir

As part of the Euromech 2G conversion, the original coolant system will be modified to provide additional cooling capacity. An extra capacity expansion tank will be fitted to the vehicle. The level of coolant must be maintained to prevent coolant over-temperature shutdown.

The coolant level should be checked every day.

A visual coolant level feature is fitted to some expansion tanks to facilitate level checking. Alternatively, the level can be checked by removing the pressure cap.



Coolant expansion tank

1. Coolant level indicator tube (optional)
2. Pressurising cap & overflow
3. Coolant level MIN / MAX

WARNING!

The pressure cap must not be removed if the engine is hot. Serious personal injury may result from hot coolant.

Section 7
Description of the Product continued

Horn

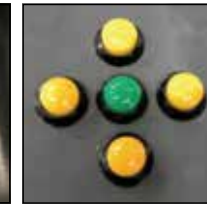
The vehicle electric horn will be replaced with a pneumatic unit. Ensure that the operator is familiar with the location of the actuating bulb.

Pneumatic horn

Buttons & Switches

Changes to OEM functions could be in the form of replacing the operation buttons & switches to a product that is required for use in a hazardous area.

CHANGE TO OEM MANUAL
The changes in appearance and operation of some buttons & switches will have changed from the OEM operation manual. The replacements will have an identical function OEM manual.



Examples of switch and button replacements

Shutdown Valve lever (only applicable with non turbocharged engines)

Section 8
Implementation, Installation, Adjustments

Pre-Start checks

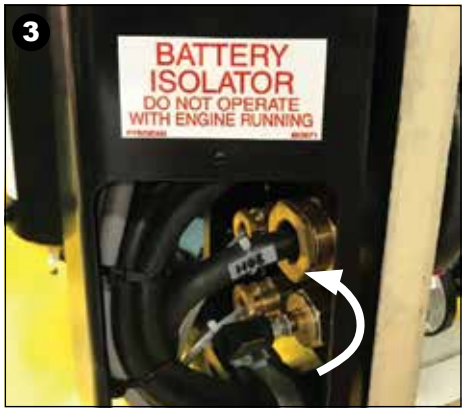
Carry out any pre-start checks recommended by the vehicle manufacturer **including coolant and fuel level**.

CHANGE TO OEM MANUAL
If applicable - the header tank will have been replaced and moved to the back part of the truck. Water levels can be checked on fill line indicator. The OEM filler point will no longer be the primary filling point.

2 Check the general condition of the vehicle and Pyroban equipment as defined in the Routine Servicing section of this manual.

Ensure the battery isolator is turned ON (located on side of control system enclosure).

CHANGE TO OEM MANUAL
The battery isolator will be located out of a gland entry from the rear enclosure.



Ensure the shutdown valve is RESET. Push the lever or knob to the RESET position and release. The valve will latch and does not need to be held.

5 Ensure the gear selector is in the NEUTRAL position. The engine will not start unless NEUTRAL is selected.

Section 8
Implementation, Installation, Adjustments continued

Park Brake ON Warning

If the park brake is 'ON' a park brake warning light will illuminate on the annunciator.

The Park Brake must be applied when the engine is started. Following the vehicle manufacturer's interlock concepts, the engine will not start unless the Park Brake is applied.

Seat Switch

The gear is forced to neutral if the seat is not occupied for a continuous period of 2 seconds.

Beacon

Beacon is on if:
- Starter motor is engaged
- Shutdown

Starter motor

Starter motor is enabled if:
- Park brake on
- Ignition is on
- No shutdowns present
- Gear is neutral

Section 9
Description of the Operation

Starting the Vehicle

Ensure all start inhibits are in the start mode i.e. Park Brake applied, gear lever in neutral, and shutdown valve has been reset.

The oil pressure LED must be illuminated before the key switch ignition is turned on.

NOTE!
If the oil pressure LED is not illuminated before the ignition is turned on the shutdown warning lamp will illuminate and disable the truck from starting.

Turn the key switch to the IGNITION position. The warning lamps and LEDs in the annunciator should all illuminate momentarily.

