delfin
INDUSTRIAL VACUUM SOLUTIONS

INDUSTRIAL VACUUM SOLUTIONS FOR COMBUSTIBLE DUST

INTERTEK ETL LISTED US

NFPA®

THE **GLOBAL SPECIALIST** FOR DUST MANAGEMENT ACROSS ALL INDUSTRIES

OUR GOAL: YOUR SAFETY

The vast majority of manufacturing and production processes involve the generation or handling of hazardous dust, powders and other materials that represent a threat to the environment and the operators' health and safety in the workplace.
For over thirty years, Delfin has developed innovative solutions for cleaning and extracting hazardous particles to make the work environment safer.

COMBUSTIBLE DUST HAZARDS ACROSS DIFFERENT INDUSTRIAL SECTORS AND APPLICATIONS

The Occupational Safety and Health Administration (OSHA) in the United States defines combustible dust as "a solid material composed of distinct particles or pieces, regardless of size, shape, or chemical composition, which presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations".

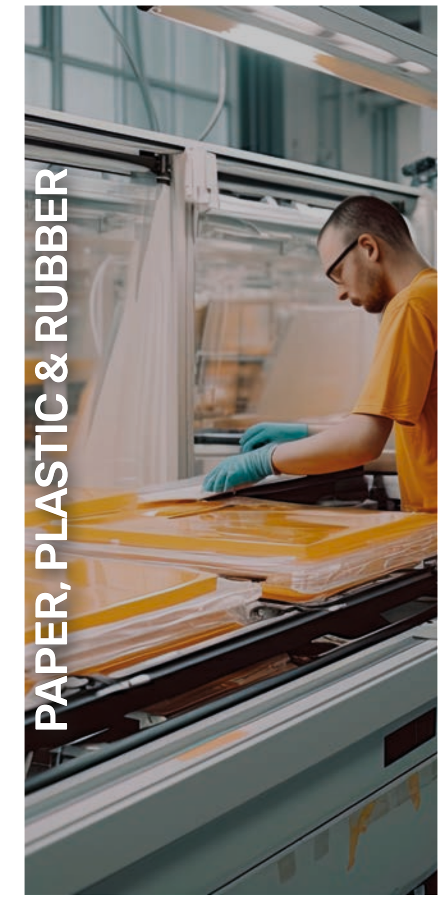
Several industrial incidences caused by underestimation of the combustible dust hazard led to an increased attention to prevention and manufacturing standards. In fact, some materials and powders are commonly known as explosive, but other ones become combustible only when in dust form.

Areas with high risk of explosion, due to the manipulation or production of combustible dust in **silos, grain mills and bakeries.**

Various machining processes in the metalworking and wood sector generate dangerous powders, during **sanding, grinding, and drilling processes.**

Processing of raw chemicals and pharmaceuticals during the production process generate **hazardous powders & dust.**

In the petroleum, energy, & minig sectors, higher levels of risk are present due to **spillage and leaks.**



Explosive powders can be generated during the transportation and storage of plastic or rubber granules. The risk is higher in areas such as **milling operations, powder storage** and **separation systems.**

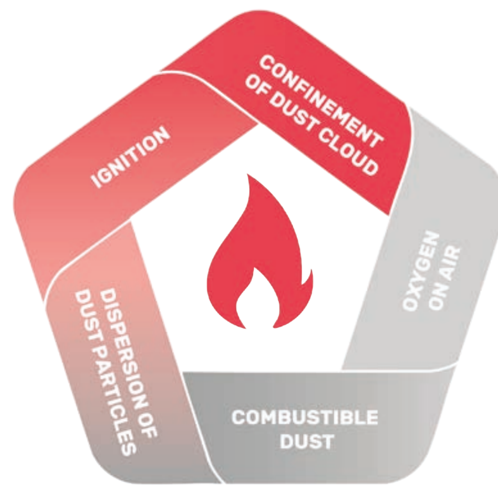
Today's 3D Printing industry utilizes both reactive and non-reactive additives throughout the production and post-production process. These **metal and polymer additives are highly combustible.**

INDUSTRIAL PROCESSES AND COMBUSTIBLE DUST

HOW DOES AN EXPLOSION OCCUR?

