Pharmaceutical

Conveying, Collection, Containment

- total dust control for pharmaceutical suites

http:// nilfisk.msk.ru
info@ nilfisk.msk.ru
+7 (495) 660-83-36
8 (800) 707-66-48

Nilfisk®

Total Dust Control

- for a safe, pure and effective environment

Nilfisk conveying, collection and containment solutions are effective to control powders, debris, and potent compounds that threaten product purity and employee health during every step of drug production—from milling to packaging.

Our critical cleaning systems meet contamination control challenges and increase compliance with OSHA and FDA practices:

- Combustible Dust National Emphasis Program (NEP)
- Current Good Manufacturing Practices (cGMPs)
- ISO 14644 Standards for Cleanroom Classification

Expert Support

We support you with a highly-trained direct sales team. Dedicated to solving your pharmaceutical manufacturing challenges, our team analyzes your processes and recommends the best vacuums and features for your particular application.

Locate your sales rep at:
www.NilfiskIndustrialVacuums.com//FindARep.aspx.

Learn more about Pharmaceutical Vacuum Solutions:
www.PharmaceuticalVacuum.com

Visit the Nilfisk Industrial Vacuums site:
www.NilfiskIndustrialVacuums.com

Watch how-to videos and customer case stories:
www.youtube.com/NilfiskVacuums

Call customer and technical support:
1-800-NILFISK

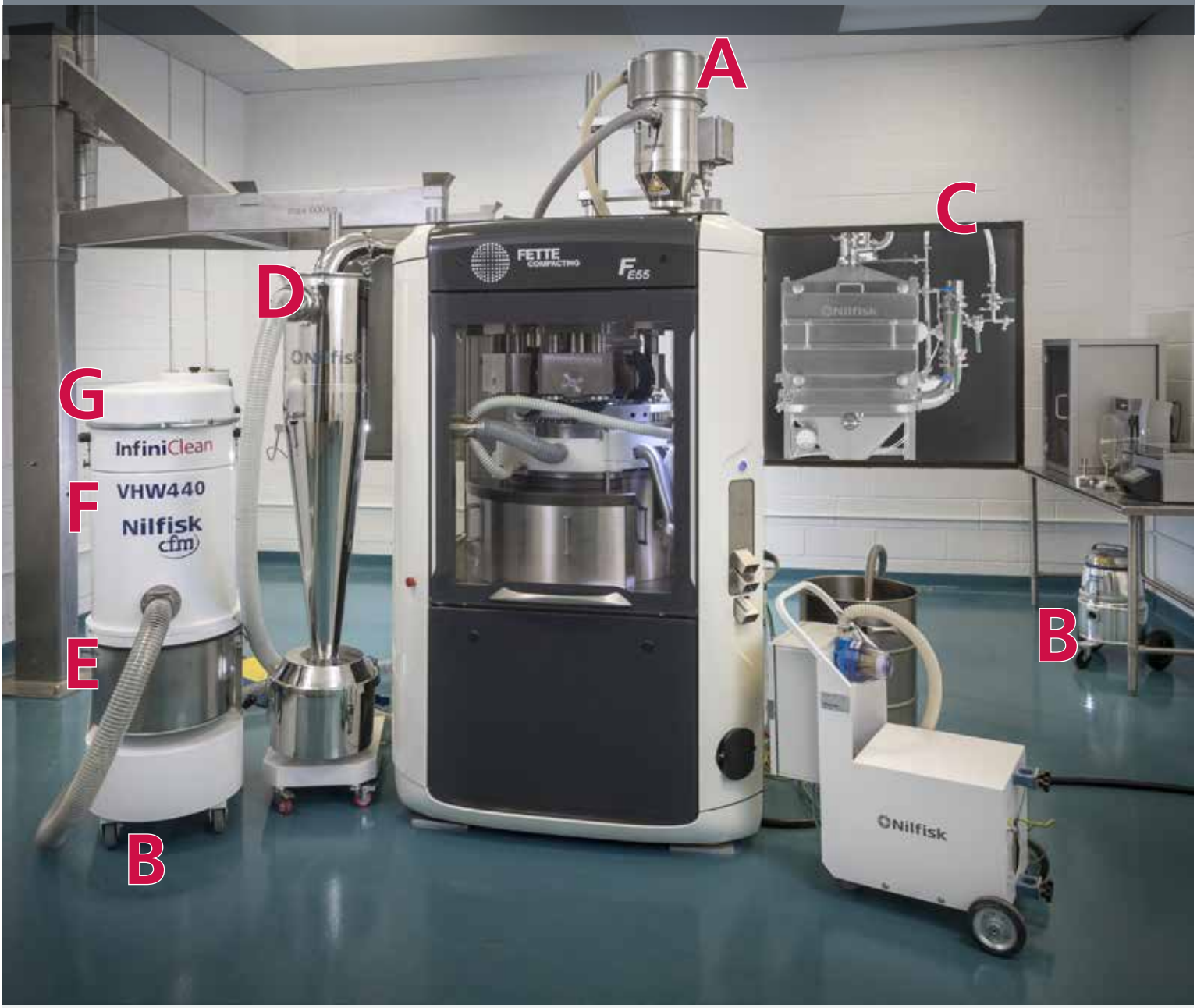
Dedicated engineering department

Dedicated sales team

Worldwide technical assistance

"We selected Nilfisk's reliable vacuum cleaners for our facility because of their proven HEPA filtration system. It's capable of collecting large amounts of powder without any leaks or breakthrough - assuring us that the materials work with are retained in the vacuum, and not released into the atmosphere."

Paul Kim, Corporate Staff Industrial Hygienist
Janssen Pharmaceuticals



Nilfisk Solutions	Page

Powder Conveying Without Segregation

- transfer powders and granules efficiently