The Battery Charge and Oil Pressure warning LEDs should remain ON.

If the Park Brake ON LED is not illuminated, the park brake should be applied. If other LEDs are ON, refer to the icon list in section 6.1b.

If any other LEDs are illuminated the engine may not start. Consult the person in authority.

Hold the shutdown valve lever in the forward/ start position, leave the valve in the start position for up to 10 seconds after the truck has started to ensure oil pressure keeps the valve open.

Turn the key switch to initiate glowplug/air heater warming. The glowplug ON LED will illuminate.

When the glowplug LED goes out, turn the key switch to the START position. The starter motor will engage to start the engine.

CAUTION!

The starter motor should be cranked for a MAXIMUM of 10 seconds, with a rest period of 10 seconds MINIMUM. Continued cranking will overheat the starter motor and may cause the internal thermal protection device to cut out or may cause serious internal damage which will not be covered by Pyroban's Warranty Scheme.

If the engine fails to start, check the annunciator for any warning indication. Consult the person in authority.

NOTE!
Lights can only be activated when ignition key is in the ON position regardless of the OEM truck behaviour.

Section 9.1a
Intended Use

OEM parameters

The truck is to be used for manual handling. Ref to the OEM manual for details on the trucks application and optimum use.

Euromech 2G parameters

Temperature class
Flammable materials have an auto ignition temperature, this is the temperature that they will ignite without a spark by coming into contact with a hot surface. Trucks are built as T3 or T4.

T3 – 200°C
T4 – 135°C

Gas Groups
IIA and IIB are increasing order of sensitivity to ignition sources, so equipment designed for use in gas group IIB is also safe to use in the less-ignitable gas group IIA.

IIA – Test Gas Propane
IIB – Test Gas Ethylene

Section 9.1b
Service Operations

Any service or maintenance on the Pyroban conversion should be carried out by a Pyroban trained engineer with a current valid training certificate.

WARNING!

All service and maintenance must be carried out in a non-hazardous area. For all OEM service and maintenance you will need to refer to the OEM manual.

Section 9.1c
Description of the Operation

Attachments

Attachments will typically be protected by a method that could change the way the operator will use the equipment. The equipment could be in an enclosure where the commands are only accessible by push through buttons. Pictured example.

Any unauthorised modifications or additions to the vehicle could invalidate the certification.

Any attachments that are fitted need to be assessed/modified to meet the hazardous area requirements for the truck certification. Any form of attachment added after the conversion must be authorised by Pyroban.

DANGER!

You must report any un-certified/modified attachments to the person in authority.

If you have concerns with an attachments certification please contact Pyroban.

Section 9.1d
Description of the Operation

Shutdown and Reset

Following shutdown trigger

- Shutdown warning lamp and corresponding shutdown icon flash for 15 seconds
  (In the case of an Auxiliary Input Board shut down the Aux Input Shutdown lamp is illuminated rather than the Flame Proof Display icon)
- Driver must bring the truck to a controlled stop within the 15 second warning period
- Truck shutdown is forced after 15 second warning period and shutdown warning and corresponding shutdown icon are on solid.

Over speed shutdown

- Truck is shut down immediately
- Shutdown warning lamp is on solid.

System Induced Shutdowns

The Euromech 2G control system will activate vehicle shutdown if an over temperature, engine over-speed or frame leakage condition† is detected. In normal operation the vehicle shut-down is activated immediately the condition is detected as the vehicle can be brought to a controlled stop without engine power.

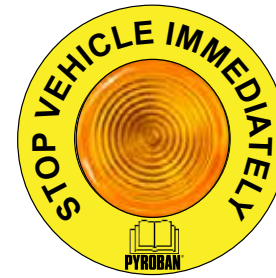
NOTE!
Shutdown on engine over-speed is immediate with no time delay.

However, in some vehicle types total engine power loss prevents the operator bringing the vehicle to a controlled stop and therefore the vehicle will be fitted with a time delay before vehicle shutdown. This delay retains critical operator functions (steering, brakes etc.) for a period of up to 15 seconds, after which time full vehicle shutdown will be activated. Over-speed conditions are shutdown immediately.

