

**The implications of the ATEX Directives on
Conveyors and Big Bag Handling Systems**

ATEX Directive 1999/92/E on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres came into European Law in January 2000. In the UK, the ATEX Directive has been implemented by the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). The Directive requires that the specific risks arising from explosive atmospheres be assessed. As part of the control of explosion risks, the Directive also requires that employers classify places where explosive atmospheres may arise and select appropriate work equipment for use in these areas.

Spiroflow Flexible Screw Conveyor

The basis of safety for all Spiroflow equipment is explosion prevention. This requires all the equipment parts to be earth bonded to one common earth point. The customer should ensure that no foreign object can enter the system.

Potential ignition sources

Surface temperature of the housings, conveying tubes and moving parts

Materials of construction (light metals)

Static charge on the inside of the conveyor tube

Foreign objects in powder

Control measures

Insufficient temperature increase to create a risk. No friction heat build-up takes place as the tube material has a low coefficient of friction and allows the spiral to rotate and slide easily. Cleaning and good housekeeping by customer to avoid dust layer build-up.

The conveyors are manufactured from carbon steel or stainless steel. No parts of the equipment uses aluminium parts with a magnesium content of more than 7.5%.

Flammable dust concentrations are not normally present inside the tube and the inside of the conveying tube is considered a Zone 22 area. The spiral is earthed through the gear box/motor drive which ensures the energy from any static discharges are limited to less than 3 milli-Joules. Anti-static tubes are available for use with materials sensitive to such low energy discharges.

The ingress of foreign objects into the conveyor via the customer's feed or by operator intervention, can cause (if the size is large enough) the conveyor to jam or the spiral to fail. Precautions must be taken by the user to avoid this.



Gearbox and drive motor

The gearbox and drive motors are selected and obtained from the supplier to meet the Zone requirement.

Static discharge at the outlet of the conveyor

The spiral is earthed and will discharge the powder as it flows. Some residual charge may be carried on to the rest of the process beyond the machine from the outlet. Equipment should be earthed.

Static discharge on the outside of the conveyor tube

The external surface of the tube does not have a charging mechanism in normal operation. Anti-static tubes are available for gaseous environments.

Spiral failure

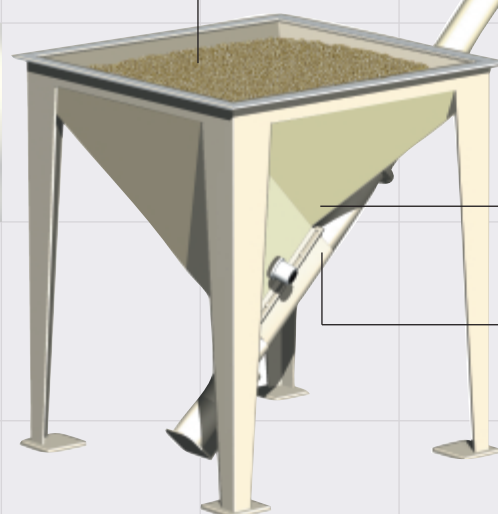
Spiral failure is only considered to be a rare malfunction and therefore need not be considered for Zone 22 or Zone 21. The user instruction manual details the correct set-up procedure to prevent this problem.

Running empty

A level switch is to be fitted at the inlet of the conveyor to prevent it running empty.

Conveyor overloading

Correct setting of the infeed restrictor prevents overload occurring. The receiving equipment at the outlet must be fitted with a High-Level switch.



