SK
Brochure sst 5e

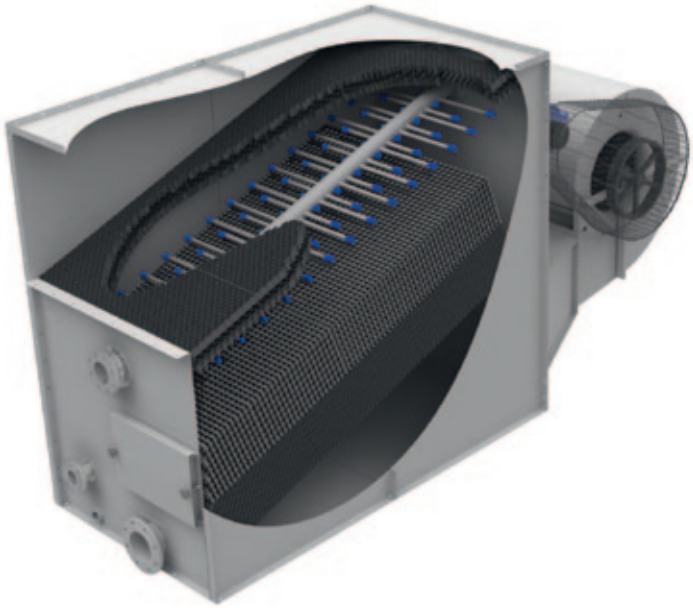
Side-stream cooling towers

For difficult installation conditions in rooms with low ceiling height which only allows for lateral blow-out.

Optional with intake and exhaust air silencers. 16 different sizes with radial ventilators.

Applications for an open circuit cooler

The side-stream cooling tower is used where large amounts of water are required for refrigeration machines (as with the vapour tower), but where the installation conditions, for space reasons, only allow a lateral connection of the air duct system. In the industry, the cooling water for cooling air compressors, diesel motors and generators, as well as for cooling rolling stock, lubricating oils and cooling emulsions, can be re-cooled by means of a cooling tower and reused, e.g. in the semi-finished metal products industry, plastics industry, etc..



Operation

The application of a cooling tower to recool water is based on the latent heat of the water. The latent heat of approximately 2407 KJ = 0,67 kWh is required to evaporate one kilogram of water at the corresponding evaporation temperature. If this heat is not available from outside sources it will be extracted from the environment until the environment attains theoretically the evaporation temperature. In this particular case the water sprayed into the cooling tower acts as the environment thus the circulating water is cooled by extracting the heat through evaporation of a small percentage of the water. The wet-bulb temperature of the ambient air must be of course, be lower than the temperature of the water to be cooled. The air absorbs the water vapour and leaves to the tower with an accordingly higher wet-bulb temperature.

90 to 98 % watersaving

In most cases 90/98 % of water can be saved with a cooling tower system if compared to a once through cooling system.

