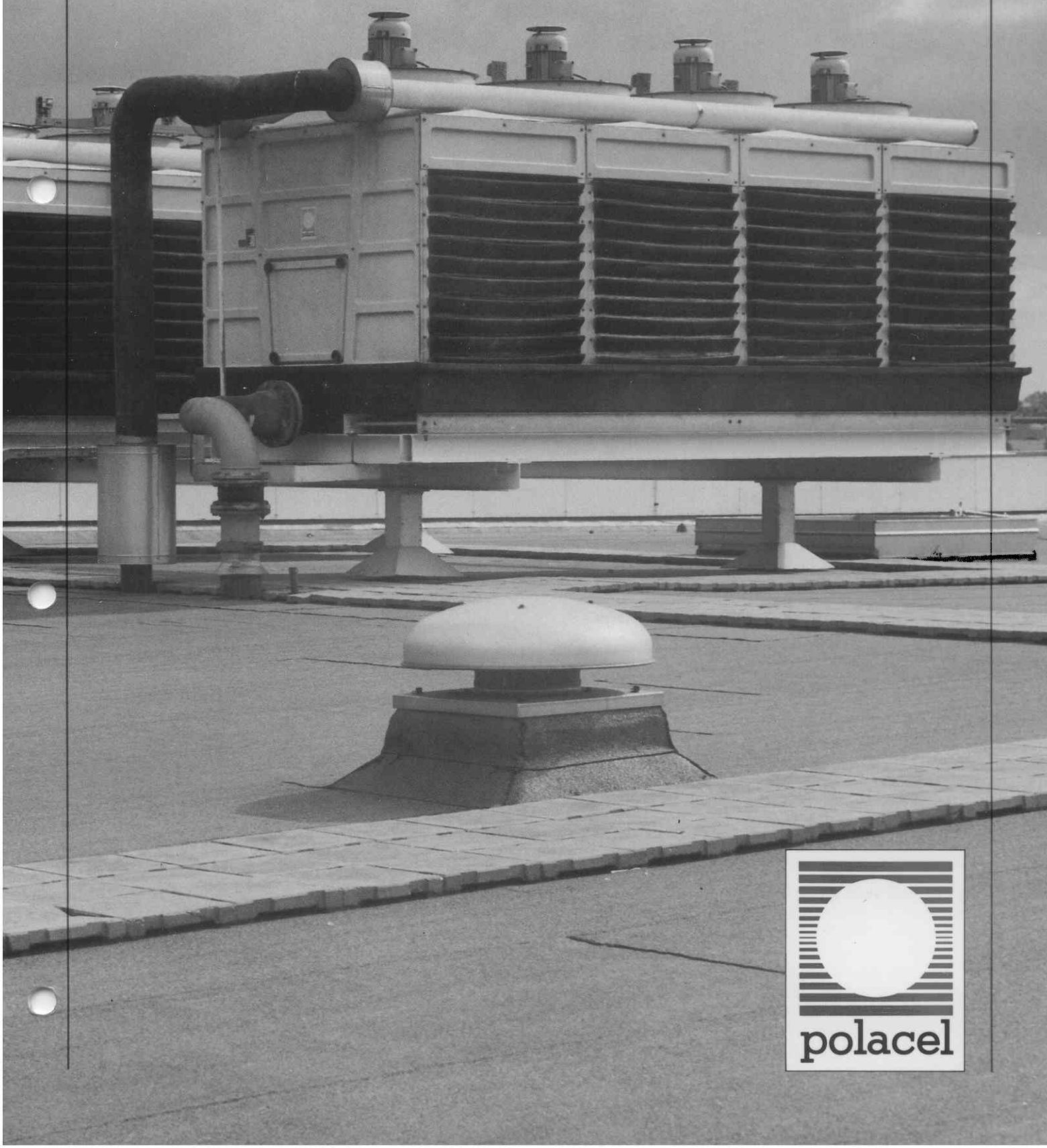
Bulletin 901

Polacel cooling towers XE Series Crossflow.



polacel

General information on the XE cooling towers.

Operating principle.