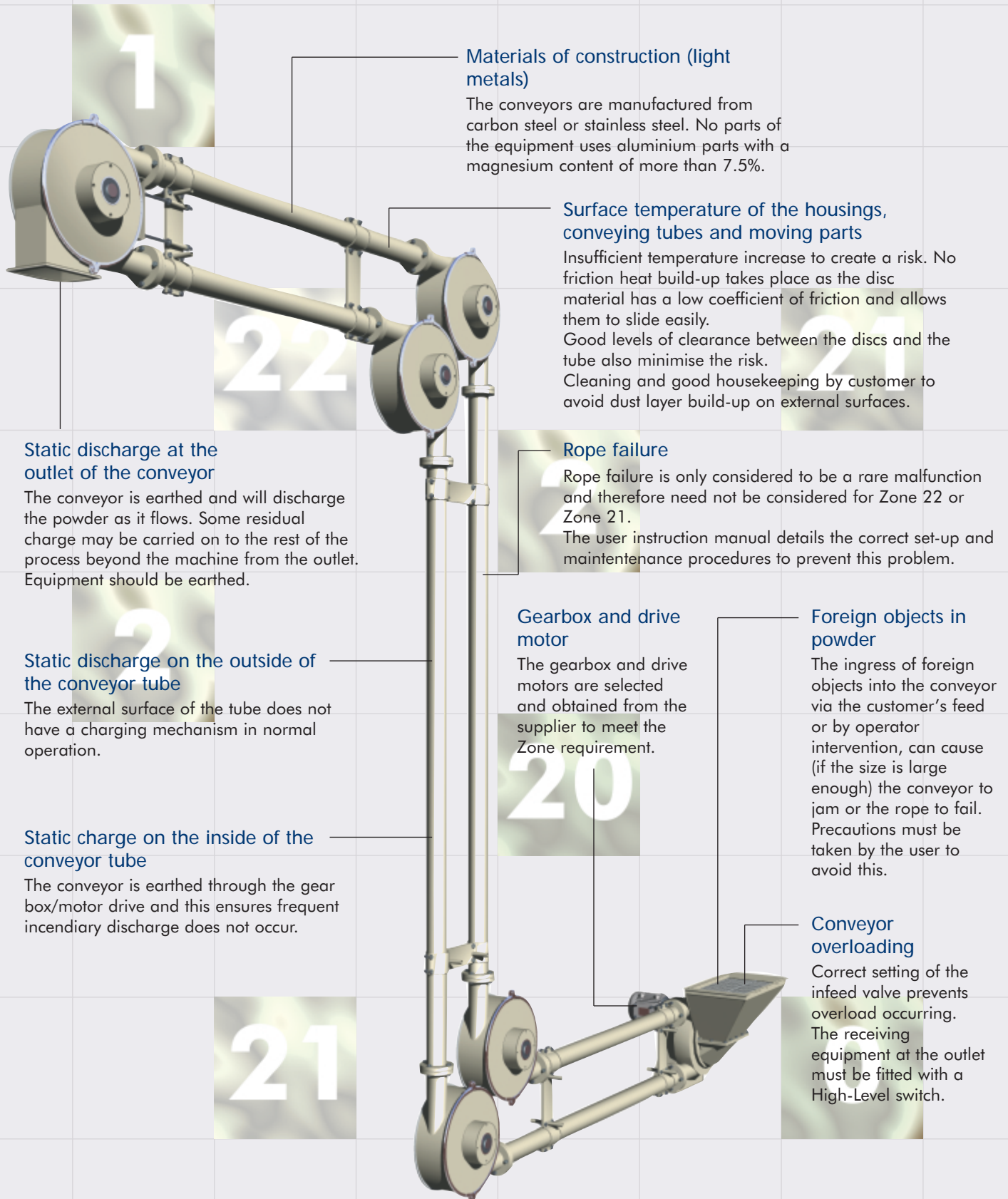
Zone 20: A place in which an explosive atmosphere in the form of a cloud of combustible dust is present continuously, or for long periods or frequently.

Zone 21: A place in which an explosive atmosphere in the form of a cloud of combustible dust is likely to occur in normal operation occasionally.

Zone 22: A place in which an explosive atmosphere in the form of a cloud of combustible dust is not likely to occur in normal operation, but if it does occur will persist for a short period only.

Spiroflow Aero-Mechanical Conveyor

The basis of safety for all Spiroflow equipment is explosion prevention. This requires all the equipment parts to be earth bonded to one common earth point. The customer should ensure that no foreign object can enter the system.