Safety organizations, including the NFPA and OSHA's Combustible Dust National Emphasis Program, use the explosion pentagon to easily illustrate how accumulations of seemingly harmless dust can result in a catastrophic explosion. Elements listed below are all that is needed to cause seemingly harmless dust to explode.

- **IGNITION SOURCE:**
  Element that triggers the explosion (spark, flame or temperature).
- **OXYGEN (AIR):**
  Fire needs oxygen to burn.
- **COMBUSTIBLE MATERIAL:**
  The fuel that will feed the explosion.
- **CONFINEMENT:**
  Closed and confined areas facilitate the concentration of dust particles and gas.
- **DISPERSION:**
  Concentrated dust can easily turn into a cloud suspended in the air, which increases the risks and damages caused by an explosion.



DUST FIRE AND EXPLOSION PENTAGON

GUIDELINES AND REGULATIONS

CERTIFICATIONS

NFPA is a nonprofit organization aimed at eliminating death, injury, property or economic loss due to fire electrical related hazards.

OSHA is a regulatory agency of the US Department of Labor. Its mission is to guarantee safe and healthy work conditions by defining the standards and providing training and support.

ATEX, "ATmosphères EXplosives" refers to the European Union directives 2014/34/EU regulating the manufacturing and certification of equipment in areas exposed to risk of explosion.

ETL Listed Marking : indicates that a product has been tested and found in compliance by a worldwide Total Quality Assurance provider.
This provider is a Nationally Recognized Testing Laboratory (NRTL) certifying electrical and electronic products to safety standards.

OSHA RECOMMENDATIONS

Recommended procedures include:

- **Detailed working environment cleaning program**, defining the materials which may be combustible, the processes to avoid explosions, hidden areas in the facilities that have to be checked regularly and source of ignitions
- **Use of industrial vacuum systems;** best and safest choice for cleaning as outlined by the environment & type of dust (DHA is recommended).

GUIDELINES AND REGULATIONS

NFPA 70 - NATIONAL ELECTRICAL CODE
NFPA set a classification of dangerous environments based on the type of risk and on its frequency in presence of combustible dust.

NFPA 654 - Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

NFPA 484 – Standard for combustible metals both define combustible dust as "any fine solid material that is 420 microns or smaller in diameter and present a fire or explosion hazard when dispersed and ignited in air".

NFPA 652 - STANDARD ON FUNDAMENTALS OF COMBUSTIBLE DUST
NFPA regulation aimed at setting standards to deal with combustible dust in industrial environments.

NFPA 484, 652 & 654 have been integrated with **NFPA 660 - STANDARD FOR COMBUSTIBLE DUSTS & PARTICULATE SOLIDS** in the 2025 Edition.

Regulations

	CLASS	DIVISION	GROUP
Gases vapors liquids	I	Div 1, Hazard normally present	D
	I	Div 2, Hazard abnormally present	D
Dust	II	Div 1, Hazard normally present	E, F, G
	II	Div 2, Hazard abnormally present	F, G

NFPA®

660

Standard for Combustible Dusts and Particulate Solids

2025 EDITION

NFPA 660 Standard for Combustible Dusts and Particulate Solids (2025 Edition) is the consolidated standard and guidance on the prevention of explosions caused by combustible dust.
Before NFPA 660, combustible dust hazards were addressed in separate standards, which have now been incorporated in this single document (NFPA 61, NFPA 484, NFPA 652, NFPA 654, NFPA 655, and NFPA 664).

NFPA 660 emphasizes the importance of adopting safety measures in all environments working with combustible dust. Specific focuses are **housekeeping** at section 8.4, defining the methodology and procedures, and **Vacuum Cleaning Methods** at section **8.4.2.2,** defining the scenarios, applications, and requirements for the use of industrial vacuum cleaners & Centralized Vacuum Cleaning Systems.

- **8.4.2.1.1*** "Documented housekeeping and inspection programs shall be developed, implemented, and updated as required".
- **8.4.2.1.2.1** "**Vacuuming shall be the preferred method of cleaning**."
- **8.4.2.2.1.3*** Where used, portable vacuum cleaning devices shall be incorporated into the DHA (Dust Hazard Analysis)
- **8.4.2.2.1.10*** In combustible dust hazardous (classified) locations, vacuum cleaners shall be listed for combustible dust hazardous (classified) locations.

