



PYROBAN[®]

Ex-Tec 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.

We have manufacturing facilities in the UK, Netherlands and China, as well as sales, training and technical service centres in China, France, UK and The Netherlands.

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 primary production and centre of excellence for diesel materials handling equipment conversions and offers a full design, conversion and manufacturing facility.

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Section 1 - Contents Page.....	3
Section 2 - Technical Specification and Certification	4
Section 3 - Relation to other documents	5
Section 4 - Contents, list of images, icons and attachments	6
Section 5 - Introduction.....	8
Section 6 - General Safety Prescriptions.....	10
Section 6.1 - Safe Use.....	11
Section 6.1a - Warning and Attention Labels	12
Section 6.1b - Ex-Tec 2G Safety Warning	14
Section 6.1c - Function of Safety.....	15
Section 6.1d - Footwear	16
Section 6.1e - Protective Clothing	16
Section 6.1f - Dissipative Floors.....	16
Section 6.1g - Earthing straps & Dissipative Tyres.....	17
Section 7 - Ex-Tec 2G Instrumentation.....	18
Section 8 - Implementation, Installation, Adjustments.....	21
Section 9 - Starting the Vehicle	22
Section 9.1a - Intended Use	22
Section 9.1b - Service Operation.....	23
Section 9.1c - Attachments.....	24
Section 9.1d - Description of the Operation	24
Section 9.2 - Information for Charging of the Battery and Battery Handling.....	26
Section 9.2a - Battery Charging	26
Section 9.2b - Battery Gas Production	26
Section 9.2c - General Battery Information	27
Section 9.2d - Battery Service	27
Section 10 - Maintenance & maintenance schedule	28
Section 10.1 - Service conditions	29
Section 10.1a - Frequency of inspections and maintenance including daily operator checks	30
Details of daily checks for...	
Section 10.1a.1 - Fork cladding (and other load handling devices).....	31
Section 10.1a.2 - Tyres.....	32
Section 10.1a.3 - Traction Battery	32
Section 10.1a.4 - Brake performance.....	33
Section 10.1a.5 - Vehicle conductivity to earth.....	33
Section 10.1a.6 - Ancillaries	34
Section 10.1a.7 - Vehicle Cleaning.....	35
Section 11 - Storage and Transport.....	36
Section 12 - Faults and Repairing	36
Section 13 - Dismantle, Environment	37
Section 14 - Glossary	38

Section 2
Technical Specification and Certification

Ex-Tec 2G protects electric vehicles operating in hazardous environments classified as zone 1 in accordance with ATEX Directive 2014/34/EU.

Ex-Tec 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.

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.

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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 1755-2019*
EN 1834-2009**

* 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: 1326808 UK
Registered Office: Endeavour Works, Dagpen Road, Shornham-by-Sea, West Sussex BN43 8QD

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.

Build no: N° de construction: *		System: Système: *	
Bouw nr: Bau-Nr: *		System: Système: *	
 			
Manufacture date: Date de fabrication: * Productiedatum: Hersteldatum: *		Mass: Masse: * kg Gewicht: Gewicht: *	
Manufactured by: Fabriqué par: * Gemaakt door: Hergestellt von: *		Manufacture date: Date de fabrication: * Productiedatum: Hersteldatum: *	
Vehicle Véhicule Voertuig Fahrzeug	Serial no: Numéro de série: * Seriennummer: Seriennummer: *		
	Manufacturer/Type: Fabricant/Type: * Fabrikant/Type: Hersteller/Typ: *		
	Engine Moteur Motor Motor		
Serial no: Numéro de série: * Seriennummer: Seriennummer: *		Type: Type: * Type: Art: *	
Manufacturer: Fabricant: * Fabrikant: Hersteller:			

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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 otherwise environmental damage may result.



CHANGE TO OEM MANUAL

This is to advise 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 will also be a label that 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 Ex-Tec 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 Ex-Tec 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.

To prevent ignition of the hazardous area, Ex-Tec 2G will shut the vehicle down in the event of a high surface temperature or frame leakage being detected. Sparking electrical devices are housed in Exd enclosures and where possible the vehicle electrical circuits are made low energy Ex ib.

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 instructions.

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 vehicle identification label

Please refer to OEM manual for vehicle description and climatic condition limitations.

Section 6

General Safety prescriptions

Safety Points

Person in authority is the person taking full responsibility for safety procedures and supervision of safety for employees under their control.



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. If it is suspected that flammable gas has entered an enclosure, the vehicle should be moved in a safe manner to a non-hazardous area where the enclosure can be cleaned. Do not restart the equipment 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!