The Polacel cooling tower type XE operates according to the crossflow principle. The water to be cooled is fed into a reservoir and through holes in the bottom equally distributed over the cooling tower fill. The falling water transfers heat to the air, sucked in by an axial fan, by evaporation and direct contact. The water is collected again in a reservoir at the bottom of the tower and can be used again for cooling purposes.

Selection of construction materials.

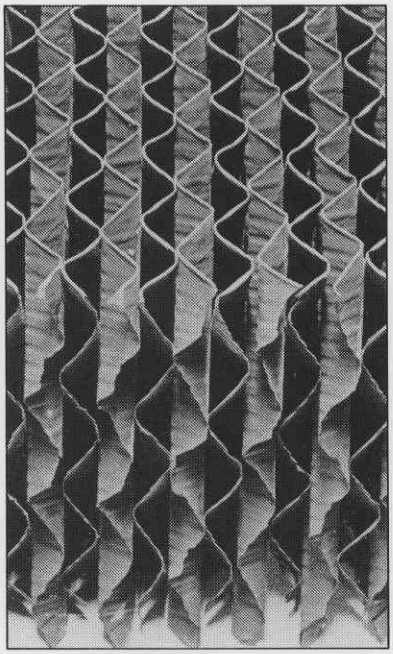
Polacel has based the selection of construction materials for the towers on the requirement of complete corrosion and chemical resistance. This has been achieved through the exclusive use of polypropylene, glassfibre reinforced polyester and stainless steel.

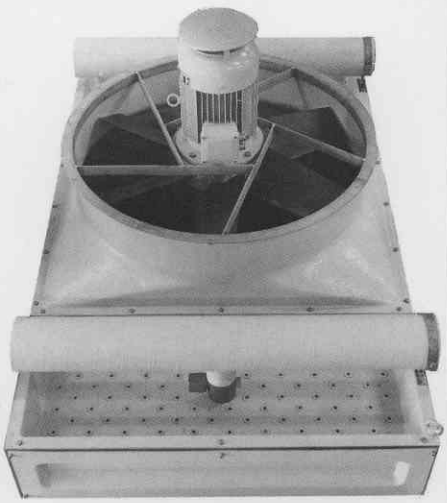
Casing.

The casing of the cooling tower is made of glassfibre reinforced polyester panels which are connected with SS-bolts to a SS-hollow profile frame. This frame is bolted together with the water collection reservoir to the hot dipped galvanized steel foundation beams.

Water distribution system.

The water inlet reservoir is made of glassfibre reinforced polyester. Through the polyethylene nozzles in the bottom of the waterreservoir, the water is equally spread over the cooling tower fill. The water reservoirs of the cooling tower are very easy to clean.





Air inlet blinds.

In order to keep splash-water losses and waterlosses during strong gusts of wind to a minimum, hot-pressed glassfibre reinforced polyester blinds are mounted between the vertical SS 304 hollow profiles.

Fan unit.

A fan hood of glassfibre reinforced polyester ensures an aerodynamically smooth flow of the water-vapour saturated air towards the fan. The axial fan itself is made of polypropylene and mounted directly to a low speed electrical motor, specially developed for use in very humid environments (IP 55). The fan/motor combination is fastened to a stainless steel frame.

Fill.

The cooling tower fill is made of P.V.C. sheets which are suitable for a maximum water temperature of 55°C. The low pressure drop of the crossflow packing causes low energy costs.

Polacel sizing and engineering data for XE cooling towers.