The selection of equipment both electrical and mechanical for use in hazardous areas should be based on the categories specified in the ATEX/DSEAR regulations as follows, unless the risk assessment finds otherwise:

Zone 20: Category 1D equipment

Zone 21: Category 1D or 2D equipment

Zone 22: Category 1D, 2D or 3D equipment

Spiroflow Big Bag (FIBC) Fillers

The basis of safety for all Spiroflow equipment is explosion prevention. This requires all the equipment parts to be earth bonded to one common earth point. The customer should ensure that no foreign object can enter the system.

Surface temperature of the filler

Insufficient temperature increase to create a risk.
Cleaning and good housekeeping by customer to avoid dust layer build-up.

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Static discharge from the filler itself

All filler parts are fastened together and are provided with an earth point.

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Heat friction or sparking due to moving parts

No frictional heating or sparking can occur due to the slow speeds involved.

1

Impact due to off-loading of the big bag (FIBC) after filling

Where a fork lift truck is being used, it is recommended that its speed be kept to below 1 metre / second.

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Load cells, vibration, level switches and other electrical equipment

All electrical equipment is selected and obtained from the supplier to meet the Zone requirement.

Materials of construction

The fillers are manufactured from carbon steel or stainless steel. No parts of the equipment uses aluminium parts with a magnesium content of more than 7.5%.

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Pneumatic control and operation sequence

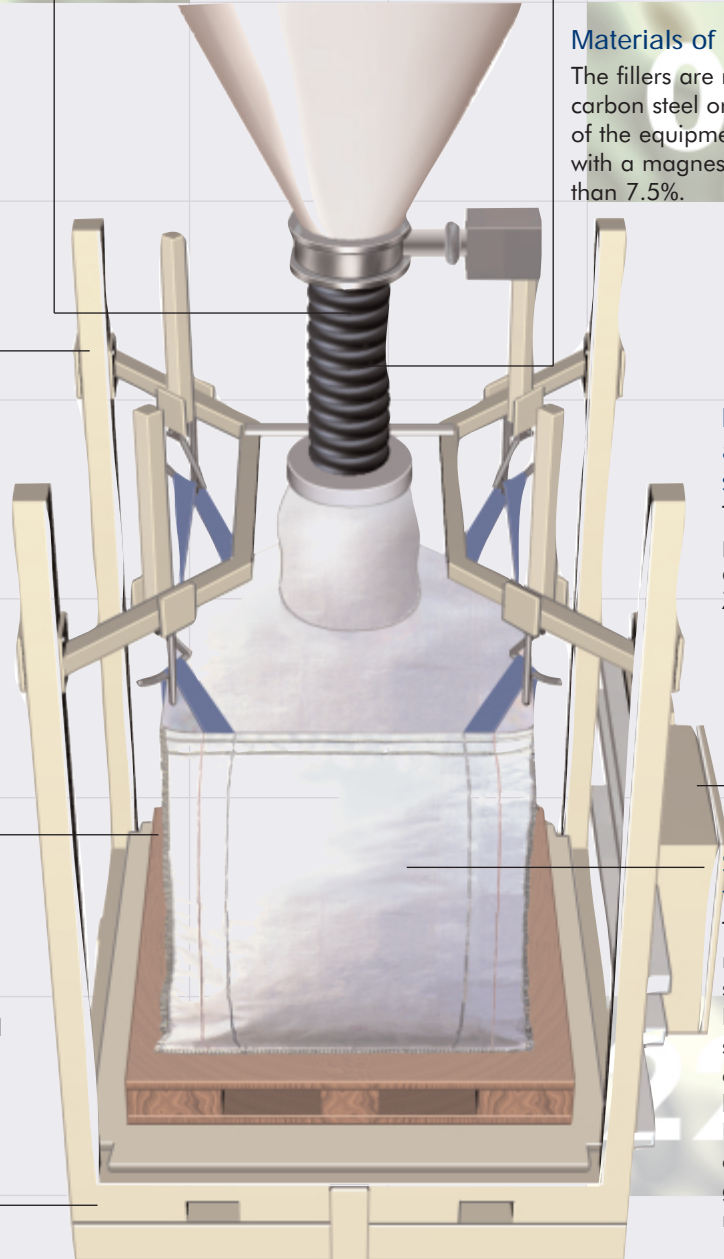
The pneumatic control panel and components are selected to meet the Zone requirement.

