

Specifications

TBC Diagnostic Laboratory Standard Design Specifications for ventilation components

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List of Abbreviations:

AC	-	alternating current
CFC	-	chlorofluorocarbon
DC	-	direct current
DDC	-	direct digital control
De (dB)	-	insertion loss index
F 7/9	-	filter class
HVAC	-	heating / ventilation / air conditioning
I&C devices	-	information and communication devices
IP	-	ingress protection rating
l/ (sm ²)	-	liter / (second x square meter)
Pa	-	Pascal
PE	-	polyethylene
PE-FR	-	polyethylene – flame retardant
PI controller	-	proportional–integral controller
PID	-	proportional integral derivative
PP	-	polypropylene
PP-FR	-	polypropylene – flame retardant
PPTV	-	polypropylene talcum forced
PTC resistor	-	positive temperature coefficient - resistor
PVC	-	polyvinyl chloride
Qo	-	capacity on design conditions
RW (dB)	-	sound reduction index
SF-CU-pipes	-	pipe material cooper
UPS	-	uninterrupted power supply
VAV	-	variable air volume
V	-	voltage
1/min	-	revolution per minute

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Position	description	amount	unit
1.	Ventilation Components		
1.1.	Air Handling Units		
	Description Components Supply Air Unit of Pos. 1.1.10 Supply Air Unit hygienic design indoor version		
	HYGIENIC VERSION		
	<i>Structure</i> All parts of the frame made of galvanized square steel tubes, arranged completely inside the casing to avoid thermal bridges and to improve thermal performance of the casing.		
	<i>Panels</i> THERMO-PANELS are double-skin, made of galvanized steel sheet, with 40 mm insulation. Inside and outside skin is separated by synthetic profiles to create the excellent thermal insulation and lowest thermal bridging. All outside surface is additionally powder-coated		
	<i>Unit floor</i> Simple and quick to clean, easy for maintenance. With integrated drip-tray, 80 mm slope. RMC: Smooth, without any inaccessible corners or depressions.		
	<i>Base frame</i> Maximum stability due to all around U –shape 100mm frame on each section.		
	<i>Technical Data of casing</i>		
	Thermal transmittance:	according to local conditions	
	Thermal bridging:	according to local conditions	
	Casing Leakage (-400 Pa):	0.04 / 0.15 l/(sm ²)	
	Casing Leakage (+700 Pa):	0.06 / 0.22 l/(sm ²)	
	Casing Strength (-1000Pa):	0.1 / 10 mm/m	
	Casing Strength (+1000Pa):	5 / 10 mm/m	
	Filter Bypass Leakage:	<0.1 / 0.5% (F9)	
	<i>Acoustic insulation 40 mm</i>		
	f(Hz)	De (dB)	RW (dB)
	125	16.3	20.3
	250	23.7	20.3
	500	30.5	43.2
	1000	33.8	50.9
	2000	32.1	49.9
	4000	34.8	56.8
	8000	36.1	- - -

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	Casing accessories		
	Access door Entirely thermal decoupled design, high air tightness, internal or external lock. Access doors on the discharge side with aperture angle limiter.		
	Damper With profiles fins and aluminium gearwheel transmission. High air tightness by rubber seals.		
	Flexible connection Coupling made of elastic polyester woven material with PVC coating, with potential equalization.		
	Sound insulated connection Sound insulated connection with double-U-shaped frame 100x30x3mm, intercostal microcellular Microlen-PE30 and profile rubber sheet and with screw expansion joint, airtight screwing with potential equalization.		
	Plug Fan Fan with open impeller, backward curved, with welded blades, powder coated, fixed on the motor shaft by Taper-lock system, impellers statically and dynamically balanced. Fan/motor system vibration isolated to the casing. For each plug fan factory balance report will be provided.		
	Variable-frequency converter For continuously variable speed regulation with square torque curve, mounted outside on the ventilation appliance and completely wired to the motor and the maintenance switch using shielded leads. Electromagnetic compatibility of relevant electric components according to national guidelines. In the case of weatherproof devices, the variable-frequency converter is internally built in cooled by the air flow and the user interface (display) is separately accessible via an exterior appliance door. Include clear text display to indicate <ul style="list-style-type: none"> • All motor operating data, present current, output frequency, etc. • The fan, such as air volume and set point in m³/h Parameter level for various applications such as <ul style="list-style-type: none"> • Speed control • Volume flow regulation (PID) • System pressure regulation (PID) • External variable set-point selection continuous, (0(4)...20 mA) or • External binary (fixed) set-point assignment through potential-free control The variable-frequency converter was factory parameterized and functionally checked for the specific fan and motor data. A maximum of operational reliability is guaranteed through presetting of the maximum speed and current limit by the manufacturer. Protection class: IP 54		

