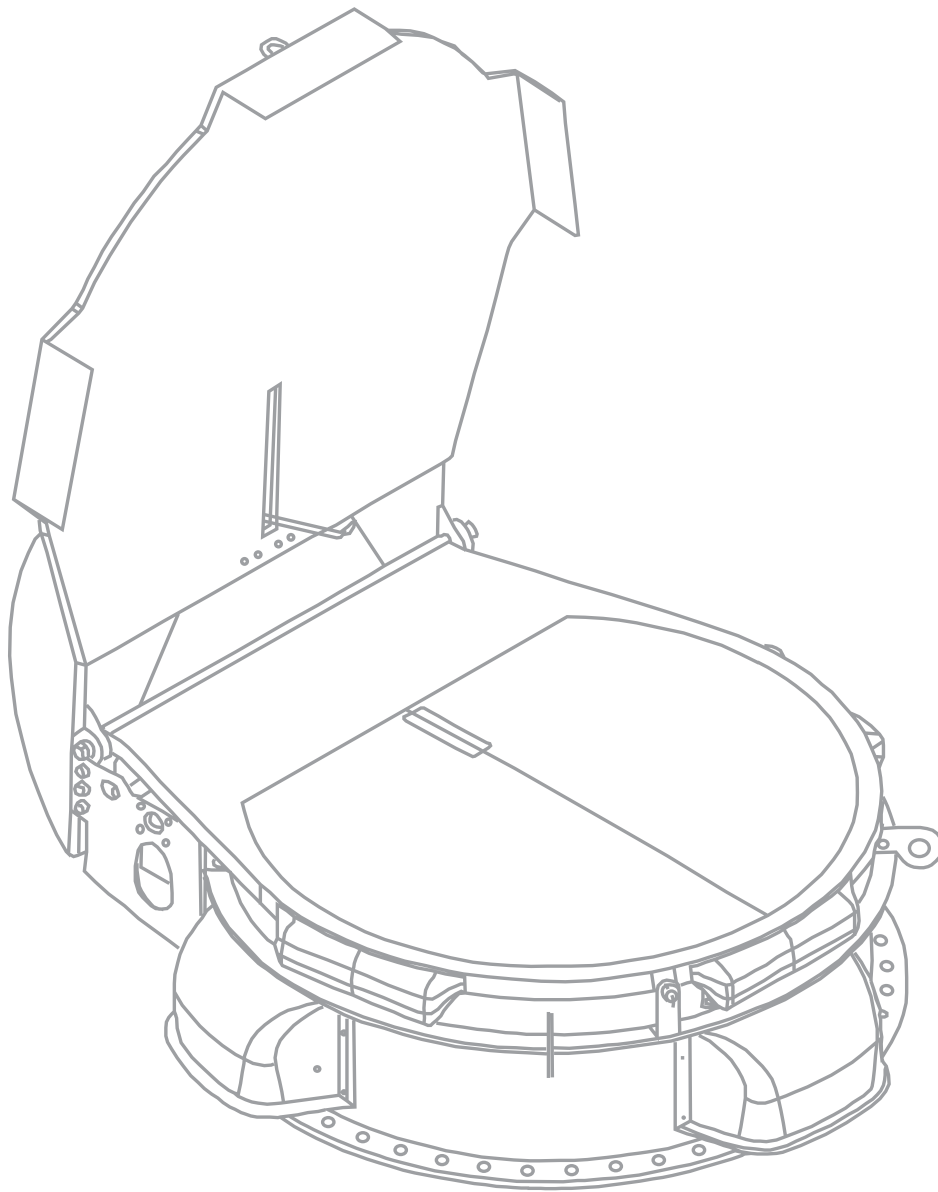


# Range of products



## Safety concepts for explosion hazardous bulk

*We provide for your safety*



### CMC TECHNOLOGIES

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# Specialized Knowledge Global Competence



Thorwesten Vent is synonymous with serious constructional explosion protection by means of explosion venting and pressure shock resistant design. Thorwesten Vent's many years of international experience ensure that silos for explosion hazardous bulk, grinding systems, filters, or other process equipment, get the right constructional explosion protection.

Thorwesten Vent has gained expertise from continuous part-taking in the creation processes of international standards and guidelines and from continuous product and application development.

The needs of the clients are approached with this expertise and with an ATEX-conform Notified Body endorsed Quality Management (ISO 9001) for suppliers of autonomous safety systems in the background.

