U-PANEL BAGS
Two piece, U-Panel construction that has two seams sewn along the two opposite sides to create two panels, creating a “U” Panel shape. Accepted as the industry standard around the world, the U-Panel FIBC is the most popular FIBC shape. This construction gives the bag a large lifting capacity.

FOUR-PANEL BAGS
It is the original polypropylene design, Four-Panel Bulk Bags (FIBCs) have seams along four separate pieces of fabric that are sewn together to construct the body of the bag as well as having the top and bottom panels sewn in. Four-Panel bags tend to hold their shape better than other types of bags and are better suited for stacking.

CIRCULAR WOVEN BAGS
A Circular or Tubular bag is woven into a cylinder or tube and cut to the correct size. The most common construction type is a circular fabric on the body with a sewn square base. As there are no seams in this construction, this creates for a more aesthetically pleasing bag, and with only a top and bottom panel sewn into the bag, they are ideal for fine and hydroscopic materials. The tubular body design is also ideal as a liner-less option for fine materials and is recognized for its ease of lifting and manipulating with a forklift.

CONICAL BAGS
The Conical Bag is designed specifically to assist in the complete discharge of contents, which are slightly sticky, like brown sugar and premix flour products. The conical shape at the bottom of the bag ensures that the bulk bag can be discharged quickly and easily.

FORM-STABLE or BAFFLE BAGS
This special Baffle construction offers maximum stability to the bag. There are 4 baffles sewn to the main fabric at each corner to prevent bulging of bag when filled, allowing for a more effective use of the bag’s storage capacity. Four rigid cross corner loops allow the forklift operator to pick up bags without the requirement of additional staff. The Baffle Bag is ideal for light-density products and can be more economical as it increases payload - the larger panel width allows corners to be filled with 25%-30% more product. Another advantage is the increased stackability and with all sewn edges turned to the outside, it reduces potential of contamination.
Bulk Bags are classified according to one of four Types: A, B, C and D. All these Types are defined by the construction of the Bulk Bags, the intended use and performance requirement criteria.

**TYPE A**
Type A Bulk Bags are made from standard polypropylene material which is a non-treated insulating fabric. They have no special electrostatic safety features. Static electricity is generated as products move over the inside surface of the Bulk Bag when they are being filled or discharged. As there is no static protection provided by Type A Bulk Bags, these are not to be used for combustible materials or utilised in flammable or combustible environments.

No requirements are specified for Type A FIBCs as they are not intended for use in potentially explosive atmospheres.
- No static protection,
- Used safely to transport non-flammable products,
- There are to be no flammable solvents or gases present around the bag,
- DO NOT USE to transport flammable products.

**TYPE B**
Type B Bulk Bags are very similar to the Type A bags as they are made from the standard polypropylene material, they too do not have the ability to dissipate static electricity efficiently. The difference is that the material used is an insulating fabric but this has a low breakdown voltage (less than 4KV) to prevent propagating brush discharges (PBD) which are highly energetic and dangerous. Type B bags can prevent PBD, however normal brush charges can still occur so these bags cannot be considered to be antistatic in any way.

Type B bags may be used in the presence of the combustible dusts with MIE of greater than 3mj but in the absence of flammable vapours of gases.
- Used to safely transport dry, flammable powders,
- There are to be no flammable solvents or gases present around the bag,
- DO NOT USE to transport flammable products.

**TYPE C** *(see pp. 4-5)*
Type C Bulk Bags known within the industry as conductive or groundable Bulk Bags or conductive FIBCs. Constructed from non conductive polypropylene material interwoven with conductive yarns that form a grid pattern, these are designed to control electrostatic charges by grounding. The bag MUST be electrically grounded during filling and emptying - this is essential to the safe use and performance of a Type C bag.
- Used safely to transport flammable powders,
- Used safely when flammable solvents or gases are present around the bag,
- DO NOT USE when ground connection is not present or has become damaged.

**TYPE D** *(see pp. 4-5)*
Type D Bulk Bags are also called antistatic Bulks Bags. A type D bag is constructed from antistatic fabric which has antistatic or static dissipative properties to safely prevent the occurrence of incendiary sparks, brush discharges and propagating brush discharges and does not require grounding.
- Used safely to transport flammable powders,
- Used safely when flammable solvents or gases are present around the bag,
- DO NOT USE when the surface is contaminated or coated with conductive material such as water or grease.

**FOOD GRADE**
Food grade bags are bags that are made with the intent of putting food products into the bags. A Bulk Bag that is manufactured in a facility that has undergone an audit and is certified by a food safety standard.
UNITED NATIONS CERTIFIED FIBCs
These bags are designed to handle products that the United Nations considers hazardous material.
The international transport of dangerous goods in Bulk Bags is regulated by a number of international codes
based on the United Nations Recommendations on the Transport of Dangerous Goods (also known as the
Orange Book). This divides bulk containers into 6 categories namely: metal, flexible, rigid plastics, composite,
fibreboard and wooden.

There are four types of FIBCs made from woven polypropylene for dangerous goods:
1) 13 H 1 - Woven plastics without coating and without liner,
2) 13 H 2 - Woven plastics, coated and without liner,
3) 13 H 3 - Woven plastics, uncoated and with liner,
4) 13 H 4 - Woven plastics, coated and with liner.

UN Bags are also classified according to the Hazard level of goods they carry. Each UN Bag shall carry the
UN-Symbol mentioned in the below table which shall imply the hazard level of the product.