VDMA Arbeitskreis Kühltürme

GOHL®

Permanently Good Cooling

200/0911

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Technical Data

Number of fans	Unit size	Nominal cooling capacity Q_N	Nominal water flow rate G_N	Air volume	Centrifugal fan selected for an external pressure of: 0 to 40 pa				40 to 80 pa				80 to 130 pa				130 to 180 pa			
					absorbed power	fan revolutions	E-Motor (1500 min^{-1})	sound pressure level at 3 m	absorbed power	fan revolutions	E-Motor (1500 min^{-1})	sound pressure level at 3 m	absorbed power	fan revolutions	E-Motor (1500 min^{-1})	sound pressure level at 3 m	absorbed power	fan revolutions	E-Motor (1500 min^{-1})	sound pressure level at 3 m
		kW	kg/h	m^3/h	kW	min^{-1}	kW	dB(A)	kW	min^{-1}	kW	dB(A)	kW	min^{-1}	kW	dB(A)	kW	min^{-1}	kW	dB(A)
1	28 ZS	250	37391	16000	1,7	364	2,2	62	2,0	388	2,2	63	2,3	422	3,0	64	2,5	437	3,0	65
	33 ZS	284	42477	18500	2,5	422	3,0	64	2,8	437	3,0	65	3,1	453	4,0	66	3,3	486	4,0	67
	36 ZS	318	47562	21000	3,6	486	4,0	67	3,9	518	5,5	68	4,2	534	5,5	69	4,5	550	5,5	70
	39 ZS	352	52647	25000	4,7	550	5,5	70	5,1	566	5,5	71	5,4	583	7,5	71	5,7	600	7,5	72
	37 ZS	340	50852	20000	2,5	364	3,0	65	2,8	388	4,0	66	3,1	422	4,0	67	3,3	437	4,0	68
	42 ZS	380	56835	24500	3,5	422	4,0	67	3,8	437	5,5	68	4,1	453	5,5	69	4,3	486	5,5	70
	45 ZS	420	62817	27000	4,8	486	5,5	70	5,1	518	7,5	71	5,4	534	7,5	73	5,6	550	7,5	74
	50 ZS	460	68800	32000	6,5	550	7,5	73	6,8	566	11,0	74	7,1	583	11,0	74	7,4	600	11,0	75
2	2/28 ZS	500	74783	32000	3,4	364	4,0	64	4,0	388	5,5	65	4,6	422	5,5	66	5,0	437	5,5	67
	2/33 ZS	568	84953	37000	5,0	422	5,5	66	5,6	437	7,5	67	6,2	453	7,5	68	6,6	486	7,5	69
	2/36 ZS	636	95123	42000	7,2	486	7,5	69	7,8	518	11,0	70	8,4	534	11,0	71	9,0	550	11,0	72
	2/39 ZS	704	105294	50000	9,4	550	11,0	72	10,2	566	11,0	73	10,8	583	15,0	73	11,4	600	15,0	74
	2/37 ZS	680	101704	40000	5,0	364	7,5	67	5,6	388	7,5	68	6,2	422	7,5	69	6,6	437	7,5	70
	2/42 ZS	760	113670	49000	7,0	422	11,0	69	7,6	437	11,0	70	8,2	453	11,0	71	8,8	486	11,0	72
	2/45 ZS	840	125635	54000	9,6	486	11,0	72	10,2	518	15,0	73	10,8	534	15,0	74	11,2	550	15,0	75
	2/50 ZS	920	137600	64000	13,0	550	15,0	75	13,6	566	15,0	76	14,1	583	15,0	76	14,8	600	15,0	77

The indicated nominal cooling capacity applies to cooling water from +31 °C to +26 °C with a wet bulb temperature of +18 °C. Due to the fact that these temperatures are still not subject to generally applicable standards and that other manufacturers possibly relate the nominal cooling capacities of their products to other temperatures, it is absolutely necessary when making a comparison to convert this data to equivalent temperatures.

The cooling capacities are guaranteed according to DIN 1947 (May 1989). There must be a water pressure of 0.5 bar at the unit's spray pipe inlet.
The full cooling capacity will not be reached until after an operating time of several days when the complete wetting of the packing inserts is then ensured.

Water consumption
1.8 to 3.0 kg/h of water depending on the water quality for a cooling capacity of 1 kW (includes the amount of water reduced by evaporation and the amount of blow-down water).

Required water pressure at the spray pipe inlet 0.5 bar
Maximum permissible water pressure: 1.0 bar
The amount of water thus increases by a factor of 1.5 of the amount of circulating process water for which the spray nozzles inside the unit have been dimensioned (not to be confused with the *nominal amount of circulating water).* The lowest permissible water pressure with a spraying system still working perfectly, is 0.1 bar. In this case the amount of water is reduced to 50%. In both cases, however, the permissible amounts of circulating water should not be exceeded or fallen below.

Sound pressure level
The indicated values in dB(A) relate to a measurement of 3 m in horizontal extension of the van shaft (maximum noise development). Although the forward-curved fan impellers of the large units, with centrifugal fans, are manufactured by a reputable company and designed for particularly low-noise level at high efficiency, the dB(A) ratings must be regarded as guide values because the installation conditions of cooling towers vary widely. Permissible tolerance +/- 2 dB.

Cooling capacity with radial ventilators driven by pole-changing motors
When changing the speed from 1,500 min^{-1} to 750 min^{-1} the cooling capacity is approx. 55%. If the ventilator of the cooling tower is switched off, the cooling capacity is only approx. 15%.