Thorwesten Vent services and products range from evaluation and engineering to hardware packages that include self reclosing explosion vents and other essential parts.

Thorwesten Vent –  
we provide for your safety!



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# Engineering, manufacturing and construction



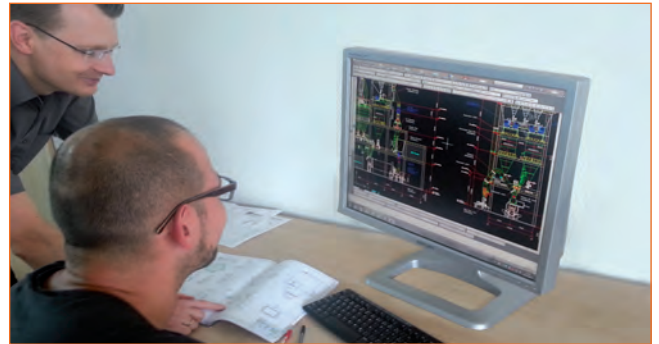
In addition to our core competence, constructional explosion protection, Thorwesten Vent provides entire technical solutions all around handling and storage of explosive bulk solids.

Another part of the service portfolio of the company is the refurbishment and modernization of existing plants as well as after sales service. Upon request, Thorwesten Vent experts will execute assessments on site.

Over the years, we have established excellent business relations to operators and engineering companies all over the world.

Thorwesten Vent is focused on the following products and services:

- Self re-closing, reusable explosion vents
- Explosion isolation by properly engineered explosion diverters
- Pulverized fuel silos (engineering for manufacturing by 3<sup>rd</sup> party / hardware supply)
- Cylindrical bag house filter concept
- Preventive explosion protection and automation (CO-analysis / emergency inertization)
- Discharging and unloading systems
- Instrumentation



Silo roof



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# Effective venting concept on duct work

Thorwesten Vent's concept for deflagration decoupling vent 1+2 and vent 1+2+3 (self re-closing) in combination with self re-closing vents on process filters and pulverized fuel silos.

## Vertical mill Vent 1 + 2



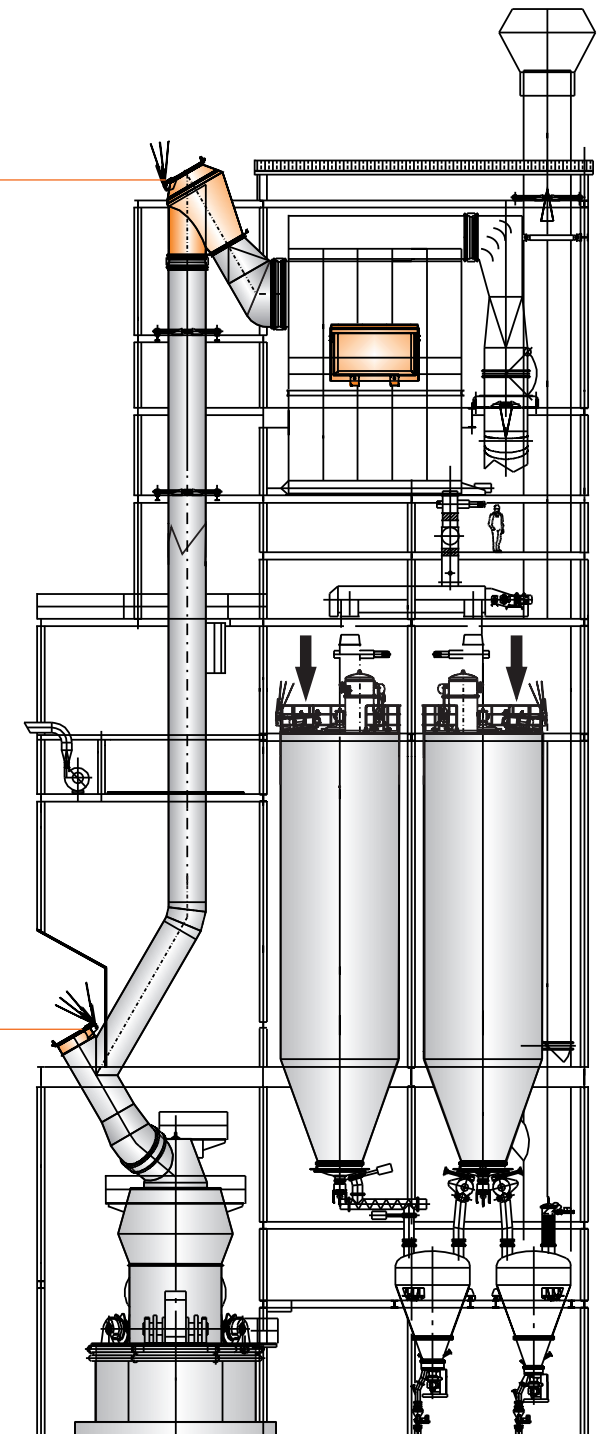
Mill-to-filter duct with propagation mitigation 1+2



