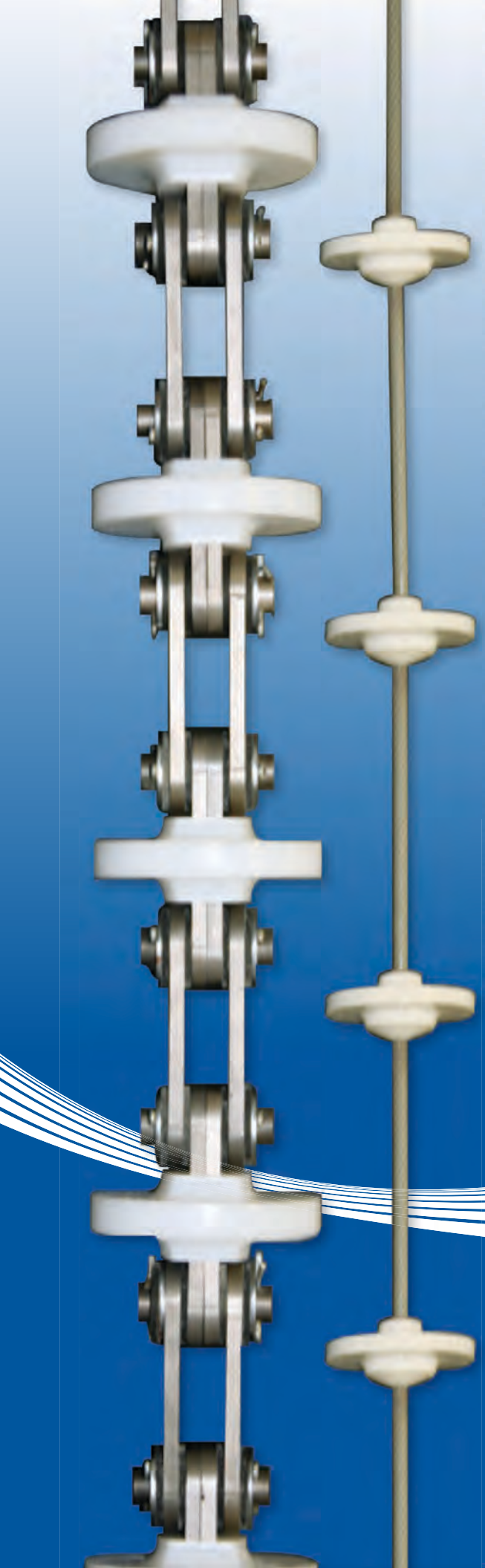


SPIROFLOW

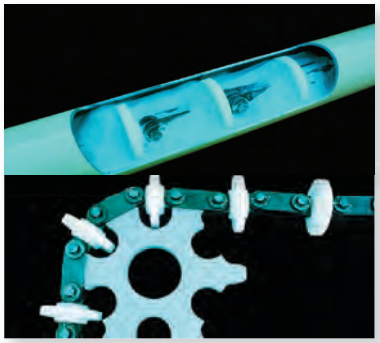
GLOBAL POWDER HANDLING SOLUTIONS

Tubular Drag Conveyors

'CABLEflow'™ cable or 'DYNAflow'™ chain driven for dry bulk solids and ingredients across all industries

Tubular Drag Conveyors

What are they?



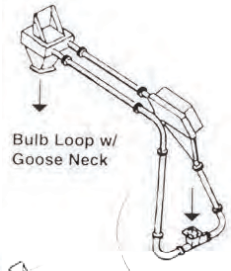
Tubular Drag Conveyors (TDCs) are mechanically driven conveyors that 'drag' material along the inside of a tube. They are designed to transfer finely and not so finely divided, flowable bulk materials from in-feed points to discharge points through a totally enclosed conduit. TDCs are positive displacement devices using close-running discs connected by a cable or metal links. They have been used successfully throughout a range of industries for over fifty years.

How do they work?

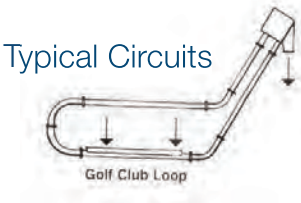
A cable or chain with discs spaced along its length and its ends connected to each other to form an endless loop is pulled by a motor driven sprocket within an enclosed tube. Changes in direction are facilitated by bends in the tubing or by corner housings for tighter radii. Discharge of the product is through 'outlet boxes'. Cable or chain and casing are routed back to the in-feed point in an endless loop.