Cooling tower model	Wet surface (m^2)	Nominal kW at 32-26-21°C	Fan diameter (mm)	Number of fans	Motor power (kW)	Speed (rpm)	Dimensions			Weight		Number of supports	SPL at 10 mtr dB(A)
							L (mm)	W (mm)	H (mm)	Ship. (kg)	Oper. (kg)		
XE 1.080 - VL	0.48	69	755	1	0,55	720	1030	1680	2540	225	620	2	45
XE 1.080 - L	0.48	86	755	1	0,55	720	1030	1680	2540	225	620	2	47
XE 1.080 - M	0.48	101	755	1	0,75	960	1030	1680	2540	225	620	2	52
XE 1.080 - H	0.48	116	755	1	1,1	960	1030	1680	2540	225	620	2	54
XE 1.120 - VL	0.72	104	1005	1	0,55	720	1430	1680	2540	300	830	2	48
XE 1.120 - L	0.72	129	1005	1	0,75	720	1430	1680	2540	300	830	2	50
XE 1.120 - M	0.72	152	1005	1	1,1	720	1430	1680	2540	300	830	2	52
XE 1.120 - H	0.72	174	1005	1	1,5	720	1430	1680	2540	300	830	2	54
XE 2.080 - VL	0.96	139	755	1	1,1	960	1030	2270	2540	350	990	2	51
XE 2.080 - L	0.96	171	755	1	1,5	960	1030	2270	2540	350	990	2	53
XE 2.080 - M	0.96	202	755	1	2,2	1440	1030	2270	2540	350	990	2	60
XE 2.080 - H	0.96	232	755	1	3,0	1440	1030	2270	2540	350	990	2	61
XE 2.120 - VL	1.44	208	1005	1	1,1	720	1430	2270	2540	450	1250	2	52
XE 2.120 - L	1.44	257	1005	1	2,2	720	1430	2270	2540	450	1250	2	53
XE 2.120 - M	1.44	303	1005	1	3.0	960	1430	2270	2540	450	1250	2	59
XE 2.120 - H	1.44	349	1005	1	4,0	960	1430	2270	2540	450	1250	2	60
XE 2.160 - VL	1.92	277	755	2	2x1,1	960	1890	2270	2540	590	1650	2	54
XE 2.160 - L	1.92	343	755	2	2x1,5	960	1890	2270	2540	590	1650	2	56
XE 2.160 - M	1.92	405	755	2	2x2,2	1440	1890	2270	2540	590	1650	2	63
XE 2.160 - H	1.92	465	755	2	2x3,0	1440	1890	2270	2540	590	1650	2	64
XE 2.240 - VL	2.88	416	1005	2	2x1,1	720	2690	2270	2540	880	2450	3	55
XE 2.240 - L	2.88	514	1005	2	2x2,2	720	2690	2270	2540	880	2450	3	56
XE 2.240 - M	2.88	607	1005	2	2x3,0	960	2690	2270	2540	880	2450	3	62
XE 2.240 - H	2.88	697	1005	2	2x4,0	960	2690	2270	2540	880	2450	3	63
XE 2.360 - VL	4.32	624	1005	3	3x1,1	720	3950	2270	2540	1300	3700	4	56
XE 2.360 - L	4.32	772	1005	3	3x2,2	720	3950	2270	2540	1300	3700	4	57
XE 2.360 - M	4.32	910	1005	3	3x3,0	960	3950	2270	2540	1300	3700	4	63
XE 2.360 - H	4.32	1046	1005	3	3x4,0	960	3950	2270	2540	1300	3700	4	64
XE 2.480 - VL	5.76	832	1005	4	4x1,1	720	5210	2270	2540	1740	4900	4	57
XE 2.480 - L	5.76	1029	1005	4	4x2,2	720	5210	2270	2540	1740	4900	4	58
XE 2.480 - M	5.76	1214	1005	4	4x3,0	960	5210	2270	2540	1740	4900	4	64
XE 2.480 - H	5.76	1395	1005	4	4x4,0	960	5210	2270	2540	1740	4900	4	65
XE 2.600 - VL	7.20	1040	1005	5	5x1,1	720	6470	2270	2540	2200	6100	5	58
XE 2.600 - L	7.20	1286	1005	5	5x2,2	720	6470	2270	2540	2200	6100	5	59
XE 2.600 - M	7.20	1547	1005	5	5x3,0	960	6470	2270	2540	2200	6100	5	65
XE 2.600 - H	7.20	1743	1005	5	5x4,0	960	6470	2270	2540	2200	6100	5	66

Selection tables for XE cooling towers.