Pneumatic conveyors move powder and granules from sacks, big bags or other containers to the required location in selected quantities and within the desired time. The Nilfisk product conveying process takes place in perfect hygienic conditions, respecting both the environment and the operator's health.

HYGIENE: Avoid dust dispersion and product contamination. The conveyed material is kept in an isolated environment from pick up to the release point. Product only comes into contact with materials such as AISI 316 or AISI 304 stainless steel.

PRODUCT QUALITY: Move pharmaceutical mixtures while still preserving their integrity and keeping the percentages of single components intact. *(Validated by a study made in collaboration with the University of Parma.)*

PRODUCTIVITY: Increase the automation and health and safety of your personnel by eliminating the task of manually scooping powder into process machines. Conveying can reduce load times by more than 50%.

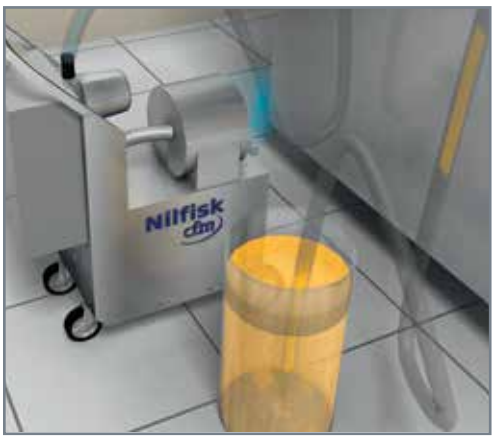
FLEXIBILITY: Nilfisk conveyors are perfectly integrated in the production process and are available in electric and pneumatic models with capacities ranging from 2 to 11 liters and conveyance of materials from 100 kg/h to 1300 kg/h.

3VT Pneumatic Powder Conveyor

PCC12HP Compressed Air Conveyor

PCC00HP Compressed Air Conveyor

Powders are conveyed in selected quantities and within desired time.



Conveyed materials are kept in isolated environment from picking to release point

Nilfisk conveyors are designed to be highly flexible, both in layout and performance ranges

Capsule Transfer Without Dispersion

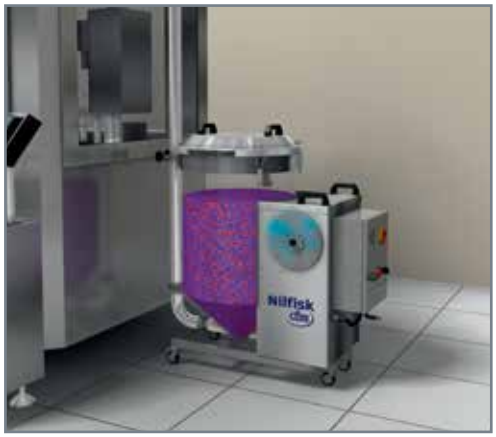
- capsule conveying without risk of contamination

The 9505 stainless steel pneumatic conveyor is designed for the transfer of empty 00-5 sized capsules. Capsules are emptied into a collection container and dispensed at an adjustable rate into a capsule-filling machine. This unique conveyor uses air power to push the capsules through rigid sanitary piping into a hopper above the capsule-filling machine without damaging the capsules. The Nilfisk product conveying process takes place in perfect hygienic conditions, respecting both the environment and the operator's health.