The following data is necessary for dimensioning the cooling tower:
1. Temperature of the water to be cooled, e.g. +32 °C
2. Desired water temperature after cooling, e.g. +25 °C
3. Amount of water, e.g. 50,000 kg/h
4. Heat content of the air to be taken as a basis, or its temperature measured on the wet-bulb thermometer (wet-bulb temperature), e.g. +20 °C
5. Layout showing the available space

Cooling capacities for other amounts of water and water temperatures
For temperatures other than those based on the nominal capacities, please see the curves in our brochure on the vapour tower series, brochure dt 25e, pages 9 to 11. The correction factor (as indicated therein) x nominal capacity of the side-stream cooling tower equals the operating cooling capacity at corresponding temperatures. With a relative rain density of < 0.65, the k2 factor (brochure dt 25e, page 13) has to be taken into account.

Floor drainage for free water discharg
If the water flowing out of the cooling tower is collected in a separate container, we recommend equipping the cooling tower with a floor drainage. The standard, lateral water connections for the cooled drain water are dimensioned for pump connection.

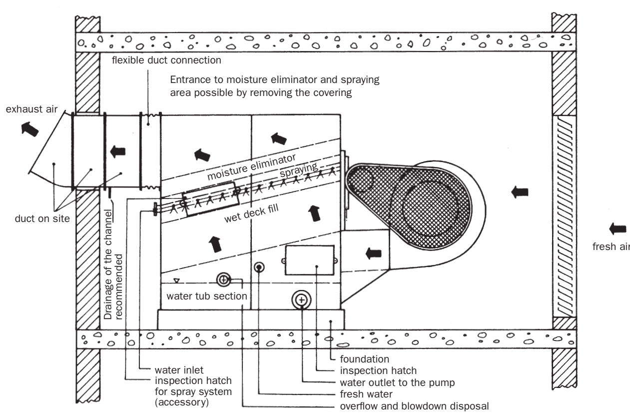
Permissible water flow rate		Overall dimensions without silencer			Overall dimensions with silencer (length of sound absorbing element 0,5 m)			Weight without silencer			Weight with silencer and ventilator casing			Weight and dimensions of largest single part (fan)			
maximal	minimal	Length (+ 60 mm water connections)	Width (+ 50 mm water connections)	Height	Length	Width (+ 50 mm water connections)	Height	Empty weight (~ shipping weight)	Operation weight water level 230 mm	max. weight water level up to overflow	Empty weight (~ shipping weight)	Operation weight water level 230 mm	max. weight water level up to overflow	Length	Width	Height	Weight
kg/h	kg/h	mm	mm	mm	mm	mm	mm	kg	kg	kg	kg	kg	kg	mm	mm	mm	kg
66000	14000	3343	1256	2040	4936	1256	2390	780	1250	1410	1220	1690	1850	970	1000 (835)*	1200	145
66000	14000	3343	1256	2040	4936	1256	2390	780	1250	1410	1220	1690	1850	970	1000 (835)*	1200	145
66000	14000	3343	1256	2040	4936	1256	2390	780	1250	1410	1220	1690	1850	970	1000 (835)*	1200	145
66000	14000	3343	1256	2040	4936	1256	2390	780	1250	1410	1220	1690	1850	970	1000 (835)*	1200	145
85000	17000	3843	1256	2040	5436	1256	2390	880	1490	1690	1320	1930	2130	970	1000 (835)*	1200	145
85000	17000	3843	1256	2040	5436	1256	2390	880	1490	1690	1320	1930	2130	970	1000 (835)*	1200	145
85000	17000	3843	1256	2040	5436	1256	2390	880	1490	1690	1320	1930	2130	970	1000 (835)*	1200	145
85000	17000	3843	1256	2040	5436	1256	2390	880	1490	1690	1320	1930	2130	970	1000 (835)*	1200	145
132000	28000	3343	2429	2040	4936	2429	2390	1430	2370	2690	2230	3170	3490	970	1000 (835)*	1200	145
132000	28000	3343	2429	2040	4936	2429	2390	1430	2370	2690	2230	3170	3490	970	1000 (835)*	1200	145
132000	28000	3343	2429	2040	4936	2429	2390	1430	2370	2690	2230	3170	3490	970	1000 (835)*	1200	145
132000	28000	3343	2429	2040	4936	2429	2390	1430	2370	2690	2230	3170	3490	970	1000 (835)*	1200	145
170000	34000	3843	2429	2040	5436	2429	2390	1600	2820	3220	2400	3620	4020	970	1000 (835)*	1200	145
170000	34000	3843	2429	2040	5436	2429	2390	1600	2820	3220	2400	3620	4020	970	1000 (835)*	1200	145
170000	34000	3843	2429	2040	5436	2429	2390	1600	2820	3220	2400	3620	4020	970	1000 (835)*	1200	145
170000	34000	3843	2429	2040	5436	2429	2390	1600	2820	3220	2400	3620	4020	970	1000 (835)*	1200	145

Supply options
Unit **without** silencers: fully assembled; completely disassembled; divided into cooling tower housing and fan module.
Unit **with** silencers: fully assembled; completely disassembled; divided into cooling tower housing, fan module, air-intake silencer and exhaust air silencer.