<table>
<thead>
<tr>
<th>DEGREE OF DANGER</th>
<th>PACKING GROUP</th>
<th>UN SYMBOL</th>
<th>MAXIMUM VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>I</td>
<td>X</td>
<td>1.5 m³</td>
</tr>
<tr>
<td>Medium</td>
<td>II</td>
<td>Y</td>
<td>3.0 m³</td>
</tr>
<tr>
<td>Low</td>
<td>III</td>
<td>Z</td>
<td>3.0 m³</td>
</tr>
</tbody>
</table>

All FIBCs carrying dangerous goods must be accurately labeled with the proper UN markings.
For example:

13H3 / Y / 01 14 / AUS / POLESY / 12345 / 4000 / 1005

- 13H3: United Nations packaging symbol
- PP woven plastics, uncoated and with liner
- Y: Approved for packaging groups II and III
- 01 14: Month and year of manufacture
- AUS: Country issuing the UN test certificate
- POLESY: Manufacturer
- 12345: Manufacturer’s mark or name & approval number issued by the Competent Authority
- 4000: Stacking test weight applied in kgs
- 1005: Maximum permissible load

UN CERTIFIED SYMBOLS
More on Antistatic Bags

ANTISTATIC BAGS (TYPES C & D)
FIBC’s can also be classified with respect to their Antistatic properties in case of usage in statically hazardous environments. These bags are especially designed for the handling of explosive or combustive material. The use of FIBCs has increased enormously throughout manufacturing industries where large quantities of powdered, granular or pelleted materials are handled. Many processes, for which Bulk Bags are used, may contain sensitive flammable media such as solvent vapours or dust clouds with low ignition energy. The fact that these bags which are traditionally manufactured from woven polypropylene can generate high levels of static electricity when filling and discharging is now well recognized and as a consequence efforts have been made by Polesy and our supply partners to design bags which are inherently antistatic.

Polesy and our supply partners comply with the industry needs and most of our FIBC and liner ranges are also available with such properties in order to offer ANTISTATIC FIBCs, in case of requirements.

Conductive FIBC - Type C
Made of specially designed Conductive fabrics with interwoven conductive yarns.
Groundable FIBC with grounding tabs, to be earthed in order to dissipate the static electricity built up from Bulk Bag to the ground.

Self Dissipative FIBC - Type D
Made of specially designed yarns, coating and construction for dissipating the static electricity built up from the Bulk Bag to the atmosphere. Doesn’t need to be grounded, which eliminates the risk of explosions in the case of misused (ungrounded) Type-C FIBCs. Type D antistatic FIBCs are designed to be static safe from the point of view of electrostatic discharges from the fabric surface even when used ungrounded. It is understood that if a sensitive flammable atmosphere exists the FIBC itself is only one potential source of electrostatic ignition and full antistatic precautions should be taken on all materials within the atmosphere.

Some Facts About Conductive Bags
The FIBCs known as “Type C Bags” have interwoven conductive threads which are all reliably interconnected and MUST BE GROUNDED. Dangerous static charge is safely dissipated to ground. Type C bags do not cause any discharges. But the most important condition is a reliable connection to ground during filling and emptying operations. To prevent grounding errors, Type C bags are additionally equipped with conductive loops in order to achieve contact to the hoist system, providing it has a path to ground. If this FIBC remains ungrounded and grounded objects are approaching, spark discharges will occur which can ignite gases, vapours and dusts.
Causes of electrostatic charging
Electrostatic charging is generated when separating a non-conductive material from another one (either non-conductive or conductive) which were in close contact with one another. When filling or discharging an FIBC, an electrostatic charge accumulates to the top of the filled material and also on the inner walls of the FIBC. These charges are built up by virtue of the resistance of the materials.

The amount of charge of a product depends on the:
- Electrical resistance of materials,
- Triboelectric properties of both materials,
- Separation speed,
- Electrical properties of product feeding systems.

Are electrostatic charges dangerous?
Electrostatic charges are not dangerous by themselves but they may be dangerous when there is a risk of gas discharge. Different types of gas discharges are as follows:
- Brush discharges: In general they are capable of igniting gases and vapours but not dusts,
- Corona discharges: In general they are not capable of igniting combustible atmospheres,
- Spark discharges: In general they are capable of igniting gases and vapours but not dusts,
- Propagating brush discharges: They are so strong that they are capable of igniting not only gases and vapours but also dusts could be ignited.

During the filling process the strongest electrostatic charge occurrence is to be expected.
Transporting itself does not increase static electricity.
During the emptying process, static charging must again be taken into account.

The table below will help you to identify the style of bag required depending on the sensitivity to ignition of the products being packaged and the surrounding atmospheric conditions. The sensitivity to ignition of the product being packaged is defined by its minimum ignition energy properties, or MIE. The surroundings are classified in increasing sensitivity to ignition by electrostatic discharges as non-flammable, explosive dust atmosphere and explosive gas or vapours.

<table>
<thead>
<tr>
<th>MIE OF DUST</th>
<th>NON FLAMMABLE ATMOSPHERE</th>
<th>EXPLOSIVE DUST ATMOSPHERE</th>
<th>EXPLOSIVE GAS or VAPOUR (Group 11A or 11B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIE &gt; 1000mJ</td>
<td>A B C D</td>
<td>B C D</td>
<td>C D</td>
</tr>
<tr>
<td>3mJ &gt; MIE &gt; 1000mJ</td>
<td>B C D</td>
<td>B C D</td>
<td>C D</td>
</tr>
<tr>
<td>MIE &lt; 3mJ</td>
<td>C D</td>
<td>C D</td>
<td>C D</td>
</tr>
</tbody>
</table>