As the ATEX declaration of conformity covers the entire vehicle, some components were assessed as safe for the application without modification. The person in authority must therefore ensure that these components are

replaced with the original manufacturers' components. If this is not possible then the person in authority must seek advice from Pyroban as to the suitability of an alternative replacement component.



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 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!

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

Section 6

General Safety prescriptions continued



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.



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.



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.

Section 6

General Safety prescriptions continued



CAUTION!

Water or high-pressure jets must not be used to clean the Ex-Tec 2G components or Pyroban enclosures.



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.

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.



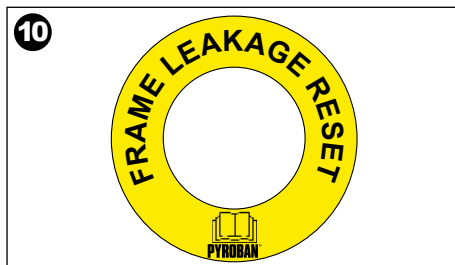
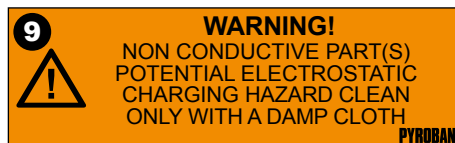
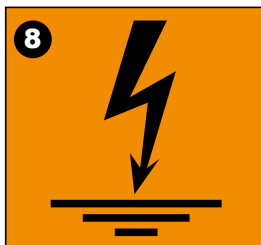
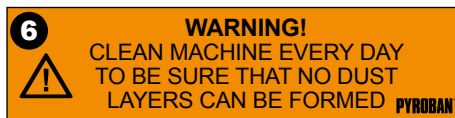
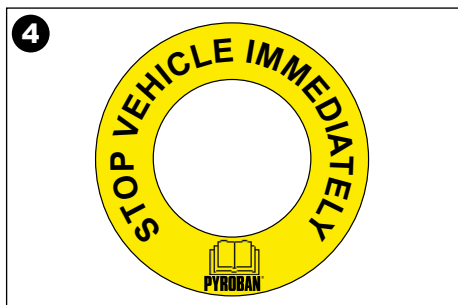
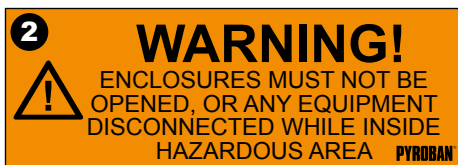
DANGER!

The truck must only be used in the assigned areas that meet the requirements established on the conversion identification marking label. 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



6.1a**Warning & Attention Labels** continued

REF	Label Text	Reason
1	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.
2	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.
3	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.
4	STOP VEHICLE IMMEDIATELY AND BOOK SYMBOL	To indicate the shutdown warning LED light.
5	WARNING! DO NOT SEPARATE WHEN ENERGISED	The equipment will not be protected from gas or dust in the hazardous area.
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	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.
9	WARNING! NON-CONDUCTIVE PART(S)- POTENTIAL ELECTROSTATIC CHARGING HAZARD - CLEAN ONLY WITH A DAMP CLOTH	To prevent the build up of static.
10	FRAME LEAKAGE RESET AND BOOK SYMBOL	To indicate the frame leakage reset key switch.

Section 6.1b

Ex-Tec 2G Safety Warning

Shutdown warning light



Section 6.1c

Function of Safety

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

- Keeping surface temperatures below the temperature class for the hazardous area. This is monitored by the system with temperature sensors placed at various locations on the equipment.
- Earthing of electrostatic charge which is a potential ignition source.
- Fork cladding in stainless steel or brass to protect from impact sparks.
- Sparking components such as relays and contactors are protected by enclosures.
- Identification of electro-static charge risks which are fitted with the appropriate warning labels.



Sections 6.1d - 6.1f Additional Safety Measures

6.1d Footwear

Footwear to be worn by the operator shall comply with EN ISO 20344.

6.1e Protective Clothing

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

6.1f 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 6.1g Additional Safety Information

6.1g 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 non-conductive parts on the truck. There is a danger of electrostatic charging of non-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 6.1h

Additional Safety Information

Earthing Straps & Dissipative 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 8 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.



Earthing strap



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.



Dissipative tyre



Reach / pallet truck wheels

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 (replaces vehicle original)

The keys are not interchangeable with pallet and counterbalance/reach vehicles. Ensure the correct key is used for the type of vehicle.



Ex-Tec 2G vehicles are fitted with one of two types of key switch to prevent untrained operators using pedestrian and rider vehicles.

Vehicle Instrumentation

Wherever possible, the original vehicle instrumentation is retained, either in its original form or by replication of the features within the Pyroban conversion. Instrumentation is housed inside an enclosure or encapsulated.

In addition to original instrumentation, the vehicle will be fitted with an amber LED light to indicate faults to the Pyroban system.