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Static discharge from the big bag (FIBC)

The big bag (FIBC) is not part of Spiroflow's supply. Further information on static dissipative or static conductive bags should be obtained from the FIBC supplier. Spiroflow can supply static grounding and monitoring devices.

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Intended usage of the equipment

Spiroflow manufactures equipment in the line with Manufacturers Directive 94/9/EC. Our conveyors and bulk bag handling equipment are intended for transporting/handling powders and/or granular material, either inside or outside a building containing a potentially explosive atmosphere and they are constructed to meet the requirements of Group II, Category 3 equipment.

Spiroflow Big Bag (FIBC) Dischargers

The basis of safety for all Spiroflow equipment is explosion prevention. This requires all the equipment parts to be earth bonded to one common earth point. The customer should ensure that no foreign object can enter the system.

Impact due to loading of the lifting frame onto the upper support frame

The speed of integral hoist is too slow to cause any sparks.

Where a fork lift truck is used, the lowering speed must be kept to below 1 metre / second.

Integral hoist

The hoist is selected and obtained from the supplier to meet the Zone requirement.

Heat friction or sparking due to moving parts

No frictional heating or sparking can occur due to the slow speeds involved.

Static discharge from the big bag (FIBC)

The big bag (FIBC) is not part of Spiroflow's supply. Further information on static dissipative or static conductive bags should be obtained from the FIBC supplier. Spiroflow can supply static grounding and monitoring devices.

Safety interlock switches and level probes

All electrical equipment is selected and obtained from the supplier to meet the Zone requirement.

Static discharge from the plastic viewing window

Static discharge from the plastic window need not be considered for dusts with a minimum ignition level of >3mJ.

Pneumatic control and operation sequence

The pneumatic control panel and components are selected to meet the Zone requirement.