Type VL Airspeed 2,0 m/sec.

approach (°C) \ range (°C)		4	5	6	7	8	9	10	11
TWB = 18 °C	3	16.6	14.2	12.7	11.6	10.8	10.2	9.8	9.3
	5	25.1	21.4	18.7	17.0	15.5	14.4	13.7	12.9
	7	34.4	28.7	25.1	22.4	20.5	18.9	17.7	16.8
	9	44.5	36.9	31.9	28.3	25.8	23.7	22.0	20.8
TWB = 21 °C	3	18.3	15.7	14.1	12.8	11.9	11.3	10.8	10.4
	5	27.8	23.6	20.7	18.8	17.2	16.0	15.1	14.3
	7	38.2	32.0	27.8	24.8	22.7	20.9	19.6	18.5
	9	49.6	41.0	35.5	31.5	28.6	26.3	24.6	23.0
TWB = 24 °C	3	20.2	17.6	15.5	14.2	13.3	12.5	12.0	11.5
	5	31.0	26.1	22.9	20.8	19.0	17.9	16.7	15.8
	7	42.5	35.4	30.8	27.7	25.2	23.2	21.8	20.6
	9	50.0	45.6	39.4	35.0	31.7	29.3	27.2	25.6
TWB = 27 °C	3	22.4	19.5	17.2	15.8	14.6	13.9	13.2	12.7
	5	34.4	29.0	25.7	23.0	21.1	19.8	18.5	17.6
	7	47.4	39.6	34.4	30.7	28.0	26.0	24.3	22.8
	9	50.0	50.0	43.9	39.1	35.4	32.6	30.3	28.4

Type L Airspeed 2,5 m/sec.

approach (°C) \ range (°C)		4	5	6	7	8	9	10	11
TWB = 18 °C	3	20.3	17.7	15.6	14.2	13.3	12.6	12.0	11.5
	5	31.1	26.2	23.0	20.8	19.1	17.9	16.7	15.8
	7	42.5	35.4	30.8	27.6	25.1	23.2	21.8	20.6
	9	50.0	45.4	39.3	34.9	31.6	29.2	27.2	25.5
TWB = 21 °C	3	22.4	19.5	17.2	15.7	14.6	13.9	13.2	12.7
	5	34.3	28.9	25.6	23.0	21.1	19.7	18.5	17.5
	7	47.2	39.3	34.2	30.6	27.8	25.9	24.1	22.7
	9	50.0	50.0	43.6	38.8	35.2	32.4	30.1	28.3
TWB = 24 °C	3	24.8	21.5	19.1	17.7	16.1	15.4	14.6	14.0
	5	38.2	32.3	28.3	25.4	23.3	21.8	20.5	19.4
	7	50.0	43.8	37.9	33.9	31.1	28.7	26.8	25.2
	9	50.0	50.0	48.7	43.2	39.0	35.9	33.4	31.5
TWB = 27 °C	3	27.8	23.8	21.2	19.5	18.1	17.0	16.2	15.5
	5	42.3	35.8	31.4	28.3	26.1	24.2	22.7	21.6
	7	50.0	48.7	42.3	37.9	34.5	31.8	29.7	28.0
	9	50.0	50.0	50.0	48.0	43.5	40.1	37.3	35.0

Type M Airspeed 3,0 m/sec.

approach (°C) \ range (°C)		4	5	6	7	8	9	10	11
TWB = 18 °C	3	24.0	20.8	18.5	17.1	15.6	14.9	14.2	13.6
	5	36.6	31.2	27.3	24.6	22.5	21.1	19.8	18.7
	7	49.9	42.2	36.5	32.6	29.9	27.6	25.8	24.3
	9	50.0	50.0	46.6	41.4	37.5	34.5	32.1	30.2
TWB = 21 °C	3	26.6	22.9	20.4	18.8	17.4	16.4	15.6	14.9
	5	40.7	34.4	30.2	27.1	25.1	23.3	21.8	20.7
	7	50.0	46.7	40.6	36.3	33.1	30.5	28.5	26.9
	9	50.0	50.0	50.0	45.9	41.7	38.4	35.7	33.5
TWB = 24 °C	3	29.6	25.3	22.6	20.7	19.3	18.2	17.3	16.5
	5	45.1	38.0	33.4	30.3	27.8	25.8	24.2	23.0
	7	50.0	50.0	45.1	40.2	36.6	33.8	31.6	30.0
	9	50.0	50.0	50.0	50.0	46.3	42.5	39.6	37.2
TWB = 27 °C	3	32.7	28.1	25.4	22.9	21.4	20.1	19.1	18.3
	5	49.8	42.4	37.3	33.6	30.8	28.6	26.9	25.6
	7	50.0	50.0	49.8	44.8	40.9	37.8	35.3	33.3
	9	50.0	50.0	50.0	50.0	50.0	47.3	44.2	41.5