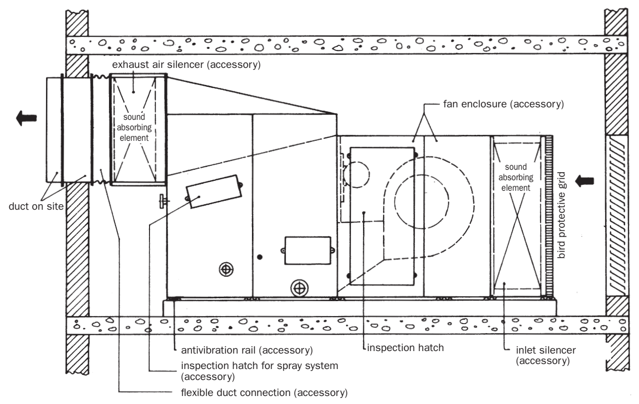
Installation of several adjacent units
Any possible number of units (even of different sizes) may be installed adjacently but observing the minimum distances in between for operation and maintenance purposes.

Accessories
Single-speed or pole-changing driving motors for ventilators, electric heating systems for the water tray of the cooling tower, neoprene rubber strips or resilient beddings for solid-borne sound insulation, standard water containers, ventilator casings, air-intake silencers and exhaust air silencers, portholes for spray chambers and further accessories are described in the currently valid list of accessories.

Installation example 1 (without silencer)



Installation example 2 (with silencer)

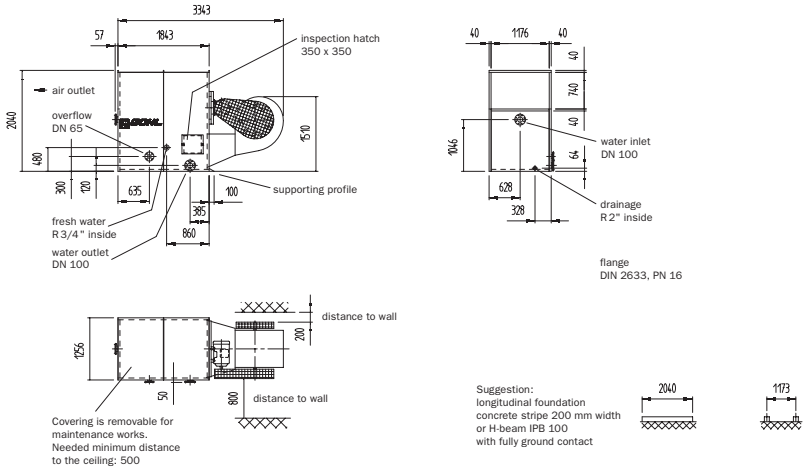


Dimension sheets for side-stream cooling towers

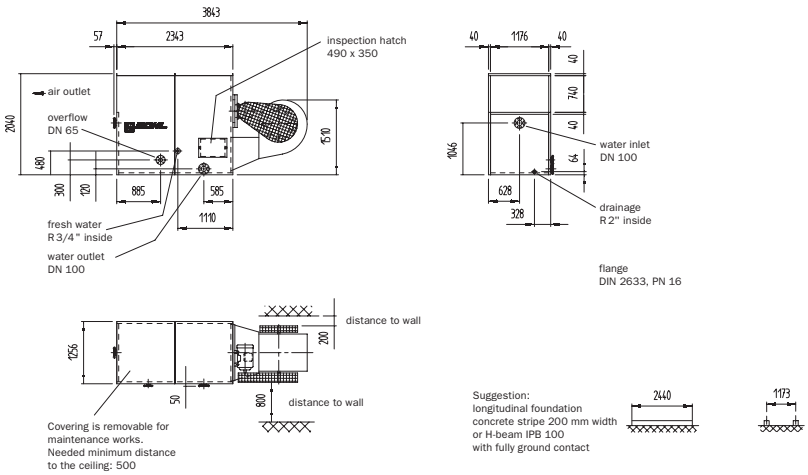
Two side-stream cooling towers (one in left-hand and one in right-hand design) can be installed side by side without any spacing. The distance from any further units should be at least 500 mm. The dimension sheet shows the right-hand design. If the left-hand design is required, please make sure that this is indicated in the purchase order. The water connections and the drive including the motor are then located on the opposite side.