HYGIENE: The conveyed material is kept in an isolated environment from picking to the release point. Treated product only comes into contact with materials such as AISI 316L stainless steel.

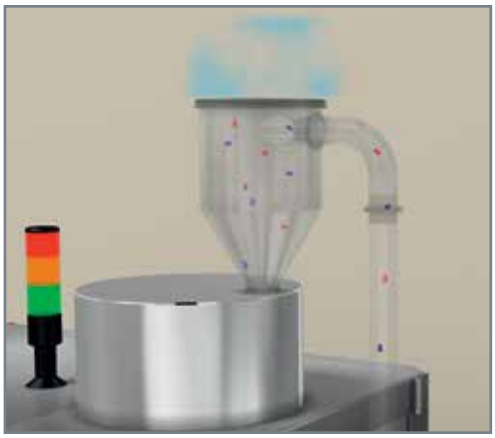
USER FRIENDLY: Two portholes on the top of the machine allow the operator to check the level of capsules in the container while the machine is running. It is also available with acousticand visual level sensors that indicate minimum and maximum capsule levels.

PRODUCTIVITY: Increase the automation and health and safety of your personnel by eliminating the task of manually filling capsules into process machines.



Small footprint and multiple configurations

Capsules are conveyed at a pre-set speed to prevent damage.



Three filtration stages prevent contamination of the environment.

Collect & Recover Toxic Dust

- maintain product integrity and equipment performance

FIXED VACUUMS

MOBILE VACUUMS

CLEANROOM VACUUMS up to ISO 4 (Class 10)

EXPLOSION-PROOF VACUUMS

TRIM VACUUMS

PORTABLE CENTRAL SYSTEMS

Nilfisk high performance, critical filtration vacuums help maintain a safe, pure and effective manufacturing process. They are available in fixed or mobile models, cleanroom-compliant designs and certified explosion-proof.

ASSURE TOP PRODUCT QUALITY: remove dust from the environment and from the equipment, avoiding product contamination.

AVOID MACHINERY DOWNTIME: continuously collecting dust and waste increases productivity and avoids lost time for cleaning the plant and machines.

SAFE ENVIRONMENT: multi-stage filtration, upstream and downstream HEPA or ULPA filters, and additional Safe-Pak™ containers maintain a safe, pure environment. CSA-certifications allow for use in classified (hazardous) locations.

COMPACT & FLEXIBLE DESIGN: Fixed or mobile, in-suite or customer piping—Nilfisk vacuums can be engineered to meet any user requirement specification (URS).

Complete Dust Containment

- safely collect highly-potent APIs, up to OEB5 GMP design

BIBO HEPA REPLACEMENT

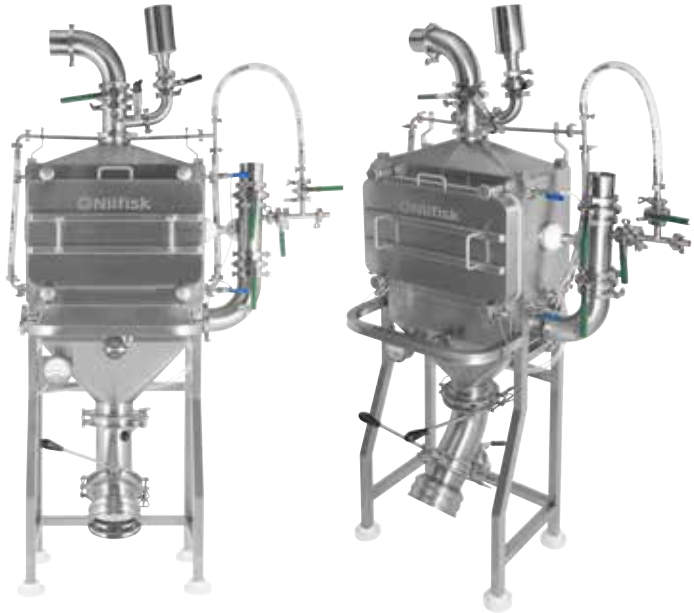
The HEPA filter is safely removed with the Bag-In/ Bag-Out (BIBO) system. Maintenance personnel never come into contact with contaminated filters while removing them from the unit. They remain protected against any hazardous contaminants retained in the filter unit. The sealed bag containing the filter is then removed and disposed of according to standard protocol.

SAFE MATERIAL DISPOSAL

The hopper is emptied by opening the butterfly valve. The material is collected into a plastic bag which is safely sealed, removed and replaced by the operator without ever coming in contact with the contents.