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471 An International Codes and Standards Organization

EXPLOSION-PROOF VACUUMS
FOR THE SAFE COLLECTION OF COMBUSTIBLE DUST

Class II, Division 2
Vacuums certified for Class II Division 2 meet requirements for combustible dust, Groups F & G.

5012681

CERTIFICATION
Conforms to UL Std. 73, 1017, 121201
Cert. to CSA Std. C22.2#68, C22.2#243, C22.2#213

660 Compliant

IP55 minimal electrical protection

Antistatic 1-micron polyester filter 99.9% Efficiency

100% grounded Static-dissipative construction

Wide range of accessories for any application

Optionals:
- Stainless steel construction
- HEPA filter cron

Class I & II, Division 1 & 2
Meet requirements for Class I Division 1 Group D, and Class II Division 1 & 2, Groups E*,F,G.

5012681

CERTIFICATION
Conforms to UL Std. UL 73, UL 1017, UL 1203, UL 121201
Cert. to CSA Std. C22.2#68, C22.2#243, C22.2#25, C22.2#30, C22.2#213

660 Compliant

Stainless steel construction

HEPA filter as standard
> 99,97% at 0.3micron Efficiency

Certified motor & switch box
Suitable for 24/7 continuous duty, maintenance-free

*Group E metal dust requires an immersion pre-separator.

MORE SOLUTIONS FOR COMBUSTIBLE DUST

FOR THE SAFE COLLECTION OF COMBUSTIBLE DUST IN NON-CLASSIFIED AREAS

ACD INDUSTRIAL VACUUMS

DESIGNED FOR SMALL QUANTITIES OF COMBUSTIBLE DUST IN NON-CLASSIFIED AREAS

- For ordinary applications where **workspace is not-classified as hazardous** even if dust is present in the process of production. In these cases, dust is usually well contained, and working areas are always carefully cleaned.
- In these areas, equipment is not required to be ATEX certified. The ACD range is designed and certified Zone 20 internally compliant, granting **higher safety requirements** than an ordinary vacuum, even in non-classified areas.
- Designed and certified not to generate ignition sources, and to **safely collect and contain combustible dust**, thus guaranteeing workplace and workers' safety.

ATEX CERTIFIED VACUUMS

FOR COMBUSTIBLE DUST

ATEX Z22

- Industrial vacuum cleaners for **Zone 22** with compliance to collect combustible dust.
- Single-phase & three-phase maintenance-free motors for continuous use.
- Optional dual stage filtration (class M + H14 / HEPA efficiency).
- AISI304 stainless steel container as standard; wide range of options available.

ATEX EX1/3D & EX1/2D

- Three-phase industrial vacuum cleaners certified by third party for **ATEX zone 20 internal and for ATEX zone 22 or 21 external.**
- Optional dual stage filtration (class M + H14 / HEPA efficiency).
- Maintenance-free high performance vacuum unit up to 28.6 HP for heavy and continuous applications.

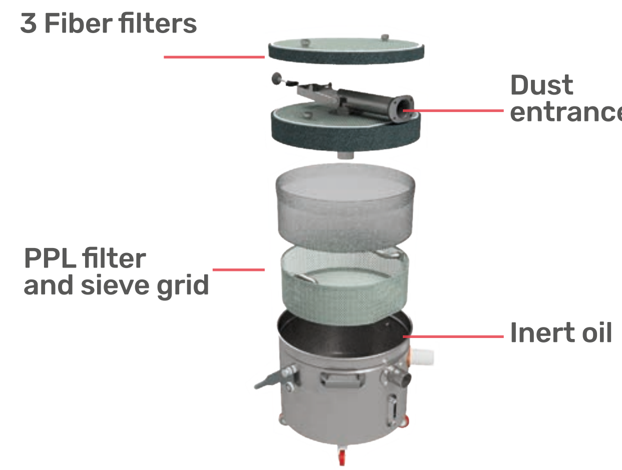
ATEX Z22 CERTIFIED DUST COLLECTORS

FOR AIRBORNE DUST

- Industrial dust collectors for **Zone 22** with compliance to collect combustible dust.
- Ideal for dry, light, and fine suspended particles.
- Three-phase, maintenance-free electric fans for continuous use (high airflow rates).
- Optional H14 / HEPA efficiency to ensure only dust-free air is exhausted into the environment.
- Wide range of options with AISI304 stainless steel.