The given dimensions are reference values.
Due to the sealing compound applied between the seams and owing to the production tolerances, piping has to be produced in accordance with the dimensions of the completed unit.

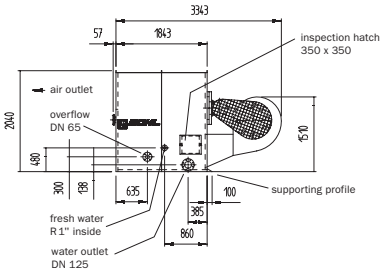
Unit sizes 28 ZS, 33 ZS, 36 ZS and 39 ZS

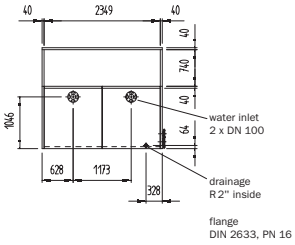


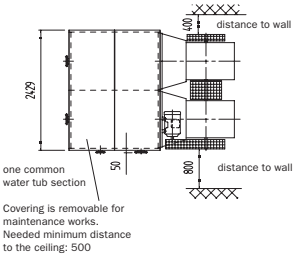
Unit sizes 37 ZS, 42 ZS, 45 ZS and 50 ZS

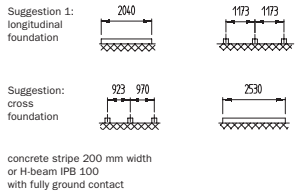


Unit sizes 2/28 ZS, 2/33 ZS, 2/36 ZS and 2/39 ZS

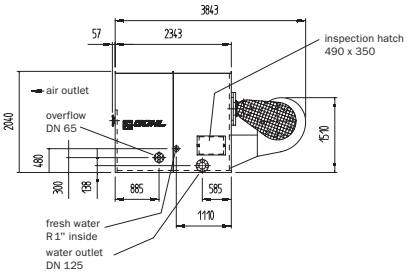