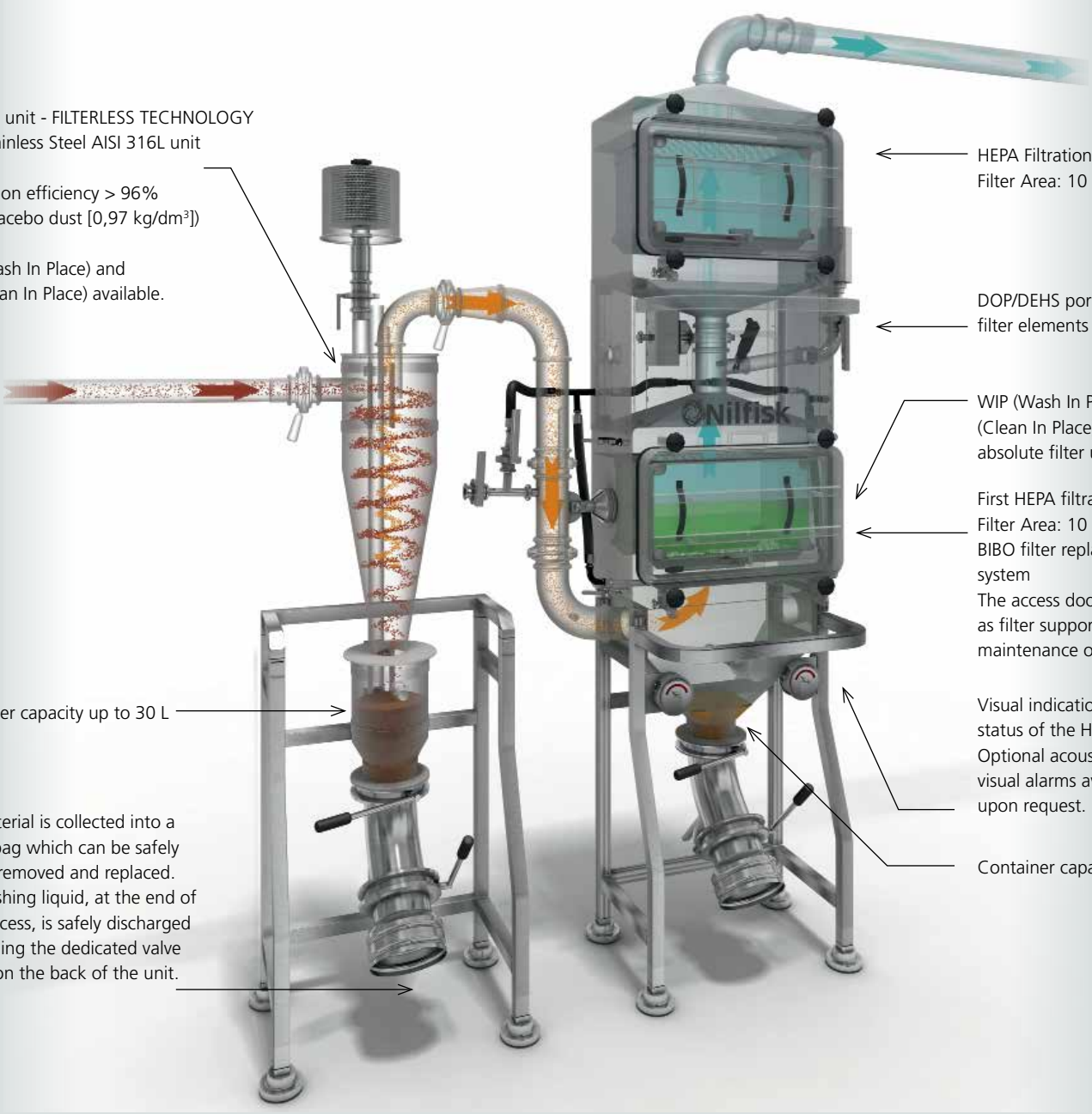
CIP AND WIP

The cyclone unit and filter unit can be washed inside—both by complete flooding and sprayballs —so as to deactivate the dust on inside surfaces. The exhaust air is filtered by HEPA filters, while the washing liquid is safely discharged. The CIP and WIP processes can be validated with fluoresceina tests before installation.



FIXED UNITS

MOBILE UNITS



Nilfisk exclusive dust containment systems for highly potent APIs safely manage toxic dust during solid dose manufacturing processes to protect personnel, the environment and your product.

