PYROBAN®

# Dust-Tec 3D
## 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 irst 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 both diesel and electric materials handling equipment conversions offering a full design, conversion and manufacturing facility.

Pyroban Ltd
Dolphin Road,
Shoreham-by-Sea
West Sussex, BN43 6QG
United Kingdom

General Enquiries:
+44 (0) 1273 456 800
**www.pyroban.com**

# Contents

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## Section 2
## Technical Specification and Certification

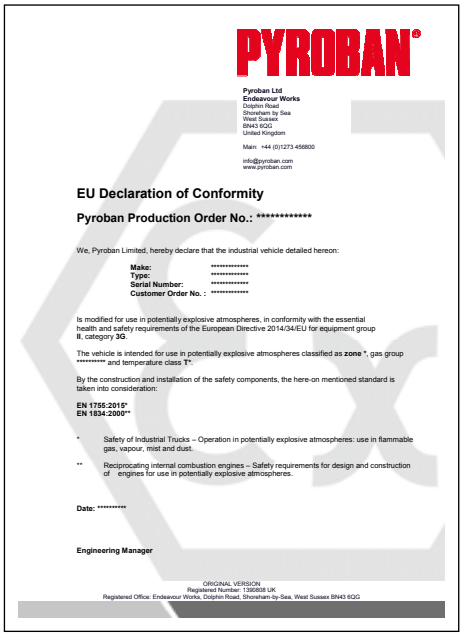
Dust-Tec 3D protects electric vehicles operating in hazardous environments classified as zone 22 (for combustible dust) in accordance with ATEX Directive 2014/34/EU.

Dust-Tec 3D 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, Dust-Tec 3D will shut the vehicle down in the event of a high surface temperature, 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.

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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**Pyroban Ltd**
**Endeavour Works**
Dolphin Road
Shoreham by Sea
West Sussex
BN43 6QG
United Kingdom

Main: +44 (0)1273 456800

info@pyroban.com
www.pyroban.com

**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: 1360808 UK
Registered Office: Endeavour Works, Dolphin Road, Shoreham-by-Sea, West Sussex BN43 6QG

# 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.

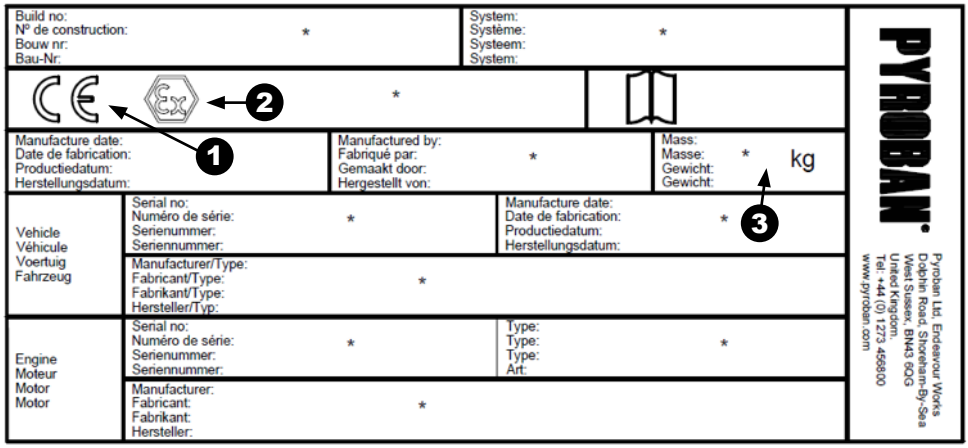
Refer to the label on the vehicle for specific details. If in doubt, refer to the person in authority.

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.



## 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 3D vehicle is designed to deliver optimum safety whilst integrated with the original equipment manufacturers (OEM) machine.

Dust-Tec protects vehicles operating in hazardous dust environments classified as Zone 22 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.

Dust-Tec 3D 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, Dust- Tec 3D prevents dust ingress into potential ignition sources and will shut the vehicle down in the event of high surface temperature being detected.

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:
**-20 °C to +40 °C**

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

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

Storage temperature limits:
**-30 °C to +60 °C**

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 dust 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 Dust-Tec 3D 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.

**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.**

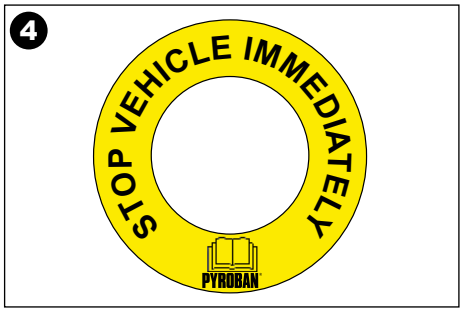
## Section 6.1a
### Warning & Attention Labels

1


2


3


4

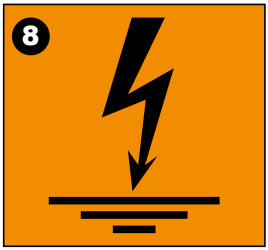



5


6


7


8



## 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 | 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. |
| 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 eartthing points on the truck. There will be 2 points per machine located on opposite ends of the truck. |

## Section 6.1b
## Dust-Tec 3D 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 dust 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.

## Section 6.1d
## Additional Safety Measures

### 6.1d
### Footwear

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

## Sections 6.1e + 6.1f
## Additional Safety Information

### 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

### 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.

**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 exactly as described in this manual. Make yourself familiar with the location of these items before attempting to start the vehicle.

### Key switch

The vehicle key switch will either be retained or replaced with a suitable alternative. In either case, the original location will be maintained.