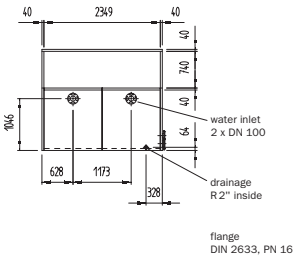


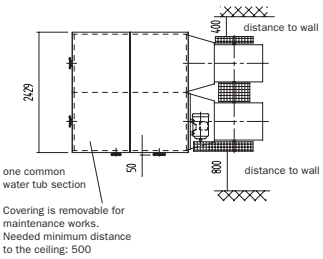


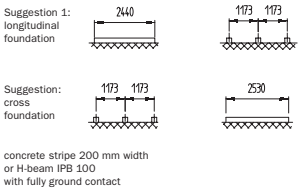


Unit sizes 2/37 ZS, 2/42 ZS, 2/45 ZS and 2/50 ZS

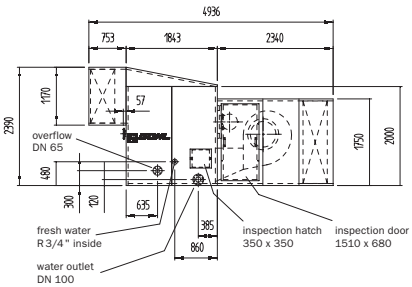


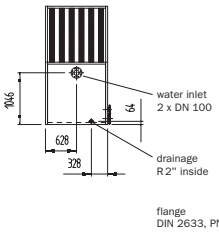


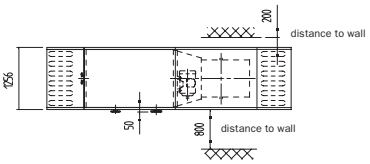


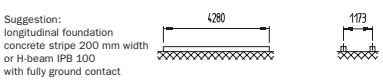


Unit sizes 28 ZS, 33 ZS, 36 ZS and 39 ZS with silencer

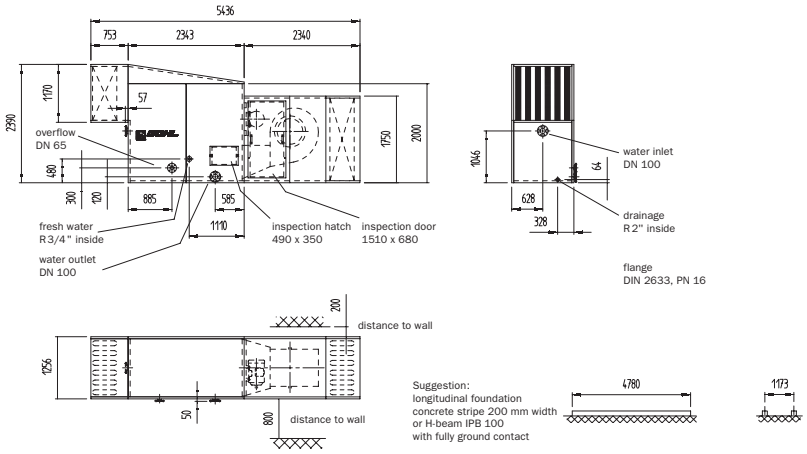




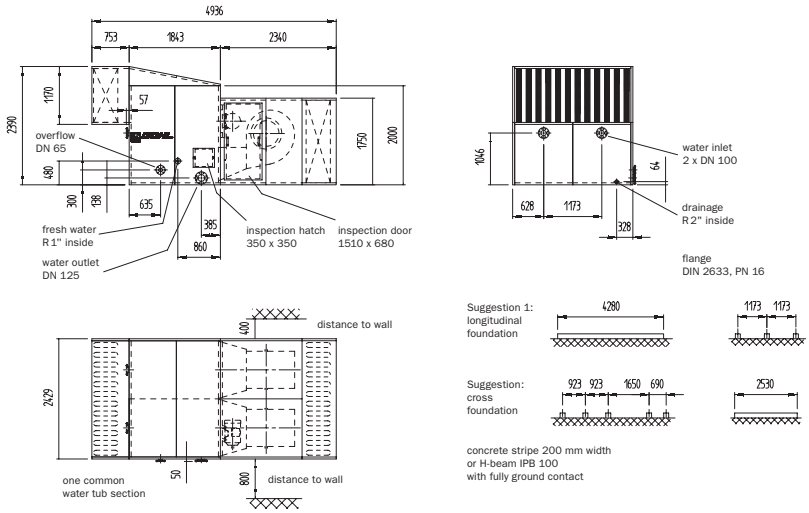




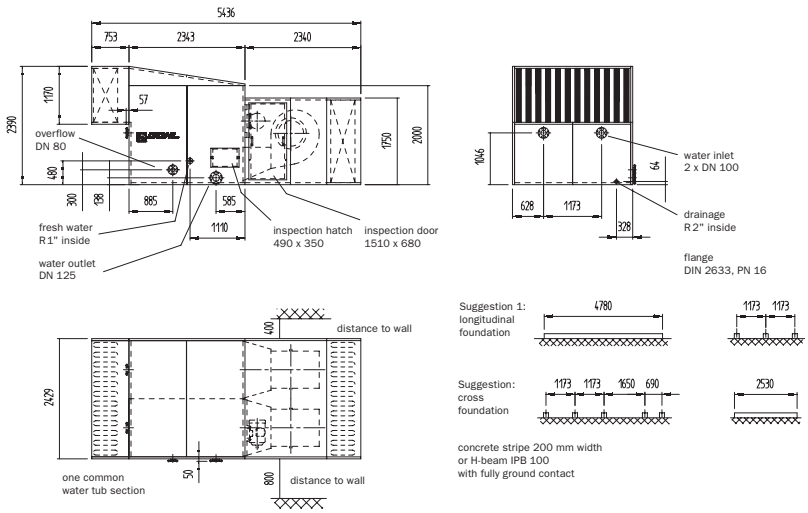
Unit sizes 37 ZS, 42 ZS, 45 ZS and 50 ZS with silencer