SAFE ENVIRONMENT: maintains a dust containment grade of OEB5 (OEL < 1 µg/m3) during the production phase and OEB4 (OEL < 10 µg/m3) during maintenance.

PROTECTING USERS: with a proprietary Bag-in/Bag-out HEPA filter replacement system, the filter is easily removed and safely disposed of according to standard operating procedures. Personnel never come in contact with the contaminated filter.

FLEXIBLE DESIGN: fixed or mobile units are available with various features to meet user requirement specifications (URS). Materials of construction, sizes, configurations and operator interface needs can be adjusted to meet URS.

(OEB) Occupational Exposure Banding
(OEL) Occupational Exposure Limit

Batch Reconciliation with Pre-Separators

- powder recovery solutions to verify product loss

Powder dispersion and product loss is unavoidable during pharmaceutical manufacturing processes. Nilfisk filtered pre-seperators help manufacturing, packaging and quality assurance personnel calculate yield and reconcile loss. Separators also provide safe collection of toxic materials to prevent cross-contamination and operator exposure.

GMP COMPLIANT: collect materials within a single manufacturing environment to verify batch loss and prevent cross-contamination.

MUTLI-STAGE FILTRATION: available with filterless technology and additional HEPA filters and bag options to filter 99.97% of particles down to 0.3 microns.

MODULAR DESIGN: units can be placed in the production area or in a mechanical room, depending on system design.

COLLECTION OPTIONS: from standard paper bags to complete Bag-In/Bag-Out (BIBO) collection, any range of hazardous dust can be collected, while keeping the operator safe.

Sealed Collection Containers

- collect, account for, and dispose of ultra-secure materials

Safe-Pak™ collection containers safely collect hazardous, potent compounds and retain them in a disposable HEPA-filtered container. Safe-Pak prevents operator exposure to HPAPIs and provides easier product reconciliation.

EFFICIENT: Easily account for the weight of collected potent compounds before disposal. Save time and money by preventing the need to "gown-up" to handle material.

USER FRIENDLY: Lower release lever for simple seal, disposal and replacement of container.

COMPLIANCE: Meet NFPA guidelines for handling combustible dust when the conductive plastic variant is used with select fully bonded and grounded Nilfisk vacuum models.
(*For use in non-hazardous (non-classified) environments)*

FILTER EFFICIENCY: The Safe-Pak alone will filter 99.97% of particles down to 0.3 microns.

CAPACITY: Capacities range from 1.75 to 4 gallons.

Available with models: VHW 321, VHW 420, VHW 421, IVT 1000CR.

Safe-Pak collection containers offer multiple levels of filtration for operator safety. (Open container for display purposes only.)

Advanced Graduated Filtration

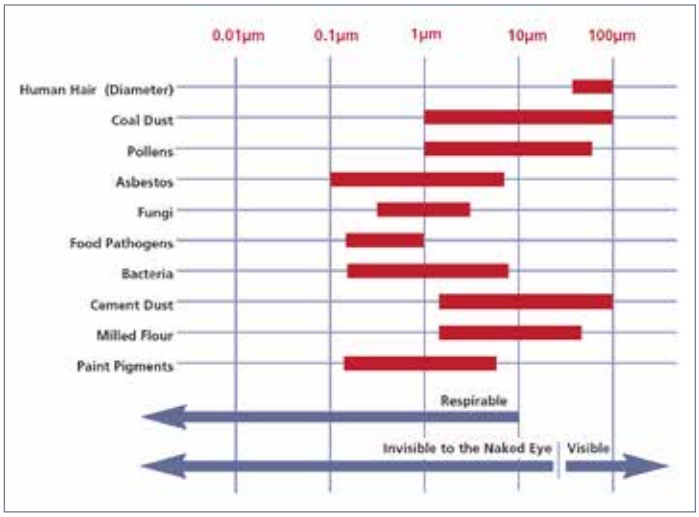
- control fine dust and cross contamination

Efficient filtration is critical to the purity of your environment and the success of collection and containment systems. Dust and debris should remain safely confined within the vacuum, not be exhausted back into the air. Nilfisk offers a complete line of filters designed for the safe, efficient collection of nuisance and hazardous materials.

MULTI-STAGE FILTRATION: built into every Nilfisk vacuum, multi-stage filtration is exclusive, graduated filtration technology that traps the largest particles first, protecting the series of progressively finer filters from blockage and improving performance. Filtration stages can include a paper bag, a main filter, a microfilter, and HEPA or ULPA filters.