SAFE COLLECTION OF REACTIVE METAL POWDERS

INTERCHANGEABLE CONTAINER FOR COMBUSTIBLE DUST NEUTRALIZATION



HOW DOES IT WORK?

When using fine metal powder, it is necessary to use an industrial vacuum with an inerting system, as this type of powder tends to self-ignite.
Extracted powder is immersed directly into the inert oil in the container, which neutralizes metal dust. Three fiber filters stop possible oil mists that may be created from suction and immersion. Pressure relief valve feature to ensure the release of internal build-up.

ATEX CERTIFIED & NFPA-COMPLIANT COMPRESSED AIR-OPERATED VACUUMS

FOR COMBUSTIBLE DUST AND FLAMMABLE GAS PRESENCE

- Air-powered industrial vacuums certified by third party, zone 20 inside and external zone 22 or 21
- Full compliance with OSHA and NFPA standards
- Suitable to work in Zone 1 and 2 with presence of flammable gas
- Can be used when electricity is not available or desirable.

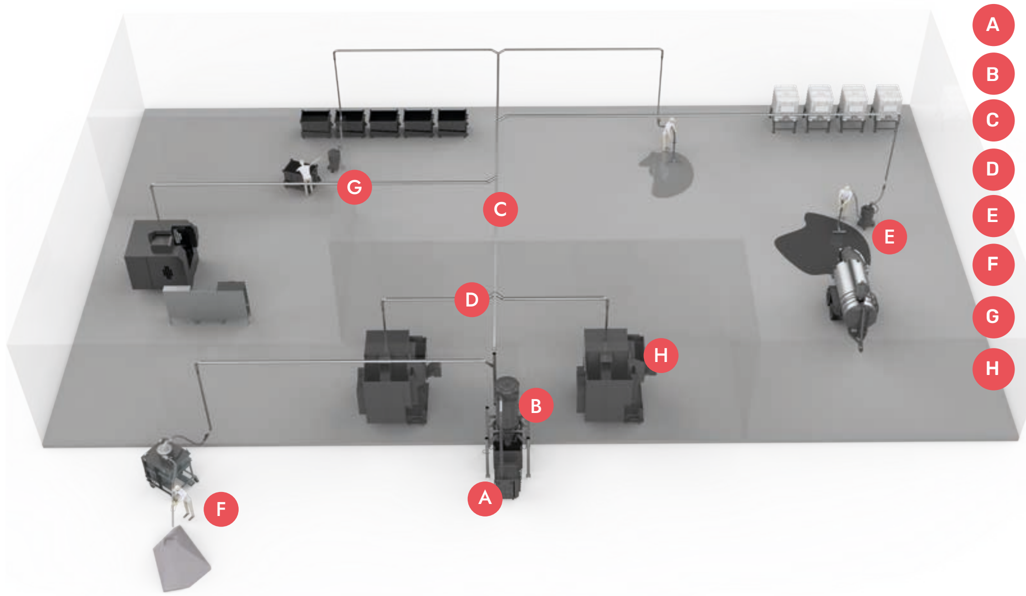
ACCESSORIES

The efficiency and performance of your vacuum operations are influenced by more than just the power and structural features of the vacuum itself. The correct tools, such as filters and accessories, play a critical role.
Accessories are crucial for adapting your vacuum to various tasks and enhancing its performance. Each accessory serves a specific purpose, tailored to different applications. Ensuring you have the right accessories can significantly impact your productivity and results.
Delfin offers a wide range of antistatic accessories and can provide the right accessory for every application.

A WHOLE WORLD OF OPTIONS AND SOLUTIONS

ATEX CENTRALIZED VACUUM SYSTEMS

When it is necessary to vacuum in large work environments, with large distances to cover and utilizing several suction points simultaneously, a centralized vacuum system represents the most effective solution. The system allows the safe collection of material from different points of the production plant, including machinery integrated in the production process. Such material can be easily gathered in a single point of the facility for easy disposal or recovery. The vacuum systems therefore make it possible to improve productivity, operating conditions and safety standards.