Diversion of flame front and pressure close to the mill outlet is crucial for effective mitigation of acceleration and propagation

2

1



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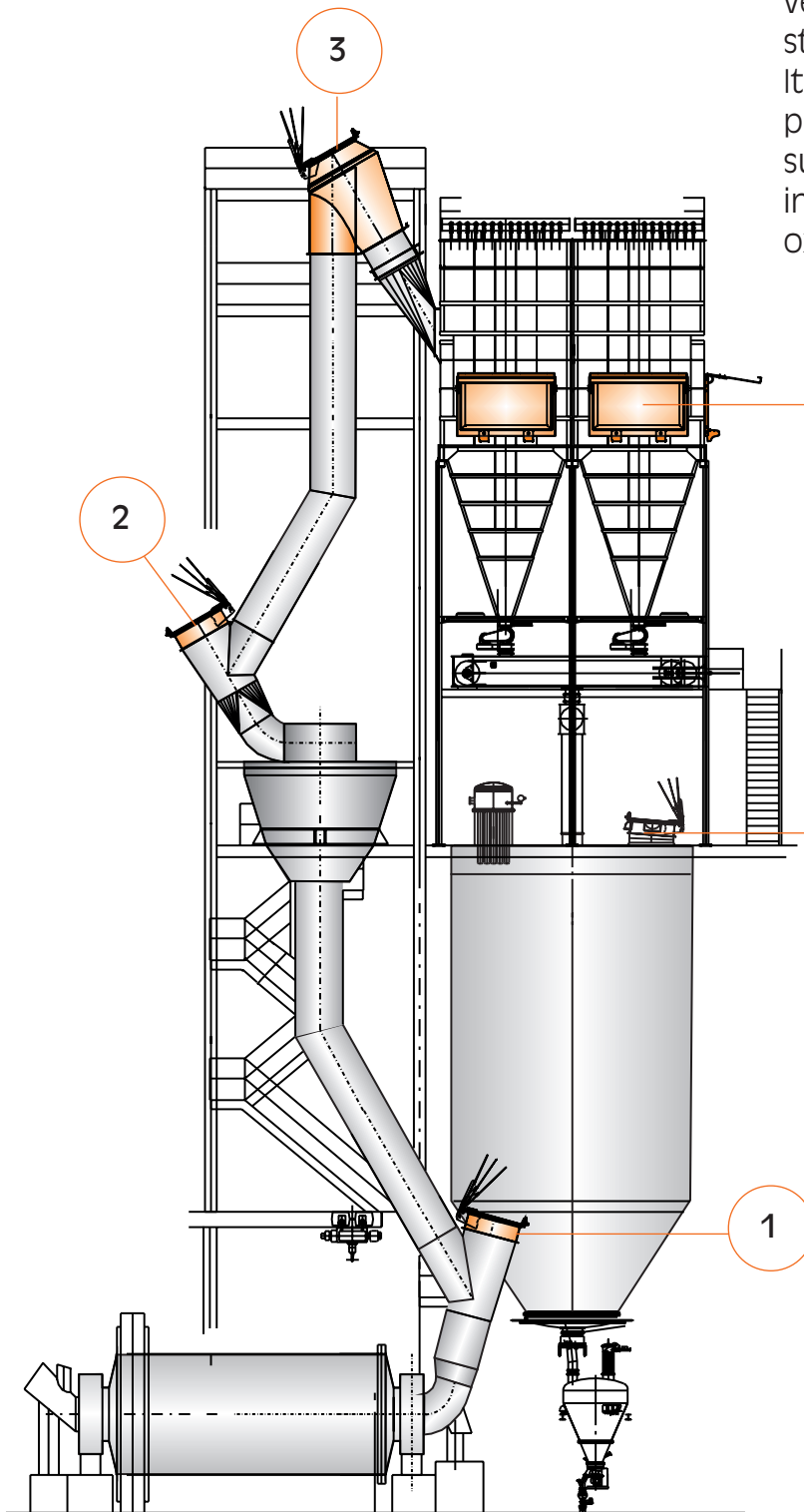