HEPA AND ULPA FILTERS: Each Nilfisk HEPA filter is tested to guarantee a minimum of 99.97% efficiency, capturing dust down to 0.3 microns in size. Nilfisk ULPA filters collect 99.999% of all ultra-fine particles—down to and including 0.12 microns.

CLEANROOM: For cleanroom environments, specific models are available that meet standards up to ISO 4 (Class 10).



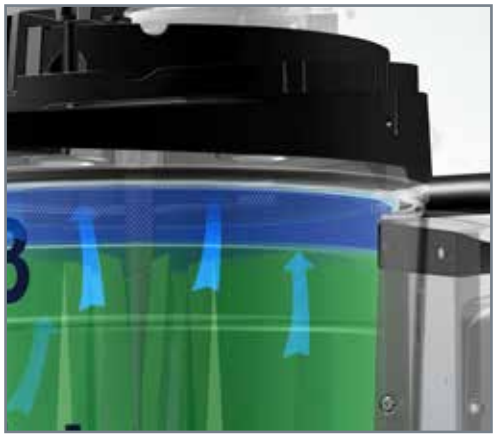
Particle Sizes

The size of dust particles is measured in millionths of meters, called micrometers or microns (notated µm). This chart shows the relative sizes of common particles in order to help determine the most appropriate filter for each application.

Multi-Stage Filtration

Along with a dust bag, cyclonic action serves as a first stage of filtration, pushing larger particles to the bottom of the collection container.

Main filters—star or conical designs—act as a second stage of filtration. Most capture 99.1% of particles down to 1.5 microns.



Any remaining fine particles are captured by an upstream HEPA or ULPA filter. Optional downstream exhaust filters are available for nearly contaminant-free exhaust.

Filter Cleaning Systems

- control fine dust and cross contamination

PullClean filter cleaning system

Clogged filters directly impact vacuum performance and cause costly downtime, so Nilfisk designed various filter cleaning systems to keep your vacuum and processes running effectively.

PULLCLEAN: clean the main filter by simply closing the inlet and opening the flap on the front of the filter chamber intermittently while you clean. Ensures longer run times, extended motor life and the best performance for your process.

Available with models VHW321, VHW421, VHW440 and VHS110 CR.

INFINICLEAN: continuously cleans the filter during unattended, continuous-duty or extremely dusty applications. InfiniClean is a self-contained, automated filter purging system requiring no external compressed air supply, secondary power source or interference by the operator.

Available with models VHW320 IC, VHW420 IC, VHW440 IC, VHT446 IC.

InfiniClean at Work

Exhaust is re-routed through the InfiniClean chamber

Solenoids automatically open and close sequentially to blast air through the filters

The pressure difference reverses air flow through the filter, sending built up dust down into the collection container

Cartridge shields provide high filter cleaning efficiency

Conical-shaped cartridges allow dust to fall off easily

TECHNICAL SPECIFICATIONS

Pneumatic Conveyors





Description	Unit	3VT	9505	PCC00HP	PCC12HP	PCC24HP
Type of Power	-	3-phase *	3-phase	Compressed Air	Compressed Air	Compressed Air
Voltage @ 60 Hz	V	220 / 460	220 / 460	-	-	-
Power @ 60 Hz	HP (W)	0.94 (700)	0.67 (0.50)	-	-	-
Waterlift, max.	in. (mm) H_2O	291 (7391)	47.5 (1207)	300 (7620)	300 (7620)	300 (7620)
Airflow, max.	CFM (L/min)	9.4-14.7 (267-417)	46 (1300)	27 (764)	54 (1529)	110 (3114)
Min./Max. Inlet Air Pressure	psi (bar)	60-90 (4-6)	-	-	-	-
Hopper Capacity	gallons (L)	2.9 (11)	53 (200)	0.53 (2)	0.79 (3)	1.8 (7)
Dimensions (L x W x H)	in. (mm)	40.0 x 18.0 x 120.0 (1015 x 450 x 3050)	24.0 x 47.2 x 47.2 (610 x 1200 x 1200)	12.4 x 15.2 x 11.3 (315 x 386 x 287)	17.4 x 19.3 x 26.4 (442 x 490 x 671)	17.4 x 19.3 x 37.2 (442 x 490 x 945)
Throughput Range	kg/h	100-500	50-700**	100-300	300-600	600-1300
Pump/Motor Size	KW	0.6	1.5	H060	H100	H200