All Euromech 2G conversions will have a 15 seconds shutdown warning on all applications.

The vehicle will be labelled accordingly (see label below), and an additional light, separate from all other devices, will be fitted within the driver compartment. The light is labelled 'STOP VEHICLE IMMEDIATELY'.

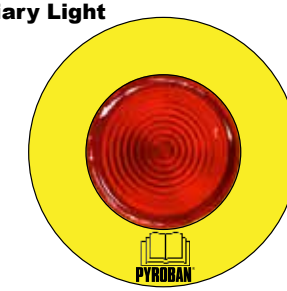
When a shutdown condition is activated, BOTH the shutdown condition LED and the 'STOP VEHICLE IMMEDIATELY' light will flash. The vehicle should be brought to a controlled stop BEFORE the vehicle is shut down.



Auxiliary Shutdown

- Shutdown warning from the auxiliary Input Board will shut down the truck and illuminated the auxiliary light rather than the flame proof display icon. The red auxiliary light within the driver compartment will illuminate.
- The driver must bring the truck to a controlled stop within the 15 second warning period.
- Truck shutdown is forced after 15 second warning period and shutdown warning and corresponding shutdown icon are on solid.

Auxiliary Light



Section 9.1e
System Induced Shutdown

Shutdown warning

Shutdown warning lamp and corresponding shutdown icon flash for 15 seconds

(In the case of an Auxiliary Input Board shut down the Aux Input Shutdown lamp is illuminated rather than the Flame Proof Display icon)

Driver must bring the truck to a controlled stop within the 15 second warning period

Truck shutdown is forced after 15 second warning period and shutdown warning and corresponding shutdown icon are on solid.

1. **Over-temperature detected.** If a temperature monitored component reaches the activation temperature of the monitoring device, the appropriate temperature warning light will be illuminated.

Exhaust gas, brakes, coolant over temperature shutdown lights

The vehicle will be shut down, either immediately or after a short delay.

BRING THE VEHICLE TO A CONTROLLED STOP.

Inform the person in authority.

After the equipment has cooled sufficiently, the temperature monitoring device will self-reset. The Euromech 2G control system must be reset before the vehicle can be re-started. Turn the key switch 'OFF' and 'ON' to reset the control system. If the over temperature condition returns, inform the Person in Authority.

2. **Frame Leakage detected.** If frame leakage is detected, the annunciator and shutdown warning light will flashing for a period of 15 seconds, after which time vehicle shutdown will be activated.

BRING THE VEHICLE TO A CONTROLLED STOP.

The vehicle will be shut down, either immediately or after 15 seconds.

The person in authority should be notified.

Frame Leakage (insulation monitoring) must only be re-set by the person in authority by operation of the reset key switch.

- The momentary key switch must be operated for 2 seconds to clear the frame leakage.
- The frame leakage shutdown will not be cleared if the frame leakage is still present.
- The frame leakage indicator will switch off once the frame leakage shutdown has been cleared

Dimple Key
(To be held by the person in authority)

Section 9.1e
System Induced Shutdown continued

NOTE!
The ignition does not need to be on to re-set the frame leakage.

3. **Engine over-speed.** Truck is shut down immediately. Shutdown warning light will be illuminated.

Engine over-speed can occur if the engine ingests flammable gases or vapours through the air inlet system. The engine is fitted with an air shutdown valve which includes automatic over-speed detection and air shutdown. In addition, the fuel supply is also cut via the fuel stop solenoid.

If over-speed shutdown occurs, the vehicle should be quarantined as gas or vapour may also enter component enclosures.

Inform the person in authority.

The vehicle should not be re-started until the source of the over-speed shutdown is identified and rectified. If shutdown is due to a release of gas or vapour, the gas should be assumed to have penetrated into the enclosures.

Stopping the air supply with the engine rotating causes a reduction in pressure to the inlet system. This will hold the valve shut, thereby preventing it being reset until the pressure equilibrates through natural leakage.

To reset the emergency shutdown device, leave the engine for at least 2 minutes to allow the system pressure to equilibrate.

CAUTION!