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	<p>Three phase motor. According to local guidelines with squirrel-cage rotor, protection class IP 55, winding with insulation class F, for an ambient temperature of 60 °C. Motor protection by 3 PTC resistors in combination with a relay.</p>		
	<p>Filter Filter class made of synthetic glass fiber.</p>		
	<p>Electrical heater Consisting of stainless steel elements with rectangular galvanized ribs and an integrated connection box with an access door for wiring outside the airflow. All elements can be replaced separately. Including skin top cable access.</p>		
	<p>Cooling coil Cu/Al Cooling coil with seamless copper tubes and high performance aluminum fins, mounted in galvanized steel.</p>		
	<p>Drop eliminator PPTV For secure water separation, removable via access door for revision. Stainless steel frame, demountable for revision. Mounted into stainless steel drip pan with slope and flow out to the operation side. Drop eliminator made of Polypropylene PPTV. Service temperature up to 80°C.</p>		
	<p>Electric steam humidifier Electric, micro-processor controlled steam humidifier for automatic production and variable supply of pure steam to the airflow. It is readily assembled in a corrosion protected casing on the casing's panel. The steam distributor tube is made of stainless steel mounted inside the airflow. Integrated PI-controller with computer interface. Stand-by blow-down function prevents standing water in the cylinder. After a period without steam production the cylinder is drained completely. Can be programmed individually.</p>		
	<p>Air-cooled condenser Suitable for CFC-free refrigerant, inside or attached to the unit, with galvanized steel casing, grounded and varnished. Made of Cu-pipes and Al-fins with a big surface area for small air flow. Including refrigerant collector for the whole filling, manual shut-off valve and a big window.</p>		
	<p>Compressor installed in the ventilation unit in multi-cylinder design and construction with the suction gas cooled hermetic three-phase motor for CFC-free refrigerant between the suction and pressure side, crankcase heater, and suction and discharge valve.</p>		

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	<p>Power control by hot gas bypass. Including refrigerant connection lines, with accessories from SF-CU-pipes between the evaporating unit and the air cooled condenser. Including assembly, material for attachment, fill the System with refrigerant and special oil at a distance of 20 m. Refrigeration cycle with internal piping with copper pipes, refrigerant dryer with removable block inserts, refrigerant sight glass with moisture indicator, liquid solenoid valve, externally equalized thermostatic expansion valve, suction, pressure and oil pressure gauge, high and Low pressure, and refrigerant operating charge.</p> <p>Commissioning, familiarization, test operation Check of the connections for device-specific requirements. Check of the individual I&C devices for function as intended such as the rotational direction of motors, adjusting direction in the case of flaps and valves, switching direction of controllers and safety limiters, functional check of all I&C facilities among each other belonging to the operational equipment as well as basic parameter settings. Check of the cable connections between the interface terminal boards of the application cabinets and the DDC substations, setting and adaptation of the components in the switching cabinets such as over current trips and timing relays, installation and commissioning of the user programs acc. To the specifications, adaptation of the parameters to the operating conditions of the initial of operational system configuration of all data points, loading and test of the user programs. One-time familiarization of the qualified, purchaser-assigned operating staff with the proper operation of the I&C equipment and record of the familiarization performed.</p> <p>Switching cabinet For floor mounting or wall mounting, complete housing. Including cable support rails, pedestal and eyebolts, wiring ducts, sufficiently dimensioned cross-wiring duct for incoming lines, terminal strip, wiring diagram pocket, permanently readable labeling and fuses including fuse link and complete accessories. Rigid sheet steel housing, protection class IP 55 without built-in units. Operable, factory tested and ready for connection.</p> <ul style="list-style-type: none"> • Power supply module • Master switch as emergency stop switch protection class: IP 65 external, IP 20 internal lockable with pad lock, suitable as maintenance switch • Control-power transformer 400/230 V, connecting terminals protection class IP 20, including protective primary and secondary device • Safety transformer 400/24 V, protective-winding type • Assembly for phase-failure protection 3x400 V, installed into the front of the switching cabinet • Assembly for switching cabinet lighting incl. door contact switch and grounding-type receptacle • Control module 		

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- Control module, smoke sensor
 - Measuring-value assembly for sensors
 - Main switch as emergency stop
- Protection class: IP65 outside, IP20 inside
Lockable with a padlock, suitable as service switch if the fan is visible.
- Transformer for Control Power 400/230V connecting terminal
- Protection class IP20, incl. primary and secondary protection device.
- Safety-control-transformer 400/24 V, design with protection winding, connecting terminal
- protection class IP20, incl. primary and secondary protection device.