Cleanroom





Description	Unit	GM 80CR	IVT 1000CR	IVT 1000CR Safe-Pak	VT 60CR	VHS110 CR
Collection Type	-	Dry	Dry	Dry	Wet/Dry	Wet/Dry
Type of Power	-	1-phase	1-phase	1-phase	1-phase	1-phase
Voltage @ 60 Hz	V	115 / 220	110-120	110-120	120	120
Power @ 60 Hz	HP (W)	1.48 (1100)	1.48 (1100)	1.48 (1100)	1.34 (1000)	1.34 (1000)
Waterlift, max.	in. (mm) H_2O	84 (2134)	78.7 (1999)	79.5 (2019)	80.4 (2042)	88.4 (2235)
Airflow, max.	CFM (L/min)	80 (2265)	76.2 (2158)	72 (2039)	70 (1982)	95 (2700)
Current, max.	amps	10 / 5	10	10	8.3	7.5
Container Capacity	gallons (L)	3.24 (12.3)	3.25 (12.3)	1.72 (6.5)	15 (56.8)	9.8 (37)
Dimensions (L x W x H)	in. (mm)	14.0 x 12.0 x 16.0 (356 x 305 x 406)	11.8 x 11.8 x 24.8 (300 x 300 x 630)	11.8 x 11.8 x 27.6 (300 x 300 x 701)	24.0 x 21.5 x 37.5 (610 x 546 x 953)	22 x 22 x 49 (570 x 560 x 1240)
Sound Pressure Level	dB(A)	61	61 dB(A)	61	75	73

Fixed & Mobile Vacuums






Description	Unit	VHW210	VHW211	VHW311	VHW321	VHW421	VHW440
Collection Type	-	Dry	Dry	Dry	Dry	Dry	Dry
Type of Power	-	3-phase *	3-phase *	3-phase *	3-phase *	3-phase	3-phase
Voltage @ 60 Hz	V	220 / 460 / 575	220 / 460 / 575	220 / 460 / 575	220 / 460 / 575	220 / 460 / 575	220 / 460 / 575
Power @ 60 Hz	HP (W)	1.27 (950)	1.27 (950)	2.75 (2050) [2.35 (1750) @ 575]	2.75 (2050) [2.35 (1750) @ 575]	3.42 (2550)	6.17 (4600)
Waterlift, controlled	in. (mm) H_2O	64 (1626)	64 (1626)	88 (2235)	88 (2235)	76 (1930)	104 (2651)
Airflow, blower max.	CFM (L/min)	102 (2888)	102 (2888)	150 (4248)	150 (4248)	222 (6286)	294 (8333)
Current, max.	amps	4.5 / 2.3 / 1.95	4.5 / 2.3 / 1.95	8.8 / 4.4 / 2.95	8.8 / 4.4 / 2.95	11.4 / 6.0 / 4.55	15.6 / 9 / 7.6
Container Capacity	gallons (L)	1.7 (6.5)	1.7 (6.5)	6.6 (25)	6.6 (25)	12.6 (48)	12.6 (48)
Dimensions (L x W x H)	in. (mm)	25.2 x 13.0 x 18.7 (640 x 330 x 475)	18.0 x 16.9 x 32.3 (420 x 430 x 820)	28.0 x 16.5 x 35.6 (710 x 420 x 905)	28.9 x 17.3 x 46.1 (735 x 440 x 1170)	38.1 x 21.2 x 54.8 (968 x 538 x 1392)	38.1 x 21.2 x 54.8 (968 x 538 x 1392)
Sound Pressure Level	dB(A)	62	59	64	64	68	70

Specifications subject to change without notice. The data, characteristics, colors and illustrations are merely indicative and therefore not binding.

*Single-phase models available; see individual product sheet for more details.

**Capsules per second

Explosion-Proof Vacuums

Description	Unit	118 EXP	118 EXPW	VHT437EXP	VHT456EXP
Collection Type	-	Dry	Wet/Dry	Dry (Wet Option)	Dry (Wet Option)
Type of Power	-	1-phase	1-phase	3-phase	3-phase
Voltage @ 60 Hz	V	120	120	220 / 460 / 575	460 / 575
Power @ 60 Hz	HP (W)	1.34 (1000)	1.34 (1000)	5 (3700)	7.5 (5600)
Waterlift, max.	in. (mm) H_2O	69 (1752)	69 (1752)	85 (2159)	72 (1820)
Airflow, blower max.	CFM (L/min)	130 (3681)	130 (3681)	218 (6167)	367 (10384)
Current, max.	amps	10	10	11.2 / 5.6 / 4.5	9.5 / 7.6
Container Capacity	gallons (L)	6.6 (25)	13.2 (25)	26 (100)	26 (100)
Dimensions (L x W x H)	in. (mm)	20.0 x 24.0 x 45.0 (508 x 610 x 1143)	20.0 x 24.0 x 45.0 (508 x 610 x 1143)	50.8 x 23.6 x 60.6 (1290 x 600 x 1540)	50.8 x 23.6 x 60.6 (1290 x 600 x 1540)
Sound Pressure Level	dB(A)	78	78	72	77
Approvals	-	CSA-certified for use in Class I, Group D, and Class II, Groups F & G environments. Group E use requires additional equipment. See Nilfisk sales manager with questions.			