Do not force the lever as damage to the linkage will result.

When the lever is free to move, push the lever to the RESET position. The valve will latch in the reset position and the lever will be returned to the centre.

Turning the Vehicle Off:

- The vehicle is turned off by turning the ignition key switch to the 'OFF' position.
- The engine will be shutdown via fuel stop solenoid.
- For SVDS (D)-Valves the air shut-off valve will not be shut.
- For electrically operated SVH –Valves the air shut off valve will shut after a short delay.
- If the vehicle is not to be used for some time isolate the battery at the battery isolator.

Emergency Engine Shutdown

Naturally aspirated engines with SVDS (D)-Valve.

CAUTION!

This must not be used for normal engine shutdown.

Section 9.1e
System Induced Shutdown continued

To initiate an emergency engine shutdown, push the knob or pull the shutdown lever in the EMERGENCY STOP direction.

Inform the person in authority of the reason for activating an emergency engine shutdown.

Note: activating the emergency shutdown causes immediate loss of engine power. There are no time delays built into this function. All functions driven from the engine (hydraulics, power assisted steering, hydrostatic transmissions etc.) will be lost.

Air inlet shutdown valve knob & lever

The emergency engine shutdown device shuts both the air supply and fuel supply to the engine. Stopping the air supply with the engine rotating causes a vacuum in the inlet system. The vacuum will hold the valve shut, thereby preventing it being reset until the pressure equilibrates.

Do not attempt to re-start the engine until the person in authority has given approval.

To reset the emergency shutdown device, leave the engine for at least 2 minutes to allow system pressures to equilibrate.

CAUTION!

Do not force the knob or lever as damage to the linkage will result.

When the knob is free to move, pull the knob to the RESET position. The valve will latch in the reset position and the knob will be returned to the centre.

When the lever is free to move, push the lever to the RESET position. The valve will latch in the reset position and the lever will be returned to the centre.

Turbocharged/other engines with SVH - Valves.

CAUTION!

This must not be used for normal engine shutdown.

Section 9.1e
System Induced Shutdown continued

For engines equipped with a SVH-Valve an emergency stop device situated in the cab within reach of the driver should be depressed.

The emergency stop device shuts both the air supply and fuel supply to the engine. Stopping the air supply with the engine rotating causes a vacuum in the inlet system. The vacuum will hold the valve shut, thereby preventing it being reset until the system pressure equilibrates.

Emergency stop device

WARNING!

Do not attempt to re-start the engine until the person in authority has given approval.

To reset the emergency stop device, leave the engine for at least 2 minutes to allow system pressures to equilibrate then switch off and on the vehicle's ignition key.

Sections 9.2 + 9.2a
Information for Charging of the Battery and Battery Handling

9.2
All batteries are designed for use in hazardous areas and are mechanically protected by robust steel casing.

WARNING!

Do not open when an explosive atmosphere may be present.

9.2a
Battery Charging

Battery charging is designed to take place in the hazardous area with a Pyroban specified alternator.

CAUTION!

The cranking battery shall not be charged using a mains powered systems in the hazardous area.

Sections 9.2b + 9.2c
Information for Charging of the Battery and Battery Handling

9.2b
Battery Gas Production

The battery enclosure is vented to prevent the build-up of hydrogen gas. This venting also aids in preventing heat build-up.

9.2c
Battery Transport & Storage

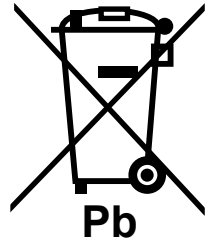
All batteries are heavy and awkward to handle. Do not lift beyond your ability. Consider a risk assessment or use a suitable lifting device to avoid personal injury.

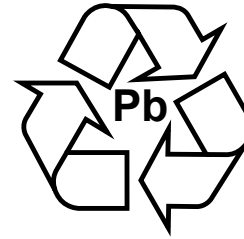
Handling

Always wear proper eye, face and hand protection when working with battery. Never lean over battery while boosting, testing, or charging.