Section 7

Description of the product continued

Emergency Disconnect Device

Ensure that the operator is familiar with the type and location of the actual emergency disconnect device fitted to the specific vehicle.



Horn

OEM to remain on the truck if it is gas protected by design. If not a replacement will be fitted by Pyroban.



CHANGE TO OEM MANUAL

The replacement button should be located in the same position as the OEM but if not it will be marked as above in the new location.

Section 7

Description of the product continued

Pneumatic Replacement



Forks (Load handling devices)

Will be clad in either stainless steel or brass to reduce the risk of impact sparks.

Battery Connectors

The replacement connectors will be zone 1 certified. Each connector will have an interlock system to avoid accidental disconnection.



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 to OEM manual.



Examples of switch and button replacements

Section 8

Implementation, Installation, Adjustments

Pre-Start checks

1. Carry out all pre-start checks recommended by the vehicle manufacturer.
2. Check the general condition of the Pyroban equipment as defined in Routine Servicing section of this manual.



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 a hazardous area.

Inspect the battery connectors (vehicle side and battery side) for damage. If acceptable connect and lock in place using the integral locking screw.



WARNING!

The battery connectors may only be disconnected or re-connected in a non-hazardous area. Failure to lock the connectors with the locking screw invalidates certification.

Section 9

Starting the vehicle

Turn the key switch to the 'ON' position.

The vehicle is then ready for use and should be operated as per the original manufacturer's instructions.

If a shutdown condition is detected at start up, the vehicle will be prevented from starting. The amber LED light will indicate the cause.

Refer to the original vehicle operator manual for further guidance on operating the vehicle.

Section 9.1a

Intended Use

OEM parameters

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

Pyroban Ex-Tec 2G parameters

The design parameters for the Pyroban conversion can be found on the Pyroban label plate. Ex-Tec 2G is for use in a zone 1 & 2 areas.

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

Category 2G

The Category defines the area in which the truck can operate. Ex-Tec 2G which are zone 1 & 2 classified areas for gas.

Section 9.1b Service Operation

Any service or maintenance on the Pyroban conversion should be carried out by a Pyroban trained or competent 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 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.

Section 9.1d

Description of the Operation

Pyroban System shutdowns

Ex-Tec 2G will activate vehicle shutdown if an over temperature condition or frame leakage is detected.

A delay retains critical operator functions (steering, magnetic brake release etc.) for a period of up to 25 seconds, after which time full vehicle shutdown will be activated.

When a vehicle shutdown condition is activated, the vehicle should be brought to a controlled stop BEFORE the vehicle is shut down.



BRING THE VEHICLE TO A CONTROLLED STOP

Inform the person in authority.

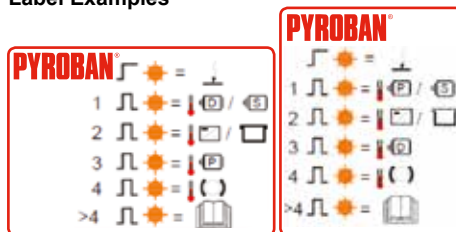
Over Temperature shutdown

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

Additional Shutdown Faults

There will be a label on the truck that will indicate a flashing sequence to a set of faults. Each set of faults can vary depending on the truck so the label will need to be checked in the event of a shutdown. Any flashing sequences that are not on the label must be crossed checked with the board channels on the wiring diagram.

Label Examples



	= Frame Leakage		= Pump Motor
	= Temperature		= Steer Motor
	= Amber LED		= Controller
	= LED constant ON		= Enclosure
	= LED Flashing		= Brakes
	= Drive Motor		= Contact PYROBAN Engineering for wiring diagram

Contact the person in authority when a fault appears.

Turning the vehicle off:

The vehicle may be turned off and restarted through the original vehicle key switch function.

Section 9.1d

Description of the Operation continued

Emergency Stop



CAUTION!

Do not use this facility for normal stopping. To initiate an emergency stop, depress the emergency stop device fitted to the vehicle. This will be either the original vehicle's emergency stop button, or a manual isolator fitted within the driver compartment.

As for the original vehicle, activating the emergency stop causes immediate loss of power. There are no time delays built into this function.

To restore the vehicle electrical system, reset the emergency stop button.

Frame Leakage Shutdown

If frame leakage is detected. Shutdown warning light will flash for a period of 25 seconds, after which time vehicle shutdown will be activated.

BRING THE VEHICLE TO A CONTROLLED STOP.

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)



NOTE!

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

Sections 9.2, 9.2a + 9.2b

Information for Charging of the Battery and Battery Handling

9.2



DANGER!

Never recharge an Ex battery in a zoned area.



WARNING!