Wiring

Complete electrical installation systems, like tubes, channels, feed-through (single/double wall) etc. integrated in the unit.
Adjusted design of the unit and of the components, like coils, dampers, filters, etc.

Electric lines and cables

Matched to the necessary requirements and ambient conditions in the device and on the device. Protection against mechanical and thermal loads (use of flexible leads). Provision for reducing factors such as raised ambient temperature, burst as well as maximum permissible voltage loss. For electrical components installation using shielded leads and corresponding laying technique. Completely pulled into the installation systems from the field device up to the built-in switching cabinet or up to the respective coupling joint of the housing, wound up and marked there at corresponding length.

Limits of supply

In the case of switching cabinets built into the HVAC device and factory-supplied leads, the implementing installation contractor has to install these from the coupling joint of the housing to the switching cabinet within the scope of equipment installation work.

Outside of the HVAC device, inside or at the building, delivery and installation will be carried out within the scope of the electrics work section. In the case of bulk-supplied switching cabinets for attachment or installation on the part of the builder, all electric leads and their installation belong to the scope of the electrics work section. This also includes the insertion into the switching cabinet; unambiguous marking of all cable ends acc. to the wiring diagram and cable list as well as their final laying immediately to the respective field device.

Connecting

Check of the electric connections for device-specific requirements such as nominal voltage and external voltage as well as shielding of leads and groundings. Factory connection of the field devices, distributors and switching cabinets installed in the device, incl. insertion, pull relief, sealing, baring the core ends and marking the leads and cables.

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Position	description	amount	unit
1.1.10.	<p>Supply Air Unit Laboratory Supply Air Unit hygienic design indoor version (Two Supply Air Units will positioned on top of each other)</p> <p>Technical Data</p> <p>Unit Version: indoor unit hygienic External Casing Execution: Powder Coated</p> <p>Supply Air / Return Air: Air Flow 2265 m³/h External Pressure Drop: 400 Pa Air Velocity: 1.40 m/s</p> <p>Casing inside: Powder Coated Insulation (mm): 40 V-Class: V2</p> <p>Compressor Air Flow: 2265 m³/h Condensation Temperature: 55.0°C Evaporation Temperature: 7.0°C</p> <p>Refrigerant Condensation Capacity according to local conditions Refrigeration Capacity according to local conditions Electric Power according to local conditions Current according to local conditions</p> <p>Accessories 1 Testing, Adjusting & Instruction Refrigeration technology, 1-stage (Qo < 20 kW) 6 Connect, Electrical Device, General 1 Connect, Motor Wiring, General, 7.5 kW 1 Mounting-set for Wiring, Refrigeration technology, Combustible (< 50 kW) 5 Motor Wiring per Meter, 7.5 kW 30 Control wiring per meter 1 DDC Connecting Cable, 3 m 1 DDC Front-Display 1 DDC Sub Station, Connector 1 DDC Sub Station PCO3000AS0, Small 1 Main Power Switch 11 kW 1 Refrigeration Controller, 18 kW 1 Add. Control Box 1 Safety-Control-Transformer 24 V, 160 VA, 400/24 V, 50 Hz, IP20 with Protection Winding 1 Control Switch Circuit 1 Safety-Control-Transformer 230 Volt, 250 VA, 400/230 V, 50 Hz, IP20, with Protection Winding 1 Wall Mounted Control Box 1 electrical Hot-Gas-Bypass Valve (Qo/n < 28 kW)</p>		

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	Empty Chamber		
	Air Flow:	2265 m ³ /h	
	Filter		
	Air Flow:	2265 m ³ /h	
	C / D / A - Pressure Drop:	61 / 200 / 130 Pa	
	Design:	Bag Filter	
	Class:	F 7	
	Filter Frame:	Powder Coated	
	Accessories		
	1 differential pressure transducer 0-250 Pa		
	Direct Expansion Coil		
	Air Flow:	2265 m ³ /h	
	Pressure Drop:	136 Pa	
	Material Type:	Cu/Al - A	
	Air In / Humidity:	according to local conditions	
	Air Out / Humidity:	15.0°C / 98%	
	Refrigerant:	R407C	
	Evaporation Temperature:	7.0°C	
	Cooling Capacity approx.:	according to local conditions	
	Drop Eliminator - Removable		
	Pressure Drop:	20 Pa	
	Frame / Fin:	1.4301 / PPTV	
	Drain Pan:	1.4301	
	Accessories		
	1 Frame from Aluminium		
	1 Collector from Cu		
	Empty Chamber		
	Air Flow:	2265 m ³ /h	
	Electric Heater		
	Air Flow:	2265 m ³ /h	
	Pressure Drop:	20 Pa	
	Design:	1.4301/vz.	
	Air In / out winter:	according to local conditions / 22.0 °C	
	Air In / out summer:	10.0 °C / 20.0 °C	
	Power Stab 1/Stab 2:	0.0 kW / 1.2 kW	
	Voltage:	3x400 V	
	Heating Capacity:	according to local conditions	
	Accessories		
	1 3-Way Thermostat		
	1 Thermostat for ductwork, -5. +30 °C, 2000 mm		
	1 Safety Temperature Limiter		
	1 Temperature Limiter		