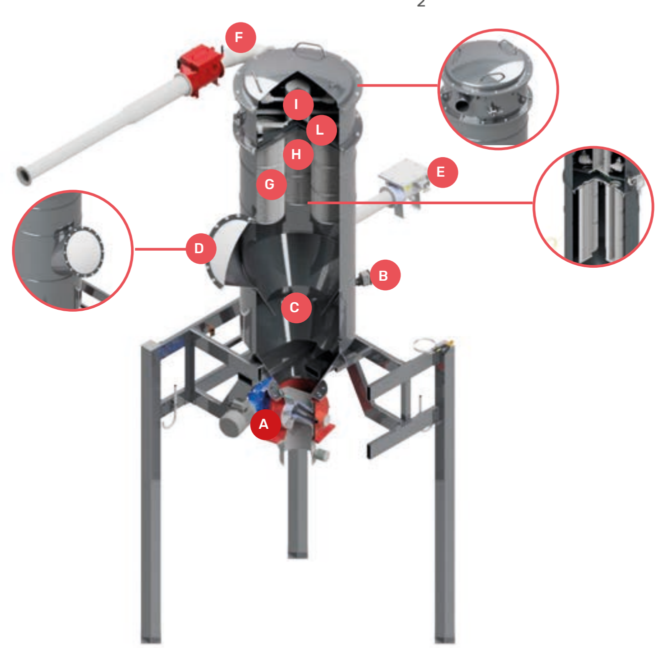
- A Suction unit
- B Filter unit with hopper and big bag discharge
- C Piping
- D Suction socket for accessories
- E Preseparator with liquids with floating device
- F Preseparator for large quantities of material
- G Preseparator with water for high temperature materials
- H Suction on process equipment

DOUBLE LEVEL OF FILTRATION - EXPLOSION RESISTANT VACUUM SYSTEM

Delfin, through its technical department, and long experience in the design, manufacture and installation of ATEX-compliant systems, develops and offers state-of-the-art solutions to meet the countless needs of industrial processes.

All our centralized filtration systems are provided with dual filtration levels. Special design to grant containment of continuous combustible dust cloud internally. Can be connected with a standard suction unit if installed in ordinary location. Our system of filtration is designed to guarantee HEPA Efficiency downstream and to ensure a secondary protection in case of failure of main filter.
We offer a wide range of power from 4 to 60HP, from 176 to 1353CFM, from 126 to 322inH$_2$O

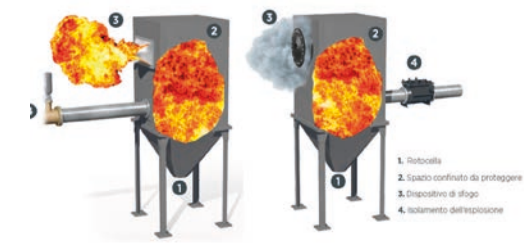
- A FLAME PROOF ROTARY VALVE CATEGORY EX 1/3D
- B LEVEL SENSOR EX 1/3D
- C ZONE 20
- D VENTING PANEL FOR EXPLOSION CONVEYNG
- E EXPLOSION RESISTANT NON RETURN VALVE
- F PARTITION VALVE
- G MAIN FILTRATION - LEVEL ONE - 99,9% EFFICIENCY
- H AUTOMATIC FILTER CLEANING SYSTEM CATEGORY EX 2D
- I HEPA FILTER 99.995% - FILTRATION LEVEL 2
- L EXPLOSION RESISTANT FLANGED HOPPER



DELFIN SOLUTION TO MANAGE EXPLOSION IN CENTRALIZED SYSTEMS

PROTECTION SYSTEMS IN THE FILTER

Explosion venting systems are designed to open at a predetermined pressure to allow the pressure and flame to vent in a safe direction. Easy to install and highly efficient, rupture vent panels are integrated to the filtration chamber of the hopper. They are available in a variety of sizes, configurations and materials to ensure reliable and rapid operation in the event of an explosion. Available in flameless version.



INSULATION SYSTEMS

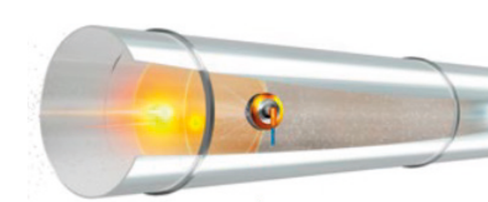
Delfin isolation systems are designed to detect an explosion and intervene to minimize the risk of the deflagration propagating between interconnected process equipment. They have to be installed in combination with a protection system.
The mechanical isolation method can be designed using an 'Active' product such as the Quick Slide Valve or a 'Passive' product such as the Flap Valve. Each of these solutions provides a mechanical barrier that isolates the deflagration.