Explosion isolation with Thorwesten Vent explosion diverters will provide an adequate degree of explosion diversion isolation. The objective is the reduction of the propagating flame body and the accompanying pressure before it can enter the bag filter.

For the situations to which this literature refers, explosion diverters constitute the most cost effective, yet fully adequate prevention of flame jet ignition in the downstream enclosure.

It is crucial that the venting devices on explosion diverters have a low activation pressure  $p_{stat}$  and feature a self re-closing venting element that avoids the ingress of oxygen.

## Ball mill Vent 1 + 2 + 3



Explosion doors RLE ideal position filter



Flat roof design of a typical coal dust silo

# Pressure shock resistant PF silos

## Volume up to 3.000 m<sup>3</sup> and pressure

Our pressure shock resistant silos come with a flat roof. This design does not require any additional platform, the platform is formed by the silo roof. Special versions with flat bottom and special discharge techniques

for fuels with poor flow characteristics are available.

The design includes all interfaces for infeed box, nuisance filter, explosion vent(s), instrumentation and access.



1.100m<sup>3</sup> silo for brown coal dust for the firing of a lime shaft kiln



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# shock resistance of 2 bar (g)



## Arrangement top of roof

- Explosion devices (self re-closing)
- Nuisance filter
- Infeed box
- Explosion diverter (DES)



## Sample taking for CO analyzation

- with heating element
- with blow back function
- available for EX zones 20, 21 and 22



## Arrangement silo cone

- Aeration / CO<sub>2</sub> emergency inerting system
- Temperature probe
- Bulk solid activator



## Explosion diverter type DES

- for ducts up to DN 300
- mainly used for decoupling of interconnected bins
- manual re-setting
- self re-closing



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# Cylindrical bag house filter concept