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Position	description	amount	unit
	Empty Chamber		
	Air Flow	2265 m ³ /h	
	Electrical Steam Humidifier		
	Air Flow:	2265 m ³ /h	
	Pressure Drop:	0 Pa	
	Power:	17.0 kg/h	
	Voltage:	0 V	
	Current:	18.4 A	
	Drain Pan:	1.4301	
	Panel Inside:	powder coated	
	Empty Chamber		
	Air Flow	2265 m ³ /h	
	Fan		
	Air Flow:	2265 m ³ /h	
	External Pressure Drop max.:	500 Pa	
	Pressure Drop total max.:	1000 Pa	
	Design:	Plug Fan	
	Unit Connection :	vibration-damped	
	Fan Speed:	3619 1/min	
	Max. Speed:	4200 1/min	
	Shaft Power:	0.9 kW	
	Efficiency:	79 %	
	Sound Power Level at f(Hz)		
	1. Unit Inlet S	82.0 dB(A)	
	2. Casing Discharge Side S	87.0 dB(A)	
	3. Beside the Unit S	61.0 dB(A)	
	125 250 500 1 k 2 k 4 k 8 k		
	1. 63 73 76 77 76 68 64 dB(A)		
	2. 65 76 82 82 79 75 69 dB(A)		
	3. 51 56 55 52 51 44 37 dB(A)		
	Motor		
	Power:	1.10 kW	
	Nominal Speed:	2840 1/min	
	Voltage:	400 V	
	Current:	2.28 A	
	Frequency:	50 Hz	
	Protection Class:	IP55	
	Power Consumption per Motor		
	PM = 0.87 kW		
	Fan Speed at Motor Frequency		
	n = 3619 1/min - f = 64 Hz		
	Max. Speed with Max. Frequency		
	n = 4200 1/min - f = 74 Hz		

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Position	description	amount	unit
	Panel Inside: powder coated		
	Frame Inside: coated		
	Floor Inside: 1.4301		
	Accessories		
	1 PTC		
	1 Measuring Pipe with Connection to the Maintenance Side.		
	Empty Chamber		
	Air Flow: 2265 m ³ /h		
	Filter		
	Air Flow: 2265 m ³ /h		
	C / D / A - Pressure Drop: 55 / 200 / 128 Pa		
	Design: Bag Filter		
	Class: F 7		
	Filter Frame: Powder Coated		
	Accessories		
	1 differential pressure transducer linear 0-250 Pa		
	Casing		
	Base Frame U100		
	General Accessory		
	5 Oval Light Aluminium die-casting 70°C, IP 43, with lamp		
	All flexible unit connections with equipotential bonding!		
	Unit Dimensions		
	Length max: 7700 mm		
	Width max: 760 mm		
	Height max: 750 m	2	pieces

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Position	description	amount	unit
1.1.20.	<p>Air cooled condenser placed outside</p> <p>Attached to the unit, with galvanized steel casing, grounded and varnished. Made of Cu-pipes and Al-fins with a big surface area for small air flow. Including refrigerant collector for the whole filling, manual shut-off valve and a big window.</p> <p>Condensation Temperature: 55.0°C Air In: according to local conditions Refrigerant: R407C Condensation Capacity: according to local conditions Electric Power: 0.78 kW Current: 1x1.35 A Connector In / Out: 35 0</p> <p>Sound Pressure Level: 43 dB (A) in the Free Field</p>	1	piece
1.1.30.	<p>Radial roof fan BSC</p> <p>Plastic roof radial fan with housing in stable, rotationally sintered version in PE-FR, one suction side, for mounting in the horizontal or vertical position. With impeller in PP-FR, injection molded version, floating-mounted on the motor shaft, statically and dynamically balanced, quality of balancing at least.</p> <p>Including internally mounted rotary current motor, encapsulated against the delivery medium, and outside mounted repair switch in case of standard motors.</p> <p>The necessary external ventilation for the motor occurs outwardly located pipe-hose connections.</p> <p>Technical Data</p> <p>Housing material: PE-FR Impeller material: PP-FR Mounting position: vertical Induction diameter: 250 mm Volume flow: 1100 m³/h Total pressure difference: 497 Pa Static pressure: 473 Pa Medium Temperature: 20 °C Density: 1.20 kg/m³ Nominal speed: 1400 1/min Circumferential speed: 31.7 m/s Power pressure level Lp2A (1m): 57 dB(A) Power pressure level Lp5A (1 m): 65 dB(A) Power demand / shaft: 0.21 kW Motor power: 0.55 kW Voltage: 230/400 V Frequency: 50 Hz nominal current at 400V/50Hz: 1.6 A Motor protection: IP55</p>		