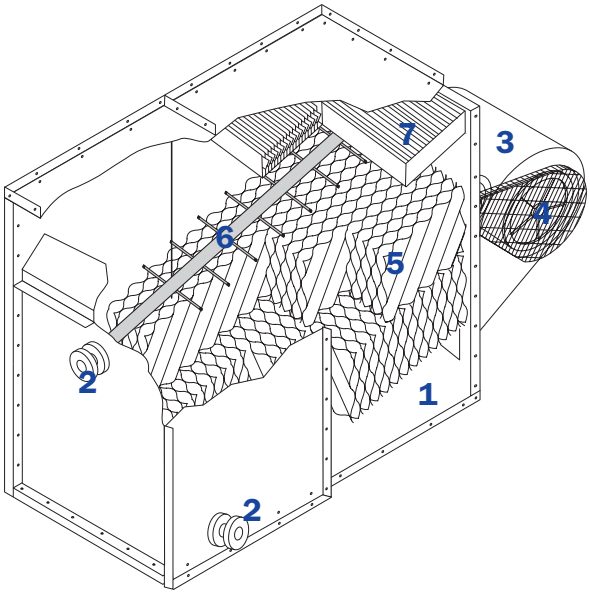
Unit sizes 2/28 ZS, 2/33 ZS, 2/36 ZS and 2/39 ZS with silencer



Unit sizes 2/37 ZS, 2/42 ZS, 2/45 ZS and 2/50 ZS with silencer



Technical Specification



Technical data

D-line side stream cooling tower, unit size

Cooling capacity	kW
Water inlet temperature	°C
Water outlet temperature	°C
Wet-bulb temperature	°C
Water flow rate	m^3/h
Required water pressure at water inlet	bar
Fresh water consumption by evaporation (approx 1,49 kg/kW)	m^3/h
Recommended additional bleed-off water	m^3/h
by blowdown water limiting value according to VDI 3803 and thickening factor 3	
Additional static pressure of the fan	Pa
Air volume	m^3/h
Absorbed fan power	kW
Fan speed	min^{-1}
Fan motor 230/400 V or 400/690 V, 50 Hz	kW
Shipping weight	kg
Operating weight (at a water level up to overflow)	kg
Dimensions	mm
Noise at 3 m horizontally in extension of the fan shaft, with free acoustic propagation approx.	dB(A)

The supply should comply with following conditions:
Unit completely assembled, or broken down in individual components,
or partially broken down into side stream cooling tower casing and fan assembly.

The supply will consist of:

1 Casing and pan section
The casing and pan section form one unit and consist of heavy-gauge galvanised, folded sheet metal panels, which are assembled into a box structure, using stainless steel bolts and a permanently flexible sealing compound. Galvanised steel beams carry the fill. Deflector plates distribute the air uniformly over the fill. An inspection door provides access for adjustment of eventual available armatures, and for cleaning of the pan section.

2 Water connections
All plastic coated water connections fitted to the unit, are provided with flanges, PN16 DIN2633. The galvanised make up wate and plastic coated drain connections have internal threads.

Strainer
The plastic coated strainer which has a mesh size of about 5 mm is attached to the casing in such a way that is can be removed through the inspection door.

Combined overflow-/bleed device
A special galvanised tray provided with an adjustable cover and situated in the spray area, discharges the required quantity of bleed water directly through the overflow. By using of a separate bleed device the cooling tower will be provided with an overflow instead of a combined overflow and a bleed device.

3 Double width double inlet centrifugal fans
Low noise level high efficiency, heavy duty fans, with forward-curved blades are used. The galvanised fan impeller is statically and dynamically balanced. The fan shaft is made of stainless steel X 20 Cr 13, material-no. 1.4021. The feather is made of steel C 45 K according to DIN 6885. The heavy duty ball bearing which are assembled in pillow blocks and equipped with lip or labyrinth seals, are provided with grease nipples led to the end of the fan housing for maintenance ease. The fan housing is made of galvanised steel and equipped with an outlet diffuser. The drive is via V-belts. The V-belt pulleys are of cast aluminium with steel hubs.
The fan is located in the dry entering air and is readily accessible for maintenance purposes.

4 Belt guard and air intake guard
The guards are hot dipped galvanised after fabrication. By using of a fan enclosure the guards will not be needed.