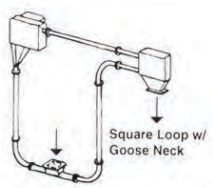
Installation

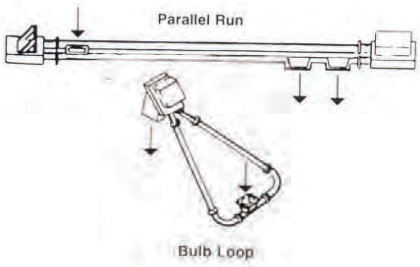
By nature, the tubular conveyor absorbs all the reactions to its own conveying forces internally. The forces are transferred by compression of the flanged casing sections in the Dynaflow Chain Drag Conveyor and by compression couplings in the Cableflow Cable Drag Conveyor. As a result, the only external supports required are those necessary to support the weight of the conveyor and load of product being conveyed. If desired, Spiroflow engineers can recommend support locations. Installation supervision is also available on a fee basis.

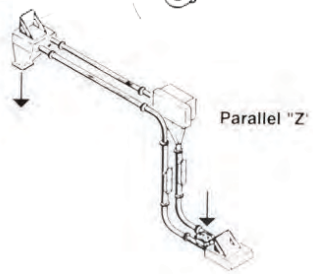


Typical Circuits



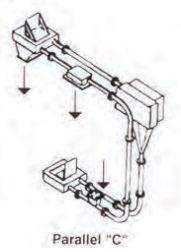






Materials of Construction

Generally, the construction materials of a tubular conveyor are determined by the product to be handled. Materials that are corrosive or contaminable would normally dictate stainless steel construction on metallic material contact surfaces. In applications where there is no concern over corrosion or contamination, carbon steel construction is a far more economical alternative. The most common materials of construction, in order of increasing costs, are carbon steel, #304 stainless steel and #316 stainless steel. External components not in contact with the product would be carbon steel unless specifically requested as some other materials. Construction from other materials quoted upon request.



What are their benefits?

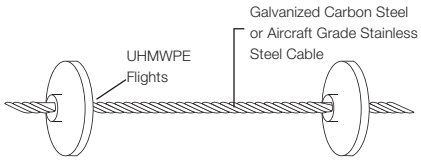
- Totally enclosed, dust-free, contamination-free handling
- Only mechanical conveyor that can operate in 3 planes, this permits complex circuits eliminating transfer points and using only a single drive
- Minimum horsepower and energy consumption
- Can be Meter or Flood Fed
- Handles hot, cold, wet, dry, hygroscopic or temperature sensitive materials
- May be fed at multiple points in a circuit
- Minimum noise level
- May discharge at multiple points in circuit (no air locks)
- No need for filters or cyclone to separate air and material as discharge gravity takes care of this for FREE
- Gentle conveying action - minimized product degradation
- Will not separate blends
- Round construction minimizes residual accumulation and build up.
- May operate under pressure differential or inert purge

Chains, Cables and Flights for every application

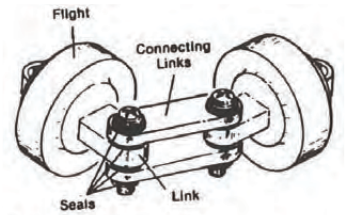
At the heart of every tubular conveyor is the conveyor cable and disc or chain and disc assembly which is the single most critical component in the system. Spiroflow offers a wide range of construction materials and assemblies to meet the demands of the various products to be conveyed.

Selection of the cable and disc or chain and disc assembly to be used on any particular application is based on a number of factors: The total developed length of the conveyor circuit, number of casing bends, material loading, the total mechanical load (chain pull), the number of planes through which the cable or chain must pass and the characteristics of the product being conveyed. Spiroflow offers two types of cables and several chain options to insure proper operation across a wide range of applications.

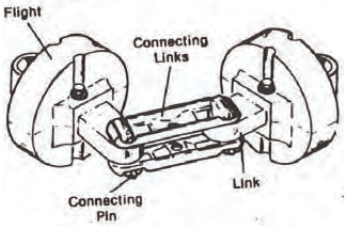
Cable and Discs: Our cable and disc assemblies are a development of those used in our tried and tested range of Aero-Mechanical conveyors. The cables are sized to be strong enough for the load imposed upon the discs. The discs are moulded onto metal ferules that are rigidly crimped along the length of the cable. Cables can be of carbon or stainless steel according to the application.