Type H Airspeed 3,5 m/sec.

approach (°C) \ range (°C)		4	5	6	7	8	9	10	11
TWB = 18 °C	3	28.0	23.9	21.3	19.5	18.2	17.1	16.3	15.6
	5	42.3	35.8	31.4	28.3	26.1	24.3	22.8	21.6
	7	50.0	48.6	42.2	37.8	34.4	31.8	29.7	28.0
	9	50.0	50.0	50.0	47.8	43.3	39.9	37.1	34.9
TWB = 21 °C	3	30.7	26.4	23.5	21.5	20.1	18.9	18.0	17.2
	5	47.2	39.9	34.7	31.5	28.8	26.8	25.2	24.1
	7	50.0	50.0	46.7	41.7	38.0	35.1	33.1	31.1
	9	50.0	50.0	50.0	50.0	48.2	44.3	41.1	38.6
TWB = 24 °C	3	33.9	29.2	26.3	23.7	22.2	20.9	19.9	19.0
	5	50.0	43.9	38.7	34.8	31.9	29.7	27.7	26.6
	7	50.0	50.0	50.0	46.3	42.3	39.1	36.6	34.5
	9	50.0	50.0	50.0	50.0	50.0	49.0	45.7	43.0
TWB = 27 °C	3	37.6	32.8	29.0	26.3	24.3	23.2	22.0	21.1
	5	50.0	49.0	42.8	38.6	35.4	32.9	31.2	29.4
	7	50.0	50.0	50.0	50.0	47.1	43.4	40.6	38.2
	9	50.0	50.0	50.0	50.0	50.0	50.0	50.0	47.8

Tender specification.

How to write a Polacel XE cooling tower in your tender specification. Example cooling tower specification type XE.

General.

Manufacturer	: Polacel
Cooling principle	: crossflow
Type	: XE 2.360 - VL
Number of cells	: 3

Design conditions.

Cooling capacity	: 624 kw
Water quantity	: 24,8 l/s
Temperature in/out	: 32/26 °C
Max. wet bulb temperature	: 21°C

Material specification.

Casing	: glassfibre reinforced polyester
Framework	: stainless steel
Fill	: p.v.c.
Water supply pipe	: glassfibre reinforced polyester
Water distribution	: glassfibre reinforced polyester
Airinlet louvres	: glassfibre reinforced polyester
Fan blades	: polypropylene
Fan support	: stainless steel
Water basin	: glassfibre reinforced polyester
Water basin support	: hot dipped galvanized
Bolts and nuts	: stainless steel

Technical specification per type.

Required waterpressure	: none
Number of fans	: 3
Motor power	: 3 x 1.1 kw
Motor speed	: 720 rpm
Electrical supply	: 380V / 50 Hz
Class of insulation	: IP 55
Dimensions per cell: height	: 2540 mm
length	: 3950 mm
width	: 2270 mm
Shipping weight	: 1300 kg
Operating weight	: 3700 kg
SPL at 10 mtr per unit	: 56 dB(A)

Cooling tower complete with:
- drain and overflow connections
- make up with floatvalve (max. 2,5 atm.)
- suction strainer

Selection tables for XE cooling towers.

How to select a Polacel cooling tower type XE.

Design conditions (example):

- **circulating water quantity Qw = 90 m^3/hr**
- **water inlet temperature Twl = 37 °C**
- **water outlet temperature Tw2 = 29 °C**
- **Wet bulb temperature Twb = 24 °C**

Determine range:
Twl - Tw2 = 8 °C

Determine approach:
Tw2 - Twb = 5 °C

Selection procedure:

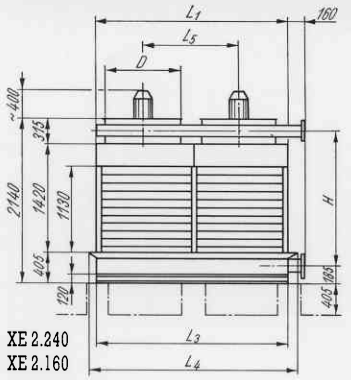
The selection tables give values for the specific waterflow R (m^3/m^2. hr).