5 Wet deck fill
The wet deck fill is manufactured from a durable synthetic material (PVC). Its special properties include a high cooling performance for low pressure drop, durability, resistance to chemical attack, and high mechanical strength. The distance between the synthetic material plates is not less than 12 mm so that under normal operating conditions blockage due to the build-up of deposits will not occur.

6 Spray system
The water is sprayed through self-cleaning, non clogging, hollow cone, spray nozzles made of anti-fouling fibreglass reinforced nylon. At a supply pressure the spray nozzles, produce a fine water spray and, because of their arrangement, ensure uniform water distribution. The spray branches and the main header are made of galvanised steel tube DIN 2440.

7 Moisture eliminators
The moisture eliminators are made of synthetic material for optimum water elimination at a low pressure drop. In the upper part of the eliminators the air directed vertically upwards.

Corrosion protection
All galv. sheet metal parts are lightly sandblasted, heated in a furnace, and dipped into a plastic powder bed (Performance Polymer Alloy). The plastic coat is approx. 0,3 mm thick on each side. It has a homogeneous surface, it is elastic, resistant to chemical attack, light- and weather resistant. (Not coated are: eliminators, fan wheel incl. shaft and pulleys, spray system, bolts and nuts, and all parts which are hot dipped galvanised.)

Accessories The accessories are described at a separate brochure.

Installation and Operating Instructions

Installation
The fully demountable cooling tower can be reassembled with little effort if the assembly has to take place on the spot. Connecting frames for possible air-intake and exhaust air ducts are available. Its compact design with a low unit height and low weight facilitates installation indoors – and also outdoors if there is limited space available.

Operation
In order to prevent condensation formed by vapour rising along vertical walls of buildings, the lateral exhaust air is ejected at such speed that it is cast out a long way. As a result, a shortcut in the airflow between air entry and air exit is also rendered impossible.

Maintenance
The drop separators, the spraying system and the packing insert become accessible by removing the cover of the unit. For indoor installation we recommend that a distance of approx. 500 mm is provided for between the unit and the ceiling of the room. The modules of the side-stream cooling tower originate from the modular system of our proven and maintenance-friendly vapour tower series.

Important Notes
1. If several units are installed adjacently without any space in between, the motors and drive components in the centre are difficult to access. Therefore, we recommend keeping a space of approx. 500 mm free between the units, if there is sufficient space available. If ventilator casings or air-intake silencers are mounted on the units, they are equipped with corresponding access openings at the top for the motors located in the centre (the distance between them and the ceiling, if any, has to be taken into account!).
2. Make sure only to use foundations recommended by us.
3. The foundations for our units (incl. casings) should be waterproof in the case of outdoor installation. For indoor installation this applies both for the foundations and for the floor, whereby the floor is constructed appropriately in the form of a tray. Sealing of the foundations can be easily achieved by adding a sealing agent to the concrete, by applying a waterproof coat of paint or by using covers made of metal sheet or plastic.
4. The foundations should be made as uniform as possible throughout (approx. 100 mm longer than the dimensions of the casing).
5. The deflection of supports below the unit over the entire length is max. L/400, and with resilient beddings and Neoprene rubber strips (due to the uniform load) max. L/600.
6. In case the unit is placed close to the wall, make sure that this is indicated in the purchase order so that the connections and possible accessories can be arranged accordingly.
7. Units involving a risk of tilting because of their small width, or because of their height when equipped with superstructures for ducts, or because of large areas exposed to wind, have to be fixed to the foundation and secured accordingly.
8. Insofar as drop separators and spraying systems are not freely accessible, we strongly recommend installing port openings for the spray chamber.
9. Piping and collectors/distributors provided by the customer must not exert any strain on the equipment connections and the customer must ensure that their weight is supported or suspended.
10. If the units are to be insulated so as to prevent transmitting solid-borne noise, compensators between the device connections and on-site piping must be installed by the customer.
11. The instructions stated in the respective order confirmation are to be taken into consideration in the individual case.
12. Exhaust air ducts must be waterproof and equipped with a draining facility for conducting condensation from their interior.
13. At outdoor temperatures below 0°C, and during operation of the cooling tower, the temperature of the cooling water must not fall below +10°C.
14. The indicated dimensions are reference values. Due to production tolerances and the sealing compound applied between the seams, corresponding tolerances must be expected and the piping has to be produced according to the dimensions taken from the completed unit.

The manufactures reserve the right to make technical modifications as a result of further development and technical advances.