ENVIRONMENT NOTE
Disposal
Batteries contain acid and lead compounds, should not be burnt and must be disposed of in accordance with the local environmental regulations.

Batteries may alternatively be returned to Pyroban for disposal.





Section 9.2d
Information for Charging of the Battery and Battery Handling

General Battery Information

The cranking batteries have been certified as Group II, Category 2G equipment, safe for use in a Zone 1 hazardous area. All of these Batteries are to be used as cranking batteries for use in Diesel Fork Lift Trucks converted under Euromech 2G.

The battery cell has been assessed and tested for use in the certified battery assemble. All battery cell's require the below label to ensure they meet the requirements for the certification.

The battery cell must be purchased from Pyroban to ensure quality control measures have been taken for the special conditions of use for the battery assemble certification.

WARNING!

Only separate in a non-hazardous area.

WARNING!

Only Pyroban specified alternator charging.

Section 9.2e
Information for Charging of the Battery and Battery Handling

Service information

This should be carried out in a safe area.

Every 12 months or 1500 hours operation whichever sooner:

- Check that the supply cables are in good condition and fixed in their original position.
- Check that the cable glands are tight.
- Check that the mounting fixings are tight.
- Inspect the unit for mechanical damage, contact Pyroban Customer services for advice on repair or replacement.

CAUTION!

The internal battery is a sealed unit and not serviceable – do not attempt to fill with water or acid.

Section 10
Maintenance and Maintenance Schedule

The hazardous area equipment covered by this manual possess features specifically designed to render it suitable for operation in such atmospheres. It is essential for reasons of safety in those areas that, throughout the life of this equipment, the integrity of those special features is preserved. The following sections provide details for safe operation.

It is important that this manual is read alongside the original operator manual that was provided by the equipment manufacturer. Operating conditions of this equipment should be adhered to, as detailed in that manual, unless special conditions occur in this publication. Any special conditions that may now exist due to the conversion work undertaken must take precedence over the original equipment manufacturer recommendations.

Section 10.1
Maintenance and Maintenance Schedule

CAUTION!

Only suitably trained and competent personnel may carry out maintenance or repair work on the Pyroban equipment. All repair and maintenance must be in accordance with IEC60079- 17 and IEC60079-19. Pyroban accepts no responsibility for work undertaken by non-Pyroban personnel.

NOTE!
All personnel are expected to employ safe working practices and observe their company safety policy and all relevant safety requirements, regulations and directives applicable to the country or locality in which the equipment is being used.

NOTE!
- Read and understand all notices and labels on the equipment before operating the vehicle.
- After maintenance or repair work, the person in authority must inspect and approve the Pyroban equipment before the vehicle is returned to service.

CAUTION!

The equipment must not be re-painted. If painting is required consult the person in authority.

CAUTION!

If any of the components that make up the Pyroban conversion are subject to direct impact, chemical spill or corrosion they must be checked by a qualified person before putting the equipment back into service.

NOTE!
The component pictures used in this manual are typical and may vary slightly in appearance from those on your vehicle but they operate exactly as described in this manual. Make yourself familiar with the location of these items before attempting to start the vehicle.

Section 10.1a
Frequency of inspections and maintenance including daily operator checks

The type and frequency of inspection and maintenance for Euromech 2G is defined by EN60079-17. This says that throughout the life of this equipment the integrity of special features, that have been specially designed to render the equipment safe to use in hazardous areas, for the reasons of safety should be preserved. This will be through initial inspection, ongoing regular periodic inspections & maintenance thereafter.

NOTE!
Inspections must be carried out by suitably qualified persons whose training is defined in EN60079-17. Maintenance can be conducted by suitably trained persons whose training can be provided by Pyroban.

Additionally checks must be carried out prior to using the truck. Each operator must conduct their own checks.