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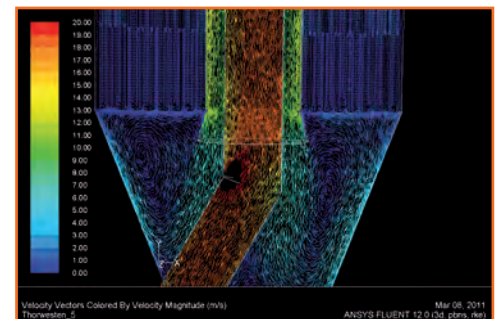
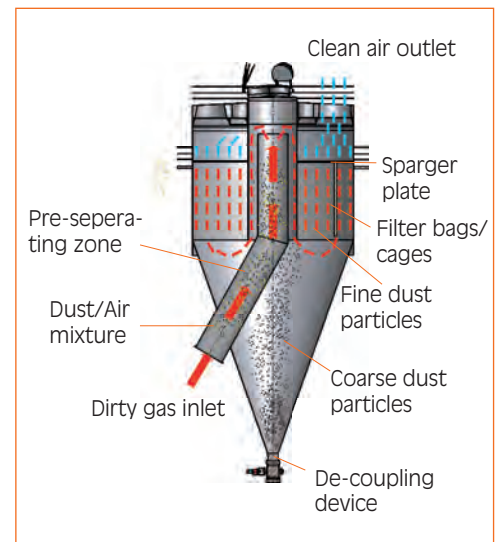
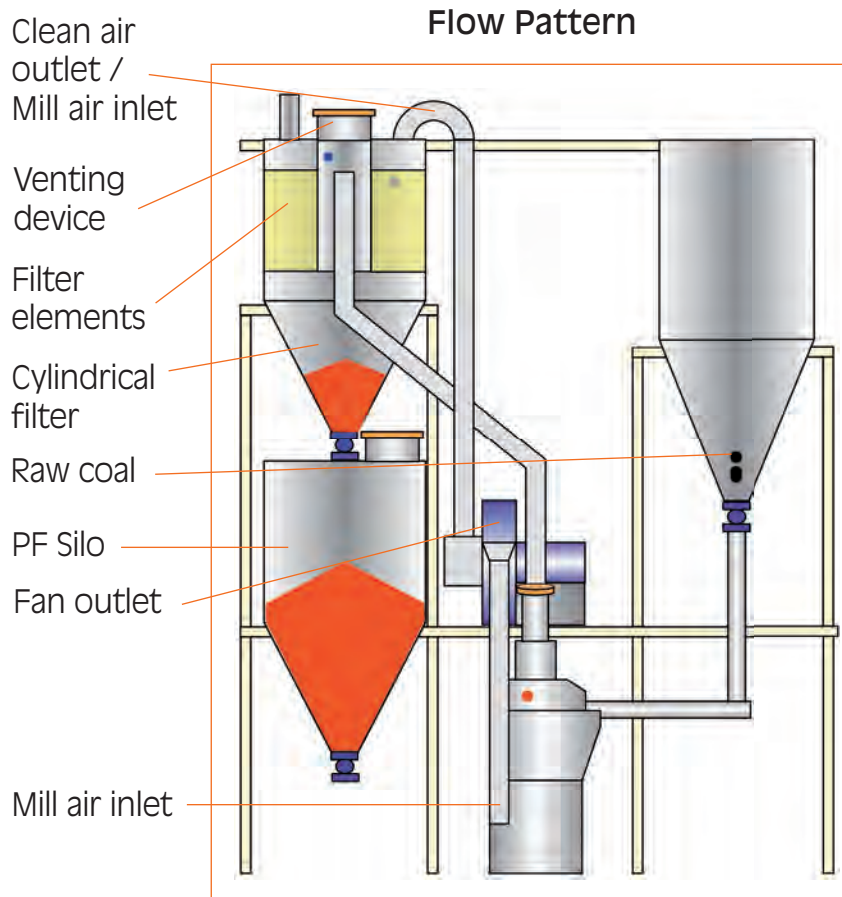
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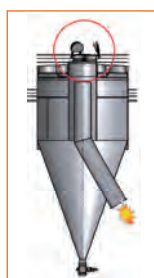
Thorwesten Vent's cylindrical bag house filter concept is characterized by an intelligent explosion protection solution. Contrary to conventional bag houses with their explosion concept comprising two explosion devices (explosion diverter in front of the filter and explosion doors on the filter) Thorwesten Vent's system accomplishes the same degree of safety with just one venting device. Both, decoupling and venting are achieved this way.

Advantages at a glance:

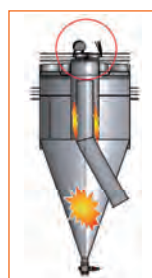
- 2 bar (g) pressure shock resistance
- Min. required explosion venting area (acc. EN 14491)
- Integrated explosion diverter / venting device (ideal diversion)
- Low activation pressure
- Vertical pressure and flame discharge
- Ideal discharge of recoil forces



CFD Simulation



Ignition  
in the  
Mill



Ignition  
in the  
Filter

Combined pressure venting  
device is able to deal with both  
explosion events



# Self re-closing carbon fibre explosion vents



Pressure tank for the pneumatic retaining device system



Front view



Detail of carbon explosion door

Thorwesten Vent's explosion devices are self re-closing. In case of an explosion event this technology inhibits ingress of air ( $O_2$ ) and supports additional measures by means of effectively working emergency inerting systems.

This comprehensive system is state-of-the-art technology and will help to reduce massive damage.

Advantages of the new vent:

- Highest rate of efficiency
- Resistant against environmental influences
- Can be used for non-turbulent gas/air mixture acc. to gas explosion class IIA
- Adjustable for different response pressures
- Explosion devices for silos equipped with vacuum breaker(s)
- Integrated heating system
- Maintenance friendly



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# Silo concepts for secondary fuels



Fig. 1: Sweeping auger

The use of alternative fuels becomes more and more popular. Most of these alternative fuels tend to create explosive atmospheres and thus require special attention concerning silo design and corresponding explosion protection. Further attention has to be given to the discharging of alternative fuels.

Thorwesten Vent offers silo concepts for alternative fuel based on 2 bar (g) pressure shock resistant silos with flat roof design. Discharge systems are selected according to the characteristics of the material (e. g. sweeping auger).