Surface temperature of the discharger

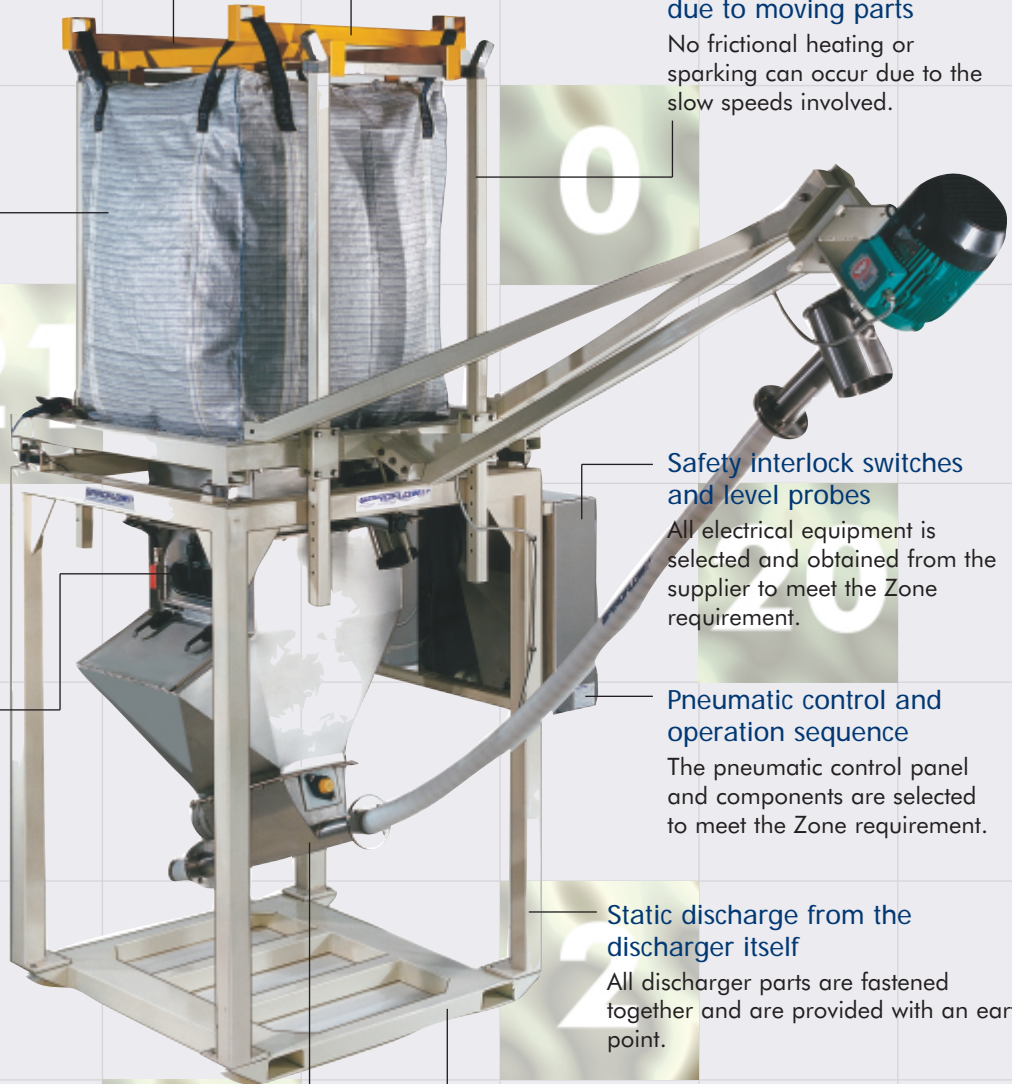
Insufficient temperature increase to create a risk. Cleaning and good housekeeping by customer to avoid dust layer build-up.

Static discharge from the discharger itself

All discharger parts are fastened together and are provided with an earth point.

Materials of construction

The dischargers are manufactured from carbon steel or stainless steel. No parts of the equipment uses aluminium parts with a magnesium content of more than 7.5%.



The risk factors mentioned in this leaflet are intended as a guideline only and do not attempt to represent an exhaustive list of all possible risks. Spiroflow equipment varies depending upon the customer's application and the equipment specified. Individual risks associated with each application must be assessed for each installation.

Some of the numerous customers for whom we have supplied ATEX rated equipment

- Quaker Oats
- Walkers Snack Foods
- FMC Biopolymer
- Colin Stewart Minchem
- Bayer Crop Science
- A J Barber (Barbery)
- Ceraform
- United Trent Water
- United Biscuits
- William Grant & Sons Distillers
- Tetley GB
- Novartis
- Proctor and Gamble
- Dow Chemical
- Kellogg Co Great Britain
- Rieber and Sons
- Saudi Formaldehyde
- Process & Vessel
- Carlisle Process
- Russell Finex
- Laurens Patisserie

At Spiroflow we are familiar with the following elements

- Secondary explosion types
- Control of dust in the work area
- Dust explosion prevention and protection
- Thermal decomposition properties
- Fire and combustion properties
- Dust cloud characteristics
- Minimum ignition energy
- Dust explosion classification
- External ignition sources
- Internal ignition sources

Although ultimately the responsibility is yours to ensure that your factory/working environment is safe, we can guide you through the ATEX maze and help ensure that your 'Spiroflow' Conveyors and Big Bag Handling Equipment are not over-specified and therefore not more costly than they need to be.

As we are specialists in powder handling, in this leaflet we have largely concentrated on the hazards associated with finely divided materials. However, our equipment often has to work in environments in which there are hazardous gases and we fully understand those risks too.

We work closely with Phoenix Loss Prevention Ltd of Skipton, North Yorks and we would not hesitate to put you in touch with them for professional and independent advice on all aspects of the ATEX/DSEAR regulations and how they apply to your situation.