Sealed Pin Chain: Elastomer washers are compressed around the pins and between the links to seal abrasive and corrosive materials from the pin bearing surfaces, thereby extending chain life. Seals are most commonly made of neoprene, EPDM or polyurethane. Other seal materials are available upon request.

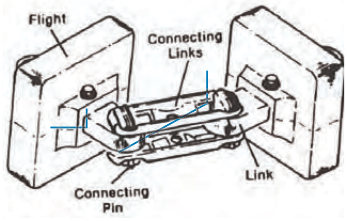


Forged Steel Chain: This chain style utilizes commercially available #348, #458 and #678 drop forged rivetless chain with open pin construction. Chain of this design is extremely durable and less costly than the sealed pin variety.



Chains for Square Tubes: From time to time, the demands of a particular application will call for a tubular conveyor with a square or rectangular cross-section. Spiroflow offers a range of chain assemblies that effectively meet these requirements.

Works in Multiple Planes: Chains are designed to rotate out of plane up to 90° over a given distance. This means that "universal joints," with their inherent drawbacks and added expense, are not required. Our chains are constructed in such a way that elements or sections can be replaced when necessary. And, of course, our cable and disc assemblies will readily flex any which way! Their construction also enables sections to be replaced as required.



Flight Selection

Conveyor flight selection is another critical point. The proper flight material must be chosen to withstand possible chemical attack, abrasion, temperature, etc. Spiroflow offers an effective range of standard flights, meeting the needs of virtually all applications, as follows:

Ultra High Molecular Weight Polyethylene (UHMWPE): Generally the most popular and best all around flight material, due to its extremely high abrasion resistance, very low coefficient of friction, high impact strength and resulting long service. The material is available in an FDA approved grade; it is chemically inert and water absorption is essentially nil. Service temperature is up to 80ºC (176ºF).

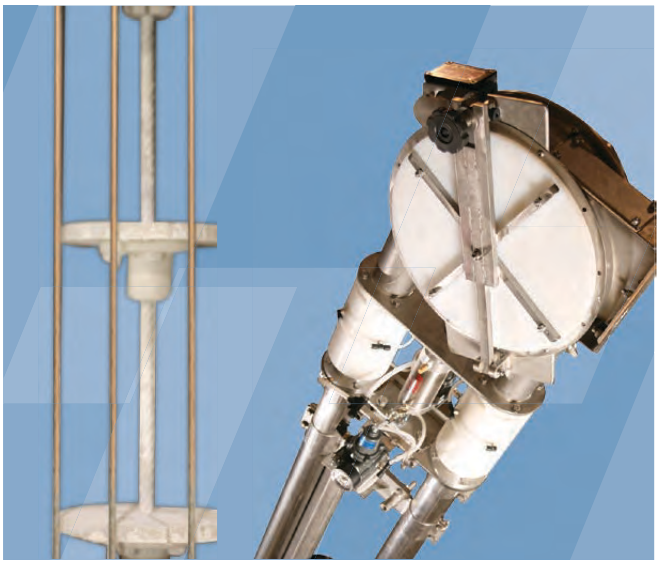
Cast Iron: The second most popular flight material due to its low cost and reasonable service life. In many applications, corrosion, abrasion, chemical resistance and product contamination are not a factor. In these instances cast iron may be a prudent choice of materials. In some applications, mild steel may be substituted to provide lthe same type of service. Cast iron and mild steel flights have a service range up to 250ºC (480ºF).

Other Materials: While nylon and polyurethane flights do not offer all the beneficial properties of UHMWPE there is a range of applications where these materials are best suited.

Specials: Conveyor flights can be molded, machined, fabricated or flame cut from a wide range of materials as required by a specific application. A Spiroflow engineer would be happy to discuss your needs and help select the flight material best suited.

‘Cableflow’ Tubular Cable Drag Conveyors

‘Cableflow’ Tubular Cable Drag Conveyors are in fact a development of our tried and tested Aero-Mechanical Conveyors operating with reduced clearances and at reduced running speeds. ‘Cableflow’ conveyors are designed for gentle material handling and for installations requiring conveying in multiple planes. They provide complete material batch transfer of bulk products from single or multiple in-feed points to single or multiple discharge points with little or no damage.



Because they are derived from our Aero-Mechanical Conveyors, they enjoy the option to have our patented DART (Dynamic Automatic Rope Tensioner) rope tensioning system for maximum rope life and minimum maintenance. This is a key advantage over competitor’s cable driven conveyors.

Cable discs are manufactured from Ultra High Molecular Weight Polyethylene and are suitable for duties up to 80ºC (176ºF).

What can they convey?