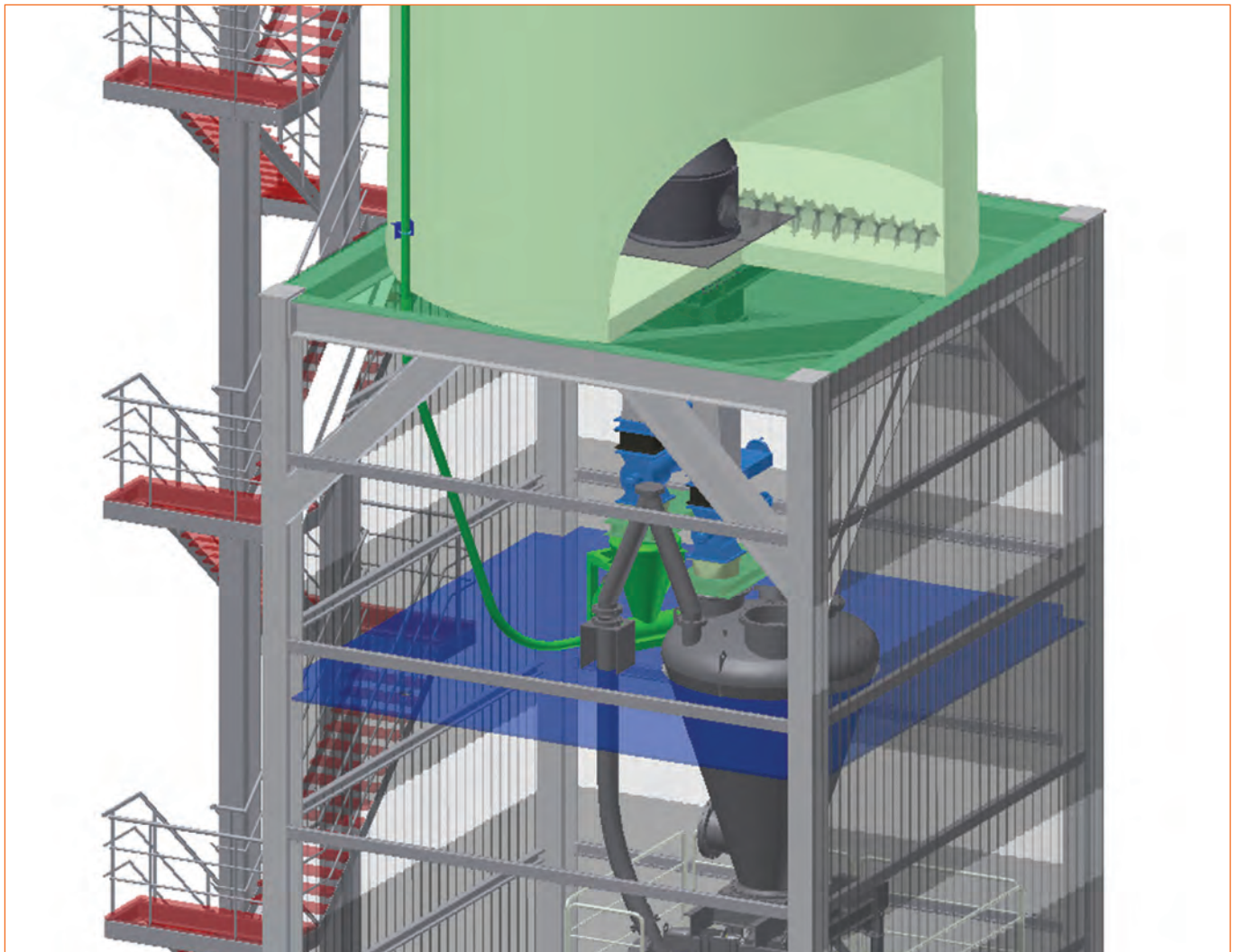


Fig. 2: 2 bar (g) pressure shock resistant flat bottom with sweeping auger



# Service



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Comprehensive services by Thorwesten Vent

- Commissioning of new installations including on-site training
- Auditing existing installations resulting in appropriate reports including proper working technical solutions
- Inspection / repair service
- Spare part service
- Maintenance contracts



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- Explosion door TT Uni C, US patent serial no 12/312,618;  
international patent no PCT/EP 2007/010265
- Round filter / Sandwich roof, US patent serial no 10/221,932;  
international patent no PCT/EP2001/002942