Task - In addition to original vehicle requirements. (Details of each check point follows in the pages after this chart)
1. Forks – check cladding including underside for damage and wear. (Forks shall be clad in such a way that inspection for hair cracks on critical locations shall always be possible).
2. Tyres – check for damage, embedded foreign particles, pressure (where applicable). Castors, wheels, earth straps and fan belts should be checked for contamination with regard to conductivity.
3. Radiator – check coolant level. Top up as necessary. Check radiator core for damage or blockage. Clean as required.
4. Brakes – check operation. Investigate any excessive noise or poor performance.
5. Check earth strap is in contact with the ground.
6. Ancillaries – check that lights and beacons are intact with no broken lenses or guards.
7. Plastic surfaces - Seats, arm rests and plastic surfaces - **warning**, electrostatic ignition hazard. Clean only with a damp cloth. DO NOT use solvents.

Section 10.1a.1
Checking fork cladding (and other load handling devices)

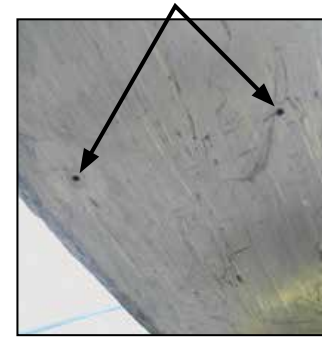
Forks and other load handling devices (drum handlers etc.) are clad in 2.5mm thick stainless steel. During operation, the stainless steel cladding will be subject to wear and therefore needs to be routinely inspected to ensure the cladding remains intact and the thickness does not reduce to less than 1mm.

Wear indicators are provided on forks by 3mm diameter inspection holes. If the cladding is damaged or worn to the thickness is less than 1mm, the vehicle should not be used in a hazardous area. The cladding must be repaired or replaced.

WARNING!

Be aware of sharp edges that can be created from dragging forks on the ground. Use gloves when checking. Do not stand under elevated forks.

Wear Indicators
(3mm diameter inspection holes)



Stainless Steel Clad Forks

The heel of the fork is left open to allow for periodic inspections

Section 10.1a.2
Checking tyres

Check the condition of dissipative tyres. Tyres should be free from metal particles, undamaged, and if applicable inflated to the correct pressure.

NOTE!
Also as part of the daily operator checks the condition of castors, wheels, earth straps and fan belts should be checked for contamination with regard to conductivity. If excessive contamination is suspected the conductivity should be checked by a suitably qualified person.

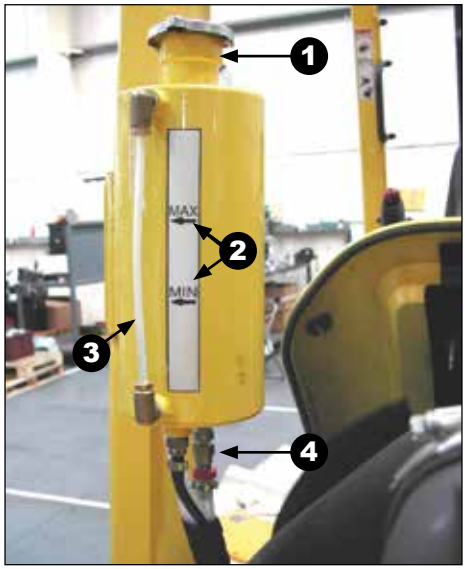
Section 10.1a.3
Topping up the coolant

As part of the Euromech 2G conversion, the original coolant system will be modified to provide additional coolant capacity. An extra capacity expansion tank will be fitted to the vehicle. The level of coolant must be maintained to prevent coolant over-temperature shutdown. The coolant level should be checked every day.

A visual coolant level feature is fitted to the expansion tank to facilitate level checking.

WARNING!

The pressure cap must not be removed if the engine is hot.
Serious personal injury may result from hot coolant.



1. Pressurising cap & overflow
2. Coolant level MIN / MAX
3. Coolant level indicator tube
4. Cooler & radiator vent hoses

Section 10.1a.4
Brake performance

Brakes are potential ignition sources from either high temperature or sparks caused by metal to metal contact of the moving and stationary components.

Brake assemblies must never be allowed to wear to the extent that metal contact between moving and stationary components occurs. In addition, allowing brakes to bind could raise the brake drum temperature above the Temperature Class. Therefore if brake performance deteriorates or a squealing noise heard when operated the truck should be stopped and the brakes should be checked.