- Acordis Cellulosic Fiber
- Almonds
- Aluminum Oxide
- Atrazine
- Barium Metaborate Monohydrate
- Burned Oats
- Carbon Black
- Coffee Beans / Ground & Whole
- Corn Starch
- Cotton Seed Coated with Starch
- Cuprous Chloride
- Detergent, powder
- Diatomaceous Earth
- Dried Feed Grade Egg Product
- Flour
- Ground Paper Product
- Lime
- Lime Kiln Dust
- Limestone Pellets
- Lysine Chunks
- Monosodium Glutamate
- Mustard Seed
- Natural Organic Fertilizer
- Oats
- Paper Sludge
- Paraffin
- Peanut Splits
- Powder/Shavings/Slivers
- Polyester Fiber
- PVC Pelletized Mix
- Rubber
- Silica Sand
- Rice
- Rubber (includes Fluff)
- Tungsten Powder
- Tea
- Urea
- Vegetable Scraps
- Virgin PVC
- Walnuts
- Waste Cotton
- Waxed Prills
- Wheat Mids
- Wood Chips
- Zinc Oxide
- Zinc Stearate

*Please call for product specific information and to arrange product testing

‘Dynaflow’ Tubular Chain Drag Conveyors

The ‘Dynaflow’ Tubular Chain Drag Conveyor is also a mechanical tubular drag conveyor operating within the confines of a pipe. In this conveyor, the discs that move material along the pipe are connected by articulated metal links (chains) meaning that they are well suited to the most arduous of applications. The discs can be made from a variety of materials including steel and cast iron. This enables them to operate at temperatures up to 250ºC (482ºF).

What can they convey?

- Activated Carbon
- Adipic Acid
- Alum
- Ammonium Nitrate
- Antimony Oxide
- Artificial Sweetener
- Aspirin Powder
- Asbestos
- Baghouse Dust
- Baking Powder
- Black Oxide
- Benzoic Acid
- Bentonite Clay
- Bisphenol
- Bone Meal
- Calcium Carbonate
- Calcium Hypochlorite
- Carbon Black
- Carbon Chips
- Caustic Soda
- Cellulose
- Cement Powder
- Ceramic Clay
- Cereal Fines
- Chlorendic Anhydride
- Coal Fines
- Coffee Beans
- Coffee Chaff
- Copper Powder
- Copper Chromate
- Copper Sulfate
- Corn Meal
- Crushed Pineapple
- Diatomaceous Earth
- Digested Wood Knots
- Epsom Salts
- Ferrous Sulfate
- Fertilizer Powder
- Filter Cake Flock
- Fumaric Acid
- Grain
- Graphite
- Green Salts
- Grinding Sludge
- Ground Coffee
- Ground Graham
- Herbicide
- Hydrated Lime
- Insecticide Powder
- Instant Coffee
- Irganox
- Iron Oxide
- Iron Sulfate
- Isophthalic Acid
- Kaolin Clay
- Lead Oxide
- Lime
- Magnesium Fluoride
- Magnesium Chips
- Magnetic Oxide
- Manganese Oxide
- Malt
- Mercuric Oxide
- Metal Chips
- Metallurical Coke
- Mica
- Mill Scale
- Molybdenum
- Monosodium p hosphate
- Mustard
- Mylar Flake
- Paint Flake
- Paint Sludge
- Paper Pulp
- Paraformaldehyde Flake
- Paunch Manure
- Penicillin Powder
- Pentaerythritol
- Pesticide
- Petroleum Coke
- Phenolic Resin
- Phthalic Acid
- Phthalic Anhydride
- Phosphate Sludge
- Phosphorus Pentasulfide
- Phosphate Ore
- Plastisol Sludge
- Powdered Metal
- Powdered Sugar
- Powdered Grass Killer
- PVC Powder
- Raven Black
- Red Lead
- Resin
- Rice
- Rice Hulls
- Sawdust
- Sewage Grit
- Sewage Sludge
- Shelled Peanuts
- Soda Ash
- Sodium bicarbonate
- Sodium Tripolyphospha
- Sodium Phosphate
- Sodium Hydroxide
- Sodium Disulphate
- Spent Grain
- Spent Hops
- Spices
- Starch
- Stearic Acid
- Sulfur
- Talc
- Tea
- Teraphthalic Acide
- Titanium Dioxide
- Titanox
- Tile clay
- Uranium Oxide
- Uranium Salts
- Uranium Tetrafluoride
- Urea
- Vinsol Resin