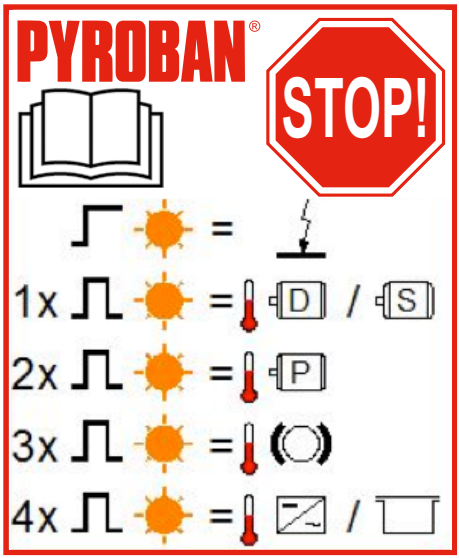
### Vehicle Instrumentation

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.

### Shutdown warning light


Example of warning sequence Label. This can vary depending on the equipment. Check the truck to establish the shutdown faults.




= Frame Leakage
= Temperature
= Amber LED
= LED constant ON
= LED Flashing
= Drive Motor
= Pump Motor
= Steer Motor
= Controller
= Enclosure
= Brakes

## 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.

Replacement example 1

Replacement example 2

Replacement example 3

OEM example 1

### Horn

OEM to remain on the truck if it is dust 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 below in the new location.

## Section 7
## Description of the product continued

### Pneumatic Replacement

### Forks (Load handling devices)

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

### Battery Connectors

The replacement connectors will be ingress protected for dust environments. Each connector will have an interlock system to avoid accidental disconnection.

## 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.**

3. Connect the battery plugs. Lock in place if applicable.

## Section 9
## Starting the vehicle

As Dust-tec 3D interfaces into the original vehicle key switch function, the vehicle can be started in the normal manner.

If an over-temperature condition is detected at start up, the vehicle will be prevented from starting.

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 Dust-Tec 3D parameters

The design parameters for the Pyroban conversion can be found on the Pyroban label plate. Dust-Tec 3D is for use in a zone 22 area.

### Dust Temperature class

Flammable dust 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 T200°C or T135°C.

T200°C
T135°C

### Dust Groups

IIIA, IIIB & IIIC are the three dust groups defined by the standard. The self-ignition temperature of a dust suspended in the air is usually higher than the same dust accumulated on a surface.

IIIA – Combustible Flying's
IIIB – Non-conductive dust
IIIC – Conductive dust

### Category 3D

The Category defines the area in which the truck can operate. Dust-Tec 3D which are zone 22 classified areas for dust only.

## 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. 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

### System induced shutdowns

Dust-Tec 3D will activate vehicle shutdown if an over temperature condition is detected. In normal operation the vehicle shutdown is activated immediately the condition is detected as the vehicle can be brought to a controlled stop without battery power.

However, in some vehicle types battery isolation prevents the operator bringing the vehicle to a controlled stop and therefore the vehicle may be fitted with a time delay before vehicle shutdown. This 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 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.

After the equipment has cooled sufficiently, the temperature monitoring device will self reset. The Dust-Tec 3D 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.

**Turning the vehicle off:**

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

**Emergency Switch Off**

**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, release the emergency stop button.

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

**9.2**

**DANGER!**

**Never recharge an Ex battery in a zoned area.**

**WARNING!**

**During the charge the battery must be removed from the closed battery compartment on the truck.**

**9.2a**

### Battery Charging rooms

Always use approved moving equipment when attempting to change batteries. 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.**

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

### 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.

### 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.**

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

### Service

All service and maintenance must be completed by an approved 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.

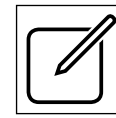
## Section 10.1
Service conditions

**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 Dust-Tec 3D 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 Dust tec 3D 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.

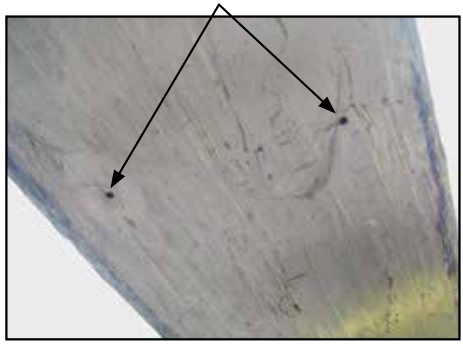
| **Task - In addition to original vehicle requirements.**<br>(Details of each check point follows in the pages after this chart) |
|---|
| **1.** Forks – check cladding including underside for damage and wear. (Forks shall be clad in such a way that inspection for hair cracks on critical locations shall 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.** Vehicle cleaning – clean the vehicle to prevent dust layers forming. Do not use high pressure water jets. |

## 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**

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

**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.**

## 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 3D (or better) 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!**
The original vehicle battery connectors will be replaced with 3D rated connectors. Check the condition of the connectors daily and replace any damaged components immediately.

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

**Certified battery & IP rated battery connectors**

## 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
### Ancilliaries

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

As well as constructional measures to avoid the build-up of a hazardous explosive atmosphere, is to prevent the dispersal of combustible substances or at least to limit it. Both of these measures can be effectively supported by thorough and regular cleaning.

It is widely recognised that with dust layers of 5mm upwards surface temperatures need controlling to avoid ignition. The other risk is that a layer of dust can be blown into the atmosphere creating a dust/air mixture, which can be easily ignited. Therefore a routine must be adopted that prevents this amount of dust collecting on the vehicle.

**CAUTION!**

**Always wipe dust build up away and never blow into the atmosphere. Dispose of all dust debris correctly.**

## 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.

**Dust Group**
Combustible dust and flyings that are segregated into groups with similar flammability and conductive properties.

**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, 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.

**Flammable Atmospheres**
Mixture with air, under atmospheric conditions, of flammable substances in the form of dust.

## Section 14
**Glossary** continued

**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 dusts 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

**Notes**

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