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Position	description	amount	unit
	Accessories		
	Self - acting flap		
	Dimension: 250 mm		
	Material: housing / PP-FR, seal plate / PVC		
	Execution: self - acting		
	double - sided with sleeve connection for vertical fitting of the pipe		
	Measurements : B = 270 x 270; fitting length = 190 mm	2	pieces

1.1.40. Radial roof fan room exhaust air

Plastic roof radial fan with housing in stable, rotationally sintered version in PE-FR, one suction side, for mounting in the horizontal or vertical position. With impeller in PP-FR, injection molded version, floating-mounted on the motor shaft, statically and dynamically balanced.

Including internally mounted rotary current motor, encapsulated against the delivery medium, and outside mounted repair switch in case of standard motors.

The necessary external ventilation for the motor occurs outwardly located pipe-hose connections.

Technical data

Housing material:	PE-FR
Impeller material:	PP-FR
Mounting position:	vertical
Induction diameter:	315 mm
Volume flow:	1400 m ³ /h
Total pressure difference:	678 Pa
Static pressure:	663 Pa
Medium Temperature:	20 °C
Density:	1.20 kg/m ³
Nominal speed:	1400 1/min
Circumferential speed:	35.6 m/s
Power pressure level Lp2A (1m):	70 dB(A)
Power pressure level Lp5A (1 m):	80 dB(A)
Power demand / shaft:	0.34 kW
Motor power:	1.50 kW
Voltage:	230/400 V
Frequency:	50 Hz
nominal current at 400V/50Hz:	3.4 A
Motor protection:	IP55
Speed - motor:	1410 1/min

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Position	description	amount	unit
	Accessories		
	Self - acting flap Dimension: 315 mm Material: housing / PP-FR, seal plate / PVC Execution: self - acting double - sided with sleeve connection for vertical fitting of the pipe Measurements: B = 385 x 385; fitting length = 190 mm	2	pieces
1.2.	Built-in Units Ventilation		
1.2.10.	Weather protection grille Weather protection grille for protection against direct rain and the penetration of foliage and birds in intake and exhaust openings of ventilation systems. Essentially consisting of frame elements with inset, rain resistant blade profiles and back arranged wire mesh screen. Material - frame and blades made of galvanized steel sheet - galvanized steel wire mesh, mesh size 20 x 20 mm - setting perforated front	1	piece
	Sound attenuator		
1.2.20.	Splitter sound attenuator outside/ supply air splitter sound attenuator in hygienic design with installed energy-saving splitter with air flow-favouring profiled frame. Works according to the absorption principle, frame end folded over to protect the splitter filling and protected against erosion with fiber glass up to air velocities of 20 m/s. Insertion loss, sound power level of air-regenerated noise, and pressure drop tested according to local standard. Both mineral wool and the faced fiber glass act inertly against the growth of fungi or bacteria. Materials Frame parts made of galvanized sheet steel. Non-combustible mineral wool. Room weight > 30 kg/m ³ . Volume flow: 2265 m ³ /h Width: 600 mm Height: 300 mm Length: 1500 mm	2	pieces

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Position	description	amount	unit
	Variable Volume Boxes supply air		
1.2.30.	<p>Variable volume flow controller Ø250 mm VAV circular controller for variable volume supply or extract systems. Consists of casing with damper blade which when closed complies with the air leakage, includes integral averaging differential pressure grid and factory pre-wired control components. Site measurement and adjustment of factory-set minimum and maximum volume flow rates can be made. Pressure difference range 20 to 1500 Pa, volume flow range, depending on controls used, up to 10:1.</p> <p>Volume flow range: 216 - 2214 m³/h</p> <p>Control component (Actuator) Variable air volume control, electronic control for locking a reference input, feedback signal can be tapped, static differential pressure measurement, 24 VAC, signal range 0-10 VDC.</p> <p>Materials Casing and attachments in galvanized sheet steel, control damper in galvanized sheet steel with thermoplastic elastomeric seal, aluminium sensor tubes, plastic bearings.</p> <p>Accessories Circular silencer for ventilation systems; suitable for the attenuation of air-regenerated noise and the reduction of sound transmission to adjacent rooms. Absorption material mineral wool. Spigot connection suitable for circular ducts with groove for lip seal.</p>	3	pieces