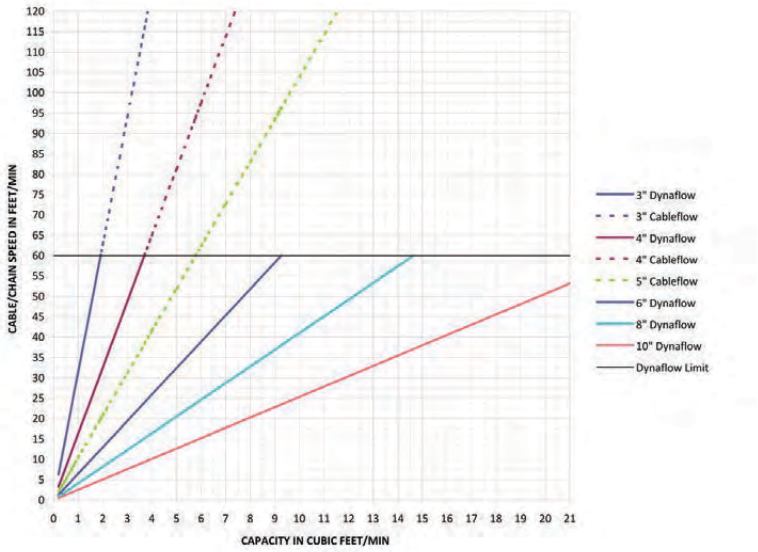
*Please call for product specific information and to arrange product testing

Conveyor Selection

Conveyor Size and Cable/Chain Speed

The capacity chart below will allow you to estimate the size of conveyor and the chain speed needed based on the throughput requirements in cubic feet per minute. The horizontal lines represent the velocity at which your product will pass through the conveyor. The vertical lines indicate the volumetric throughput rate in cubic feet per minute. The diagonal lines are the sizes of the conveyors available.

*CABLEflow TDC's can operate up to 175 ft/min dependent on material characteristics



How to Use the Capacity Chart

1. Based on your material's bulk density, calculate the required conveying rate in cubic feet per minute. Then locate the amount required in cubic ft / min. on the horizontal scale.

2. Move up the vertical line and note where it intersects with one or more diagonal lines. Each intersection point indicates a possible conveyor size.

3. From each intersection point, move left horizontally all the way to the vertical scale, indicating the conveyor cable/chain speed.

There are many factors that enter into the tubular conveyor selection process. Beyond the mechanical selection described above, consideration must be given to the physical characteristics of the material to be conveyed and the equipment duty cycle.

Tubular Conveyor Selection Guidelines

1. The average operating speed range of a tubular conveyor is in the 5 to 55 ft/min cable/chain speed range.

2. It is generally advisable to apply a larger conveyor at a slower cable/chain speed if your material possess sluggish flow characteristics, is sticky abrasive or if the equipment operational duty cycle is extensive.

3. Smaller conveyor sizes and faster cable/chain speeds are usually selected when the material is free flowing and non-abrasive and/or the equipment duty cycle is low.

4. Future capacity requirements should be considered. It may be prudent to install a larger conveyor now, at a lower cable/chain speed, then increase the cable/chain speed later to accommodate a higher capacity. This can be done with the use of a variable frequency drive or gearing change.

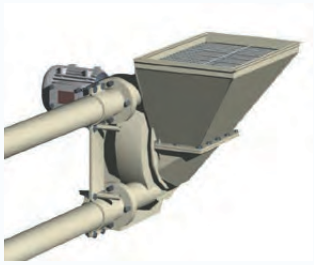
5. Surges and uneven feed conditions should be considered. Surge hoppers may provide for more constant feeding and may allow use of a smaller conveyor.

6. Many forms of sludge do not flow well into or out of tubular conveyors. In applications involving sludge, it is generally advisable to oversize the conveyor by a factor of four or more and to never run the cable/chain at a speed above 20 ft/min. In all sludge applications, it is important to determine the characteristics of the sludge when it dries on the conveyor wall and cable or chain linkage. If it becomes too hard to be easily removed, another type of conveyor may be better suited.

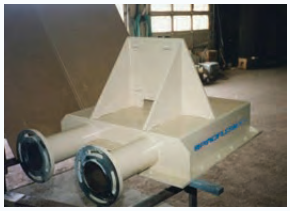
Final equipment selection should be made by a Spiroflow engineer, who will consider the above as well as other factors and make a recommendation on a conveyor that will provide reliable service.