Section 10.1a.5
Vehicle conductivity to earth

Earth straps are fitted using a dual eyelet system which allows the strap to be lowered should the strap become worn.

The straps are fitted with an M8 bolt and washer drilled and tapped into the chassis. This position will be marked. The position cannot be changed without consulting Pyroban.

Example of a 350mm conductive strap

NOTE!
To ensure sufficient contact with the ground each strap is cut to a length that allows 50mm to be pressed against the floor.

The straps can be easily wiped clean with a cloth to remove any dirt or grease. They have been proven to be resistant to most harmful substances.

Section 10.1a.6
Ancillaries

Ancillary equipment such as lights will have been replaced with suitably certified alternatives. It is therefore essential that any broken lights, beacons etc. are reported immediately and the truck isolated until confirmed safe to use.

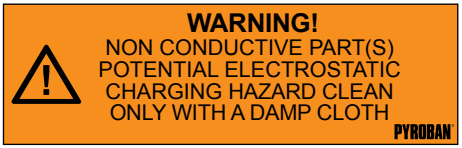
Flameproof work light

Section 10.1a.7
Plastic surfaces

To prevent the build-up of static electricity plastic materials also require consideration. Parts in frequent contact with moving bodies (seats, arm rests, cab sides. etc.) require all plastic materials to be electrically conductive or anti-static. Therefore seats and arm rests are either covered in an electrically conductive vinyl or cloth.

Dashboards, canopies, seat backs, bonnets, roof guards, finger guards (stacker vehicles) etc. if approved by Pyroban do not require additional measures as they have proven to meet the requirements of the ATEX Directive.

NOTE!
Approved plastics will be fitted with a label as shown below:



Sections 10.1b - 10.1f

10.1b
Maintenance of insulation resistance monitoring

The insulation resistance monitoring system shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

NOTE!
This vehicle is fitted with an earth leakage detection circuit. If there is a positive or negative voltage leak to chassis the vehicle will come to a controlled stop. The annunciator display will illuminate the relevant icon. Any such incident should be reported to the person in authority.

10.1c
Clearance between rotating and stationary parts

Clearance between rotating and stationary parts shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

10.1d

Maintaining a good path to earth

As part of the daily operator checks the condition of the castors, wheels, earth straps and fan belts should be checked for contamination with regard to conductivity. If excessive contamination is suspected the conductivity should be checked by a suitably qualified person.

10.1e
Maintaining seat and non-metallic covers

Seats and non-metallic covers shall be bonded to the chassis and be anti-static. Bonding straps that are visible should be checked to commencing work activities with the vehicle. Any faults should be reported to the person in authority.

The surface resistance shall be included in the periodic maintenance along with the bonding which shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

10.1f
Maintaining seat and non-metallic covers

Correct functioning of safety monitoring and shutdown systems shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

NOTE!
Safety monitoring devices are built to fail safe. If any system fails it will be indicated on the annunciator or warning lights.
Take a note of this and report it to the person in authority.

Sections 10.1g - 10.1j

10.1g
Maintenance of fasteners

Correct tightness of fasteners and the correct maximum gap of flameproof joints shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

10.1h
Maintenance aspects of the internal combustion engine

Maintenance aspects for the internal combustion engine shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

10.1i
Maintenance of enclosures

Maintenance of enclosures shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

NOTE!
If you notice damage to any of the systems enclosures the vehicle must not be used. Report to the person in authority.

10.1j
Markings and warning labels

Verification of the integrity of markings and warning labels relevant to the protection concepts shall be included in the periodic maintenance that shall be carried out by the contract service provider. The maintenance person must be suitably qualified to maintain Pyroban equipment.

This will also be checked during the yearly inspection which could result in a non-compliance if not present and legible.

NOTE!
Warning labels can be replaced by quoting the Pyroban job number.

Section 11
Storage and Transport

For information on transportation and storage refer to the original equipment manufacturers handbook. It is recommended that the battery should be isolated during extended periods of time when the equipment will not be used.