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Position	description	amount	unit
Variable Volume Boxes exhaust air			
1.2.40.	<p>Variable volume flow controller for exhaust air BSC Ø250 mm VAV circular controller in PP-FR plastic (especially for laboratories) for variable extract air volume flow systems. Suitable for use with aggressive media as all parts in contact with the air flow are made of plastic (no metal components).</p> <p>Consists of casing with control damper, an integral mean value differential pressure grid and with factory installed prewired control components. Each VAV controller is factory tested and the desired flow rates set or programmed. Site measurement and adjustment of factory-set minimum and maximum values can be made.</p> <p>Volume flow range: 342 - 2214 m³/h (fast running)</p> <p>Control component (Actuator) Analogue controller 24 VAC. signal range 2-10 VDC, Pressure control, Actuator, 0-10 VDC, 24 VAC, Actuator, Signal range 0-10 VDC</p> <p>Materials Casing and damper blade in polypropylene, non-flammable (PP-FR), plain bearings in polypropylene (PP), damper blade seal in chloroprene rubber (CR), plastic grid (PP).</p>	2	pieces
1.2.50.	<p>Variable volume flow controller room exhaust air Ø250 mm VAV circular controller in PP-FR plastic (especially for laboratories) for variable extract air volume flow systems. Suitable for use with aggressive media as all parts in contact with the air flow are made of plastic (no metal components).</p> <p>Consists of casing with control damper, an integral mean value differential pressure grid and with factory installed prewired control components. Each VAV controller is factory tested and the desired flow rates set or programmed. Site measurement and adjustment of factory-set minimum and maximum values can be made.</p> <p>Volume flow range: 342 - 2214 m³/h (fast running)</p> <p>Control component (Actuator) Variable air volume control, electronic control for locking a reference input, feedback signal can be tapped, static differential pressure measurement, 24 VAC, signal range 0-10 VDC.</p> <p>Materials</p>		

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	Casing and damper blade in polypropylene, non-flammable (PP-FR), plain bearings in polypropylene (PP), damper blade seal in chloroprene rubber (CR), plastic grid (PP).	3	pieces
	Fire damper supply air		
1.2.60.	<p>Fire damper 250/200 mm Fire damper with connecting flanges, 90 min fire resistance. Sheet steel casing, made of stainless steel. Shut-off damper blade made of special insulating material, air-tight. Suited for installation into, in front of, and outside of massive walls in ceilings, as well as in wall construction panels made of plaster, lightweight partition walls, or shaft walls with strut frame.</p> <p>Simplified installation into massive walls and ceilings or into lightweight partition walls through installation sub-frames made of sheet steel or calcium silicate, as well as front wall section sub-frame with board classing as a complete parts kit for installation onto massive walls and ceilings.</p> <p>Direct connection of ducts made of flammable or non-flammable building materials. Thermal release mechanism, 72°C or 95°C, and with spring return actuator 24V AC/DC and two integrated limit switches, even in explosion-proof constructions. Integration into the centralized building management system possible.</p> <p>Material Wall and drive frame in galvanized steel, butterfly valve of asbestos-free insulating materials.</p> <p>Accessories: Spring return actuator 24V AC/DC 2x Electric limit switch Locking device</p> <p>Locking device and integrated acid-resistant Fusible link mechanism.</p> <p>Fire rating class: 90 min Length: 500 mm Width: 200 mm Height: 250 mm</p>	1	piece

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1.2.70.	<p>Fire damper coated 250/250 mm As described in Pos. 1.2.70 Fire rating class: 90 min Length: 500 mm Width: 250mm: Height: 250 mm</p>	1	piece
1.2.80.	<p>Fire damper coated 450/400 mm As described in Pos. 1.2.70 Fire rating class: 90 min Length: 500 mm Width: 450 mm: Height: 400 mm</p>	1	piece
	Fire damper coated for exhaust air		
1.2.90.	<p>Fire damper coated 250/250 mm Fire damper with connecting flanges, 90 min fire resistance. With powder coating made of stainless steel. Shut-off damper blade made of special insulating material, air-tight. Suited for installation into, in front of, and outside of massive walls in ceilings, as well as in wall construction panels made of plaster, lightweight partition walls, or shaft walls with strut frame.</p> <p>Simplified installation into massive walls and ceilings or into lightweight partition walls through installation sub-frames made of sheet steel or calcium silicate, as well as front wall section sub-frame with board classing as a complete parts kit for installation onto massive walls and ceilings.</p> <p>Direct connection of ducts made of flammable or non-flammable building materials. Thermal release mechanism, 72°C or 95°C, and with spring return actuator 24V AC/DC and two integrated limit switches, even in explosion-proof constructions. Integration into the centralized building management system possible.</p> <p>Material Wall and drive frame in galvanized steel, butterfly valve of asbestos-free insulating materials.</p> <p>Accessories: Spring return actuator 24V AC/DC 2x Electric limit switch Locking device and integrated acid-resistant Fusible link mechanism.</p> <p>Fire rating class: 90 min Length: 500 mm Width: 250 mm Height: 250 mm</p>		