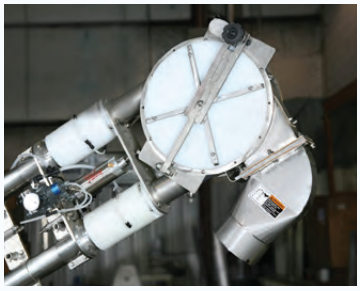
The System Components

Drive Assemblies
Conveyor drive assemblies are available for 90º or 180º locations. They are always located at a high point in the conveyor circuit, after product discharge or can be used as a discharge point. Drive components are selected as required by the conveyor circuit and are mounted on a drive plate which serves as a take-up unit. All drives are complete with overload protection and drive guards. Constant or variable speed units available. All drives are designed for full load start up.

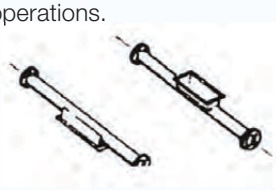


Idler Sprocket Turns
Sprocket turns are placed in a circuit in place of a bend to reduce frictional drag. They are available in any angle from 90º to 180º. They are most commonly placed in the circuit. Conveying product through an idler box is not recommended, although idler turns are often used as a product discharge point in a system.



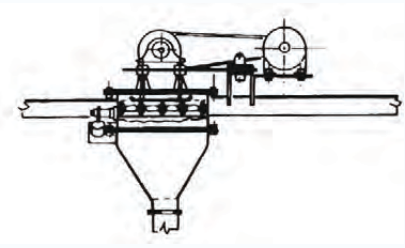


Inlet & Discharge
Chutes and hoppers are located where required along the straight sections of the conveyor circuit. The actual length and height of the hopper are determined by the flow characteristics of the conveyed product and the dimensions of interfacing equipment. It is quite common to provide a large surge hopper at the inlet for bag-dump operations.



Discharge Gates
Manual or air-operated discharge gates allow the operator to choose which of a multiple of discharge points is to be used at a specific time. Commercially available knife or butterfly style valves, located below a standard discharge hopper, are also available.

Chain Vibrator
Where a conveyed product resists complete discharge, a special chain vibrator can be incorporated. The vibrator mechanism penetrates the conveyor housing to make direct contact with the chain.



Inspection Openings
Inspection and access openings are located along straight casing sections.

Powder Handling Systems

Superior design, outstanding performance

Spiroflow is internationally recognized as a leading equipment and solution provider for applications associated with dry bulk solids - whether in powder, granule, flake, pellet, lump or whatever form and whether in bulk quantities or as minor ingredients. The company was founded nearly 40 years ago with the Flexible Screw Conveyor as its cornerstone and with which the name Spiroflow has become synonymous.

Tubular Drag Conveyors *CABLEflow / DYNAflow

Bulk Bag Dischargers

Vacuum Conveyors

Bulk Bag Fillers

Aero-Mechanical Conveyors

Flexible Screw Conveyors

We aim to offer our customers the best solution, we have never believed in the 'one size fits all' philosophy. Accordingly, as we have expanded our horizons, we have developed our conveying ranges to meet the new challenges whether organically, by strategic acquisitions or through joint ventures. So, today, we offer the 5 types of conveyors illustrated above.

For nearly 40 years, we have designed, engineered and continuously developed our line of equipment and systems to effectively handle the enormous diversity of products to be found within today's process industries. Time and again, in food and pharmaceuticals, cosmetics and chemicals, minerals and plastics, our proven experience has enabled us to provide solutions to meet every handling need. Our conveying systems are designed with a minimum of working parts for maximum reliability. They are simple to operate, easy to clean and maintain, and are dust-free in operation.

Why two types of Tubular Drag Conveyor?

One size does not fit all. Each has been described in detail on the previous pages together with a list of their attributes. Our engineers will only be too pleased to help you choose the optimum for your application.

Manufacturing

We actively encourage customers to visit our modern manufacturing facility at any time. Here, we are able to process orders efficiently and to our high quality standards.

Design

We have an experienced team of mechanical and electrical engineers with a vast collective knowledge of solids handling, geared to handle your project quickly and efficiently, whether you need a single conveyor or a complete powder handling system.

After Sales

At Spiroflow, we firmly believe that after sales service forms an integral part of the product. Over 70% of our business comes from existing customers, whom we work with as partners from the moment of placing an order and throughout the equipment's operational life.

Testing

Our fully equipped test facility, which is at your disposal, assesses performance of our machinery on your particular material. On-site trials can also be arranged if preferred.

SPIROFLOW

GLOBAL POWDER HANDLING SOLUTIONS

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