Heavy Industrial Vacuums for Portable Central Systems

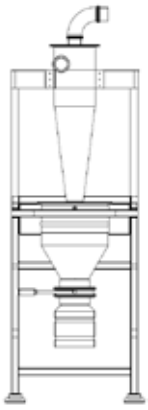
Description	Unit	3707/10	3907/18	3997
Collection Type	-	Dry (Wet Option)	Dry (Wet Option)	Dry (Wet Option)
Type of Power	-	3-phase	3-phase	3-phase
Voltage @ 60 Hz	V	460 / 575	460 / 575	460 / 575
Power @ 60 Hz	HP (W)	12 (9000)	19.4 (14500)	30.8 (23000)
Waterlift, controlled	in. (mm) H_2O	92.3 (2344)	108 (2743)	176 (4470)
Airflow, blower max.	CFM (L/min)	518 (14668)	740 (20954)	780 (22087)
Current, max.	amps	15.1 / 12.8	29 / 20.4	42 / 36.8
Container Capacity	gallons (L)	46 (175)	46 (175)	46 (175)
Dimensions (L x W x H)	in. (mm)	63.0 x 31.5 x 71.3 (1600 x 800 x 1810)	63.0 x 31.5 x 71.3 (1600 x 800 x 1810)	78.7 x 35.4 x 84.6 (2000 x 900 x 2150)
Sound Pressure Level	dB(A)	78	78	79

Trim Vacuums

Description	Unit	R104	R154
Collection Type	-	Dry	Dry
Type of Power	-	3-phase *	3-phase *
Voltage @ 60 Hz	V	220 / 460 / 575	220 / 460
Power @ 60 Hz	HP (W)	1.27 (950)	1.47 (1300)
Waterlift, controlled	in. (mm) H_2O	64 (1626)	60 (1524)
Airflow, blower max.	CFM (L/min)	102 (2888)	135 (3823)
Current, max.	amps	4.5 / 2.3 / 1.95	1.3 / 2.6
Container Capacity	gallons (L)	30 (114)	30 (114)
Dimensions (Diameter x H)	in. (mm)	18.1 x 47.2 (460 x 1200)	18.1 x 47.2 (460 x 1200)
Sound Pressure Level	dB(A)	68	72

Cyclone Pre-Separators

Description	Unit	d220mm	d300mm
Nominal airflow	m^3/h	500	900
Filter efficiency (complete unit)	-	99.995%	99.995%
Efficiency	-	> 96% w/ placebo dust (0.97 kg/dm^3)	> 95% w/ placebo dust (0.6 kg/dm^3)
Construction Material (separator unit)	-	AISI 316L Stainless Steel	AISI 316L Stainless Steel
Inlet diameter	mm	70	100
Outlet diameter	mm	70	100
Container Capacity	L	30	30
Dimensions (L x W x H)	mm	629 x 760 x 2180	630 x 760 x 2690



Filtered Pre-Separators

Description	Unit					
Container Capacity	gallons (L)	2.38 (9)	6.60 (25)	10 (37.85)	25 (94.63)	66 (249.84)
Container Diameter	mm	280	360	360	460	460
Inlet Diameter	mm	40	50	50	70	70
Outlet Diameter	mm	40	50	50	70	50
Available Features						
Bag Filter	-	•	•			•
Star Filter	-			•	•	
HEPA Filter *(efficiency 99.97%, down to 0.3 microns)*	-	•	•			
Paper Bag Collar		•	•			
Painted White Construction	-	•	•	•	•	•
Stainless Steel Construction	-	•	•	•	•	•

• *indicates this feature or construction type is available. Some combinations of features may not be possible.*

Safe Choice Commitment

At Nilfisk Industrial Vacuums we understand that you face many risks each day, just by operating your business. That is why Nilfisk is dedicated to helping you make smart choices to keep your facility and your workers safe. Our team of experts is ready to tackle any cleaning challenge – because in a world full of risk, you have to make safe choices.

We are committed to being that safe choice.
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