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		1	piece
1.2.100.	<p>Fire damper coated 250/200 mm As described in Pos. 1.2.90 Fire rating class: 90 min Length: 500 mm Width: 250 mm Height: 200 mm</p>	1	piece
1.2.110.	<p>Fire damper coated 300/300 mm As described in Pos. 1.2.90 Fire rating class: 90 min Length: 500 mm Width: 300 mm: Height: 300 mm</p>	1	piece
	Supply air outlets		
1.2.120.	<p>Supply air outlet size 400/400 mm Swirl diffuser type provides swirling, horizontal air discharge with high induction, for air change rates up to 30 per hour, comprising diffuser face with fixed radially arranged air control blades and a plenum box with connection spigot. The diffuser face is fitted / removed by means of a centre fix screw into a sub-frame.</p> <p>Air volume: 250 - 400 m³/h Size: 400 x 400 mm</p> <p>Materials Diffuser face and plenum box are galvanized sheet steel. Diffuser face pre-treated and powder-coated.</p>	1	piece
1.2.130.	<p>Supply air outlet size 600/600 mm Swirl diffuser type provides swirling, horizontal air discharge with high induction, for air change rates up to 30 per hour, comprising diffuser face with fixed radially arranged air control blades and a plenum box with connection spigot. The diffuser face is fitted / removed by means of a centre fix screw into a sub-frame.</p> <p>Air volume: 250 - 600 m³/h Size: 600 x 600 mm</p> <p>Materials Diffuser face and plenum box are galvanized sheet steel. Diffuser face pre-treated and powder-coated.</p>	3	pieces

Specifications

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Position	description	amount	unit
Exhaust air outlets			
1.2.140	<p>BTS exhaust air outlet with HEPA-filter (H14) HEPA filter (H14) air outlet for ceiling and wall as a terminal filter and for air distribution. Holding filter media for removing suspended solids. Housing made of sheet steel with powder coating. Housing with clamping device (2-point or 4 point mounting) for the HEPA filter. Fit testing device and pressure authorities to supervise the operation pressure difference. Diffuser section of sheet steel with powder coating or anodized aluminium.</p> <p>Air volume: 550 m³/h Size: 600 x 600 mm</p>	2	pieces
1.2.150	<p>Room exhaust air outlet with HEPA-filter (H14) HEPA filter (H14) air outlet for ceiling and wall as a terminal filter and for air distribution. Holding filter media for removing suspended solids. Housing made of sheet steel with powder coating. Housing with clamping device (2-point or 4 point mounting) for the HEPA filter. Fit testing device and pressure authorities to supervise the operation pressure difference. Diffuser section of sheet steel with powder coating or anodized aluminium.</p> <p>Air volume: 320 m³/h Size: 400 x 400 mm</p>	1	piece
1.2.160	<p>Room exhaust air outlet with HEPA-filter (H14) HEPA filter (H14) air outlet for ceiling and wall as a terminal filter and for air distribution. Holding filter media for removing suspended solids. Housing made of sheet steel with powder coating. Housing with clamping device (2-point or 4 point mounting) for the HEPA filter. Fit testing device and pressure authorities to supervise the operation pressure difference. Diffuser section of sheet steel with powder coating or anodized aluminium.</p> <p>Air volume: 425 m³/h Size: 600</p>	3	pieces

Specifications

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Position	description	amount	unit
1.3.	Ventilation ducts and pipes		
	Ducts for supply air		
1.3.10.	Galvanized air duct Air duct As a straight channel galvanized steel sheet in folded form with a rectangular cross section. Including channel connection with profile frame and seal the necessary fluidic devices and fasteners, as well as the suspension and mounting materials such as Anchors, threaded rods, furring, nuts, washers. The mounting material should be provided in a galvanized finish. Channels are fully assembled, mounted and hung up, including the required sections and measuring bores, by means of mineral wool acoustic separation for wall and ceiling penetrations.	as needed	m ²
1.3.20.	Galvanized air duct-fittings Air duct - fittings Galvanized steel sheet in folded version with a square cross section. Design, thickness and accessories as described above in air ducts.	as needed	m ²
	Pipes for supply air		
1.3.30.	Galvanized ventilation pipe Ventilation pipe galvanized steel sheet. Included are all the connecting material and the required suspension and fastening material such as anchors, threaded rods, perforated tape, screws and nuts. Tubes of various lengths are fully assembled, fastened or suspended, including the required sections, measuring bores and insulation as acoustic isolation for wall and ceiling penetrations. The pipe connection is made by means of plug sockets.	as needed	m