FILTER SUPPRESSION SYSTEMS

Within milliseconds, the explosion suppression system is able to detect the pressure build-up in the initial stages of an explosion and consequently discharge the contents of a suppressor into the confined space before the pressure can reach destructive capacity. The suppressor works by interfering with the explosion reaction, removing heat from the flame of the deflagration and thereby reducing the temperature below that required to sustain combustion. The explosion suppressor also creates a barrier between the combustible particles to prevent further heat transfer.

PRE-FILTER PREVENTION AND SHUTDOWN SYSTEMS

Spark detection and extinguishing systems are designed to prevent dust explosions and fires by detecting sparks and extinguishing them automatically.
The small amount of water used for extinguishing, about 1.3-gallons, does not damage filters or other production machinery. Once the danger has been eliminated, the system automatically stops the extinguishing process and is ready to intervene immediately at the next passage of sparks or hot particles. These systems can be used in a wide range of industries, including: Wood Processing, Bioenergy, Waste Recycling, Paper, Food, Textiles and Plastics.



ATEX PNEUMATIC CONVEYORS BY DELFIN

Pneumatic conveyors is a system widely used in the food, agri-food, nutraceutical, pharmaceutical and chemical industries. These systems allow the transfer, through closed/hermetic pipes, of bulk materials in powder or granule form, from one starting point to another, eliminating the risk of contamination and dispersion of dusts.

The passage of a gaseous flow inside the pipes creates a (negative) pressure difference that allows the material to move forward. The gas commonly used is air, but in industrial sectors such as the chemical and pharmaceutical sectors, nitrogen is often required because, being inert, it is the ideal choice with potentially explosive materials.

The use of suitable conveyor systems for handling powders between the different processing machines can make all the difference in the quality of the final product and in the safety of the working environment.

Pneumatic conveyors are used in many types of industries and their use can increase productivity by up to 30% and the efficiency of the automatic machines on which they are installed, more than reduce the risk of explosion.

FEATURES:

- FULL CUSTOMIZATION AND PROGRAMMING SERVICE
- EX ELECTRICAL PANEL WITH CONTROLS SETTING DISPLAY
- AUTOMATIC FILTER CLEANING SYSTEM
- TWO LEVELS OF FILTRATIONS WITH HEPA EFFICIENCY
- MANUAL OR AUTOMATIC LOADING PICK UP
- COUNTERWEIGHT FLAP, BUTTERFLY OR CLAPET DISCHARGE SYSTEMS
- ATEX VALVES AND SENSORS FOR SAFETY MANAGEMENT
- ATEX VIBRATION SYSTEMS
- AISI 304 STAINLESS STEEL & FDA COMPLIANCE
- INTERNAL MIRROR FINISHING

HOW TO CHOOSE THE PERFECT INDUSTRIAL SOLUTION FOR YOUR NEEDS

Making the right choice of an industrial vacuum cleaner, pneumatic conveying, or plant engineering solution customized to your specific production needs is fundamental to ensuring a workplace prioritizing safety, health, and maintenance with best performance.
The decision hinges primarily on factors such as the type of application, handled material, operating hours, and production plant features.

Delfin's Engineering team is available to design and propose the best suitable solution:

1- SERIES MODELS READY TO USE FOR ANY NEEDS OF CLEANING

2- CUSTOMIZED VACUUM CLEANER SYSTEMS FOR SPECIFIC APPLICATION

3- CENTRALISED VACUUM SYSTEM DESIGNED ON PROJECT

4- PNEUMATIC CONVEYORS TO INCREASE PRODUCTION SAFETY AND PERFORMANCE

According to your unique needs, our experts will guide you towards the best customized solution. Our application questionnaire will provide all the information and technical features necessary to work on your project. Let's find your next Delfin Industrial perfect solution together!

LET OUR EXPERTS ASSIST YOU IN ACHIEVING YOUR GOALS!

CONTACT US TO GET THE FORM!
sales@delfinindustrial.com

Delfin is a global leader in the manufacturing of industrial vacuum equipment, ranging from portable vacuums for industrial cleaning, to central vacuum systems and engineered solutions, to pneumatic conveying systems. Our mission is to create value by designing innovative solutions that improve efficiency, safety, and productivity. Our aim is to use our expertise to help our customers to achieve their goals.

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