During charging, the battery must be removed from the closed battery compartment on the truck.

9.2a

Battery Charging rooms

When lifting and handling the Ex batteries use the correct approved lifting equipment and keep the battery in an upright position.

The original truck manufacture should supply the correct methods and procedures for handling of the battery.



CAUTION!

The cable should not be extended without prior consultation with the charger manufacturer and supplier of your Ex battery.

9.2b

Emission of Gasses

Hydrogen and oxygen are emitted during charging and can cause an explosive mixture. Install in a ventilated area. Avoid exposing batteries to ignition sources.

Sections 9.2c + 9.2d

Information for Charging of the Battery and Battery Handling

9.2c

General Battery information

All Batteries will be certified for use in a hazardous area. The battery manufacturer will be clearly labelled on the battery with a certification plate.



The Ex symbol should be visible on the battery.



WARNING!

Never open the battery cover in a zoned area.



WARNING!

Never use the battery if damaged or bare cables are evident.



WARNING!

Never disconnect the battery in a zoned area. (Isolate circuits before disconnecting the battery outside a zoned area).



CAUTION!

Never use the battery if the connector plugs are damaged.

9.2d

Service

All service and maintenance must be completed by an Ex battery approved personnel.



DANGER!

If frayed wires or worn insulation is noted take the battery out of service immediately and place in a safe area that is outside the zoned area. DO NOT ATTEMPT TO REPAIR an Ex battery.

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 section. 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

Service conditions



CAUTION!

As the Pyroban risk assessment covered the entire vehicle, some components were assessed safe for the application without modification. The person in authority must therefore ensure that these components are replaced with the original manufacturers' components. If this is not possible then the person in authority must seek advice from Pyroban as to the suitability of an alternative replacement component.



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 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!

Do not remove connectors or plugs from Ex-Tec 2G components when the battery is connected. All connectors and plugs must be reconnected before connecting the battery.

Section 10.1a

Frequency of inspections and maintenance including daily operator checks

The type and frequency of inspection and maintenance for Ex-Tec 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 and earth straps should be checked for contamination with regard to conductivity.
3. Traction battery – charge and maintain as per manufacturers instruction.
4. Brakes – check operation. Investigate any excessive noise or poor performance.
5. Conductivity – 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 point the thickness is less than 1mm, the vehicle should not be used in a hazardous area. The cladding must be repaired or replaced.

Wear Indicators (3mm diameter inspection holes)



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



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.

Fork cladding for double stacker trucks will be clad in a way where the under section will only be partially clad at the front impact point. The top forks will have a clad sleeve. There will be no wear indicators so a daily visual inspection will be required.



Section 10.1a.2

Checking tyres

Check the condition of conductive 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

Traction Battery

The battery will be certified 2G from a third party supplier. The batteries are of "wet cell" construction and should be charged and maintained in accordance with the manufacturers' instructions supplied with the battery

The protective access cover must be in place and locked at all times when operating in a hazardous area.

Batteries must not be charged, disconnected or reconnected in a hazardous area.



NOTE!

Check the condition of the connectors daily and replace any damaged components immediately.



WARNING!

DO NOT CONNECT TOGETHER OR USE THE VEHICLE IF THE CONNECTORS ARE DAMAGED.

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.

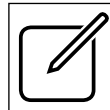
Section 10.1a.5 Vehicle conductivity to earth

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 allow 50mm to be pressed against the floor.



Strap attached to the chassis

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 assessed and actions taken to secure them from presenting an ignition source. It is therefore essential that any broken lights, beacons etc. are reported immediately and the truck isolated until confirmed safe to use.

Section 10.1a.7 Vehicle Cleaning

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 checked for anti-static properties or covered in an anti-static material.



NOTE!

Approved plastics will be fitted with a label such as the one shown below:

Dashboards, canopies, 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.

⚠ WARNING!

NON CONDUCTIVE PART(S)
POTENTIAL ELECTROSTATIC
CHARGING HAZARD CLEAN
ONLY WITH A DAMP CLOTH **PYROBAN**

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 batteries 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.

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.

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

Replacing 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.

EU Declaration of Conformity

Legal document required for machine issued by company placing the equipment on the market.

Declaration of Incorporation

Document giving compliance details to applicable EU directives for a partially completed machine. This document is not issued by company placing completed machine on the market.

Dissipative

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

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

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

Explosive Protection Level

Equipment marking – defining equipment category, dust group and temperature class for the machine.

Fire Triangle

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

Section 14

Glossary continued

Flammable Atmospheres

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

Frame Leakage

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

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.

OEM

Original Equipment Manufacturer

OEM Manual

Original Equipment Manufacturer Manual

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.

Notes



**Enabling people to
work safely
every day**

PYROBAN[®]