Section 12
Faults and Repairing

Due to the nature of the protection for this vehicle any faults must be reported to the person in authority before commencing work activities. All repairs must be carried out by suitably trained personnel as defined in EN60079-17.

Section 13
Dismantle, Environment

To avoid damage to the environment do not dispose of used engine oil, batteries, filters etc. yourself. Dispose of such waste products in accordance with the laws of your country, or an authorized waste treatment agency.

Oil, gas, chemicals, batteries, tyres and other flammable materials must be stored in a safe location to prevent these materials from harming the environment. Refer to the OEM manual for the procedure of their disposal.

Forklifts are built with parts that contain recyclable metals and plastics. Make sure that those materials are appropriately recycled.

Section 14
Glossary

Accessories
An optional part that may be fitted to the machine either by OEM or aftermarket.

Air Inlet Shutdown Valve
Safety device fitted to the inlet of a diesel engine which will shut air supply off to the engine. Will be activated automatically when air flow increases, high temperature shut-off and manually from the operator.

Annunciator
Display that provides information on the state or condition of the truck by LED indication.

Antistatic
Preventing the build-up of static electricity or reducing its effects.

ATEX Directive
European legislation governing the classification of work areas and work equipment in potentially explosive atmospheres.

Attachments
An accessory attached to the vehicle. e.g barrel handler, side shift or cage.

Auxiliary warning lamp
An additional fault indicator from electrical channels not shown by annunciator.

Bonding
Electrical bonding is the practice of intentionally electrically connecting all exposed metal items not designed to carry electricity on the machine.

CE Marking
Symbol used on equipment label and conformity certificates indicating that the equipment meets all relevant legislation requirements.

Cladding
Act of cladding forks or attachments with non-sparking material.

Conductive
Transmitting or able to transmit energy, particularly heat or electricity.

Conversion
Modification process to truck. The change in a fork truck from a standard industrial unit to a hazardous area suitable machine.

Dissipative
In terms of electrostatic charge, a medium resistance material classification as to how quickly electricity moves through a material.

EU Declaration of Conformity
Legal document required for machine issued by company placing the equipment on the market.

Earthing
Electrical connection to the ground intended to carry current safely away from a circuit in the event of a fault, or a wire that makes such a connection.

EN1755:2015
Industrial Trucks - Safety requirements and verification - Supplementary requirements for operation in potentially explosive atmospheres. European technical standard.

Explosive atmosphere
Vapour, dust, fibres, or flyings which, after ignition, permits self-sustaining propagation.

Explosive Protection Level
Equipment marking – defining equipment category, gas group and temperature class for the machine.

Section 14
Glossary continued

Fire Triangle
Illustration of the three elements required for combustion; fuel, air & ignition. Used to define methods of protection.

Flammable atmospheres
Mixture with air, under atmospheric conditions, of flammable substances in the form of gas.

Flammable Gas
Gas that at ambient temperature and pressure forms a flammable mixture with air at a concentration of 12 percent (or less) by volume.

Frame Leakage
The reduction of insulation resistance between the truck electrical system and its chassis.

Gas Group
Is a defined group of Gases that each have different explosive properties.

Hazardous Area
Hazardous areas are those places, commonly on industrial sites, where a potentially flammable atmosphere may exist.

Ignition Hazard
Something that has the potential to become an active ignition source if a flammable atmosphere were present. Examples hot surface temperature or sparking component

Lower Explosive Limit (LEL)
The lowest concentration (percentage) of a gas or a vapour in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat).

OEM
Original Equipment Manufacturer

OEM Manual
Original Equipment Manufacturer Manual

Overspeed
Condition where an internal combustion engine is forced to run beyond it design running speed. Ingestion of air and flammable gas can lead to engine overspeed.

Person In Authority
Person providing technical management, having adequate knowledge in the field of explosion protection, having familiarity with the local conditions, having familiarity with the installation and who has overall responsibility and control of the inspection systems for the equipment within hazardous areas.

Temperature Class
A classification for flammable gases for their ignition from hot surfaces.

Zoned Areas
The zone defines how likely it is that a hazardous concentration will be present in any given geographical location. The zones are a result of a formal area classification exercise.

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