Specifications

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Position	description	amount	unit
1.3.40.	<p>Galvanized ventilation pipe fittings and connectors Ventilation pipe fittings and connectors galvanized steel sheet</p> <p>Smooth pressed, in segments or hand built. Included are all the connecting materials and the required suspension and mounting hardware. Completely assembled, mounted and hung.</p> <p>The pipe connection is made as previously described for the tube.</p>	as needed	m
1.3.50.	<p>Alu-flexible tube Flexible pipe as a highly flexible tube made of three layers of aluminium.</p> <p>Assembly in different length cuts.</p> <p>Compounds by means of plug sockets and plastic binding.</p> <p>Including the suspension and mounting hardware such as Anchors, threaded rods punched tape.</p> <p>Pipes are fully assembled, mounted and hung.</p>	as needed	m
	<p>Ducts for exhaust air made of plastic (PP-FR)</p>		
1.3.60.	<p>Air duct made of plastic Plastic duct (PP-FR) as a straight channel with rectangular cross-section.</p> <p>In welded construction according to the dimensions. Including channel connection either with flanges and gaskets or welded the necessary fluidic devices and braces as well as the suspension and mounting materials such as Anchors, threaded rods, furring, nuts.</p> <p>The mounting material should be provided in a galvanized finish. Fastening and connecting screws must be cadmium-plated.</p> <p>If necessary, an acid-and chemical-resistant protective coating is provided.</p> <p>Channels are fully assembled, mounted and hung in the necessary sections including measuring bores and acoustic separation wall penetrations.</p>	as needed	m ²

Specifications

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Position	description	amount	unit
1.3.70.	<p>Air duct fittings made of plastic Plastic duct fittings (PP-FR) with rectangular cross-section.</p> <p>In drawn or welded construction in accordance with the dimensions.</p> <p>Design and equipment as before standing for a straight plastic channel described.</p>	as needed	m ²
	Pipes for exhaust air		
1.3.80.	<p>Ventilation pipe made of plastic Ventilation plastic pipe (PP-FR), welded design.</p> <p>Includes welded pipe connecting or flanges with acid and chemical resistant seal, and the suspension and mounting materials such as Anchors, threaded rods, perforated tape or clamps.</p> <p>Fastening and joining material galvanized.</p> <p>Pipes are fully assembled, mounted and hung, including the necessary cut outs, acoustic separation for wall and ceiling penetrations.</p>	as needed	m
1.3.90.	<p>Ventilation pipe made of plastic fittings and connectors Ventilation plastic pipe (PP-FR) fittings and connectors.</p> <p>Plastic produced in hand-formed construction or segment pieces.</p> <p>Seams sealed airtight.</p> <p>The connection with the pipe carried by flanges with acid and chemical resistant seal or by welding. Fully assembled, mounted and hung.</p>	as needed	m

Specifications

TBC Diagnostic Laboratory Standard Design Specifications for ventilation components

Position	description	amount	unit
1.4.	Control components ventilation		
1.4.10.	<p>Differential pressure gauge Differential pressure gauge to display with analog and color display (red / green) of normal operation.</p> <p>With switch for connection to the DDC.</p>	6	pieces
1.4.20.	<p>Flashing lights Flashing lights, color red with encoder swelling on alarm. It is controlled via the DDC.</p>	8	pieces
1.4.30.	<p>Uninterrupted power supply UPS to power the DDC with field devices and a part of the exhaust fans. Is used to ensure controlled shutdown of the plant, e.g. in case of power failure.</p> <p>Failure of the UPS must be displayed.</p>	1	piece
1.4.40.	<p>DDC system including cabling For alarm messages a fault message panel with 20 messages is to install (outside the lab).</p> <p>In the laboratory a set point to increase / decrease the room temperature by 2-3 K is necessary. The fans are operated with variable frequency converter.</p> <p>The alarm / incident is trying to exhaust as long as possible to keep operating.</p> <p>For disinfection of the laboratory a key button on the switch code is provided.</p> <p>Contacts for alarm shutdown e.g. in case of fire are considered.</p>	1	piece