GENMA bulk

PNEUMATIC SHIP UNLOADER

GPU SERIES

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OFFERS TOTAL CAPABILITY IN
EQUIPMENT SYSTEMS & PROCESSORS FOR
Particle Size Reduction, Milling, Crushing, Sifting
Classifying, Pelleting, Agglomeration, Extruding,
Bulk Material Handling, Drying, Cooling,
Conveying & Packaging

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Introduction:

The GPU pneumatic ship unloader series are available in a range of capacities from a rated discharge rate of 80 ton/hr through to 600 ton/hr with corresponding boom standard operating modes from 12m horizontal / 8m vertical transfer to 28m horizontal / 25m vertical transfer.

Key features include:

- May be adopted with single or dual suction nozzles
- Can be designed to suit varying ship sizes
- Machine and agitators can be designed to handle difficult and material having special characteristics
- Incorporate air lock discharge having special design technology
- Variable diameter suction pipe assembly to balance the material conveying velocity for minimized wear and energy consumption
- Utilizes multi-stage vacuum pump optimized through special design and in-house operation proving

This service is deigned for discharge applications of various free flowing materials such as cereal grains, feed milling ingredients, fly ash and fertilizers.

The units are usually customised and adapted to suit the particular application including unloading of all types of inland or ocean-going vessels and discharge directly onto conveyors, trucks or wagons.

Dust free transfer is maintained through the use of enclosed conveyors and aspiration systems.

Units are powered either directly by low voltage or medium voltage electric motors from on board transformers to meet the required operating voltage or optionally diesel, gas or biofuel generators may be used.

Base/support system options

Three options are available for the ship unloader base/ support system. These are rail, pneumatic tyres (drives unit) or permanently fixed.

Rail:

- Ideal for ports with standardised pathways
- Can be used on large vessels

Steerable tyres:

- Either driven or towed options
- Ideal for ports where movement flexibility is required

Fixed:

- Unit is fixed to the wharf
- Ideal for small to medium sized ports and vessels

Range of applications

Vessel types:

- Can unload from barges to panamax, tankers or any type of vessel
- Can discharge into hoppers, trucks, wagons or chain/belt conveyors

Materials handled:

- Grains: wheat, rice, soybeans, rapeseed, etc
- Powders: cement, mineral powder, fly ash, pulverised lime, etc
- Other material: cement clinker, sulphur, aluminium, alumina, soda ash, salt, fertiliser, petrol cake, pulverised coal, etc.

Climate limitations on usage:

- Due to being a closed system, the unloader can operate under all conditions such as extreme temperatures, dust, wind and high salinity atmosphere
- All parts are sand blasted, prepared and treated with the highest quality under and tops coat paint to achieve an excellent long-lasting finish

Main usage industries

Pneumatic unloaders are widely used in industries where automated control and high capacities are required.

The following industries have adopted pneumatic ship unloaders:

- Integrated bulk material transfer from ship to storage silo systems
- Industrial plants such as power, aluminium smelters, cement industry, etc
- Feed mills and flour mills
- Grain storage

A customised solution will be developed with the customer following a consultation with our engineers where the application is discussed and concepts are prepared.

Material handling range

Grain

Typical material parameters:

- Specific gravity: 0.45-3.00 mt/m^3
- Moisture: ≤25%

Cement

Free flowing material: Semi dense phase gas-solid flow

- Granular materials
- Soy beans, maize, wheat, rice, rapeseed, cassava

Difficult to handle materials: dilute phase gas-solid flow

- Powders
- Cement, mineral powders, fly ash, pulverised lime

Alumina

Other materials:

- cement clinker, sulphur, aluminium, alumina, soda ash, salt, fertiliser, petrol cake, pulverised coal, etc.

Performance and efficiency

Main parameters:

- 30% energy saving over roots type blower systems
- Single conveying pipe capacity: 80-600 m ton/hr
- Dual conveying pipe capacity: 600-1200 m ton/hr
- Material degradation during conveying: ≤1%
- Expected operation life: 20 years
- Material loss to atmosphere during conveying: ~0%
- Boom working range:
    - Elevation angle: 10^{o} to -48^{o}
    - Rotation angle: $\pm 135^{o}$

Main wear components and expected life:

- Horizontal pipe: 500,000 tons
- Vertical pipe: 1,000,000 tons
- Discharger: 300,000 tons
- Elbow: 300,000 tons

Technology and advantages

- The ship unloader conveying pipework is designed to work under constant pressure and flow rate keeping the capacity steady throughout and load on the equipment steady
- The airflow velocity is adjustable to ensure optimal material conveying speed
- Variable diameter suction pipe to balance and adjust conveying velocity
- Additional wear resistance added to the airlock, elbows, pipework and moving parts
- Fully automated control incorporating real time monitoring in visual form
- Automatic nozzle immersion device to control depth
- Automated nozzle rotating device can be installed to prevent non free flowing material such as cement from caking. This ensures continuous operation
- The boom can be installed with a winch unit able to drop a front end loader up to 10ton weight capacity into he ship
- The option for dual conveying pipe is available having advantages as follows:
    - Conveying takes places simultaneously but in separate compartments
    - The unloading process can continue even where there is a breakdown with one of the pipes
    - The capacity can be increased

Safety considerations

Safety is of highest priority in the design and construction of the ship unloader which meets or exceeds ATEX as well as NZ/Aus requirements.

The machine is equipped with:

- Explosion protection and monitoring devices
- Temperature monitoring
- Pressure monitoring
- Flame extinguishers
- Noise reducing silencers and noise insulated rooms achieving noise levels is ≤80dba at 10m

Some of the design considerations include:

- The boom can be lowered to the ground for maintenance to avoid working at height
- Where high winds/storms are expected, the machine can be anchored to the ground
- The unloader is equipped with advanced, reliable and proven electrical control system ensuring safety of operation

Environmental considerations

One of the main advantages of using a pneumatic ship unloader is the fact that it is the most environmentally friendly option available.

The conveying is done in a dust free manner due to the system being totally enclosed using the latest dust collection technology and filter bag cleaning system achieving dust removal efficiency of 99.5% and emission levels below 20mg/nm^3.

The use of variable diameter suction pipe and multistage blower can save ≥30% power consumption.

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Example drawing