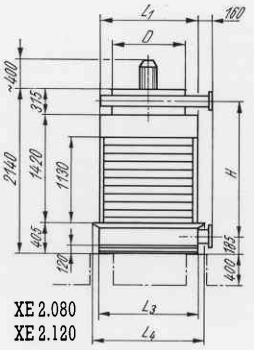
XE type	Fill height
VL	R = 19.0
L	R = 23.3
M	R = 27.8
H	R = 31.9

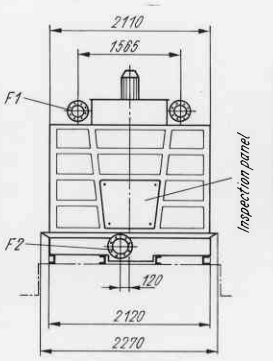
To determine the necessary tower surface, devide the circulating water flow by the specific water flow.
Select a cooling tower model from the tables, taking into account the fact that the wet surface in the table (second column) is greater than or equal to the necessary tower surface.

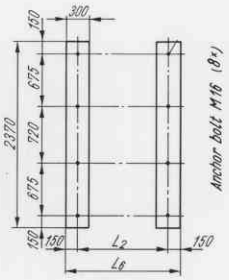
Cooling Tower type	Necessary surface tower (m^2)	Selected Cooling tower model
VL	4,74	XE 2.480 - VL
L	3,86	XE 2.360 - L
M	3,24	XE 2.360 - M
H	2,82	XE 2.240 - H

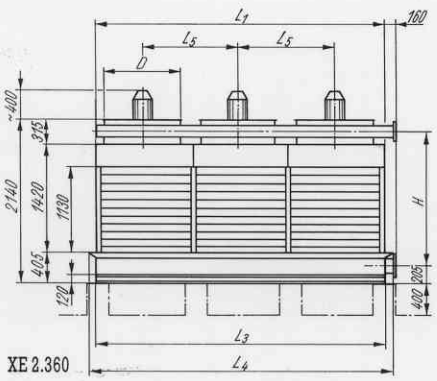
Engineering data.

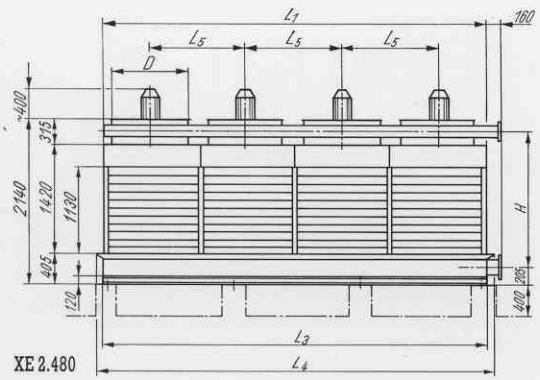




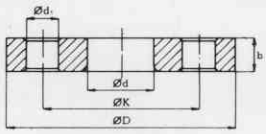








Dimensions of connecting flanges.



Nominal Opening	Flange					Treaded bolts	
	D	K	d	d_1	b	Quan-tity	Dimension bolts
15	95	65	34	14	14	4	M12
20	105	75	40	14	14	4	M12
25	115	85	48	14	16	4	M12
35	140	100	52	18	16	4	M16
40	150	110	66	18	16	4	M16
50	165	125	78	18	16	4	M16
65	185	145	92	18	16	4	M16
80	200	160	108	18	18	8	M16
100	220	180	133,5	18	18	8	M16
125	250	210	150	18	18	8	M16
150	285	240	188,5	23	18	8	M20
200	340	295	238	23	26	8	M20
250	395	350	288	23	29	12	M20

Flange sizes according to DIN 2501 (ND 10) and NEN 5821 (ND 10).
Material: P.V.C. or glassfiber reïnforced polyester.
Note: All dimensions in mm.

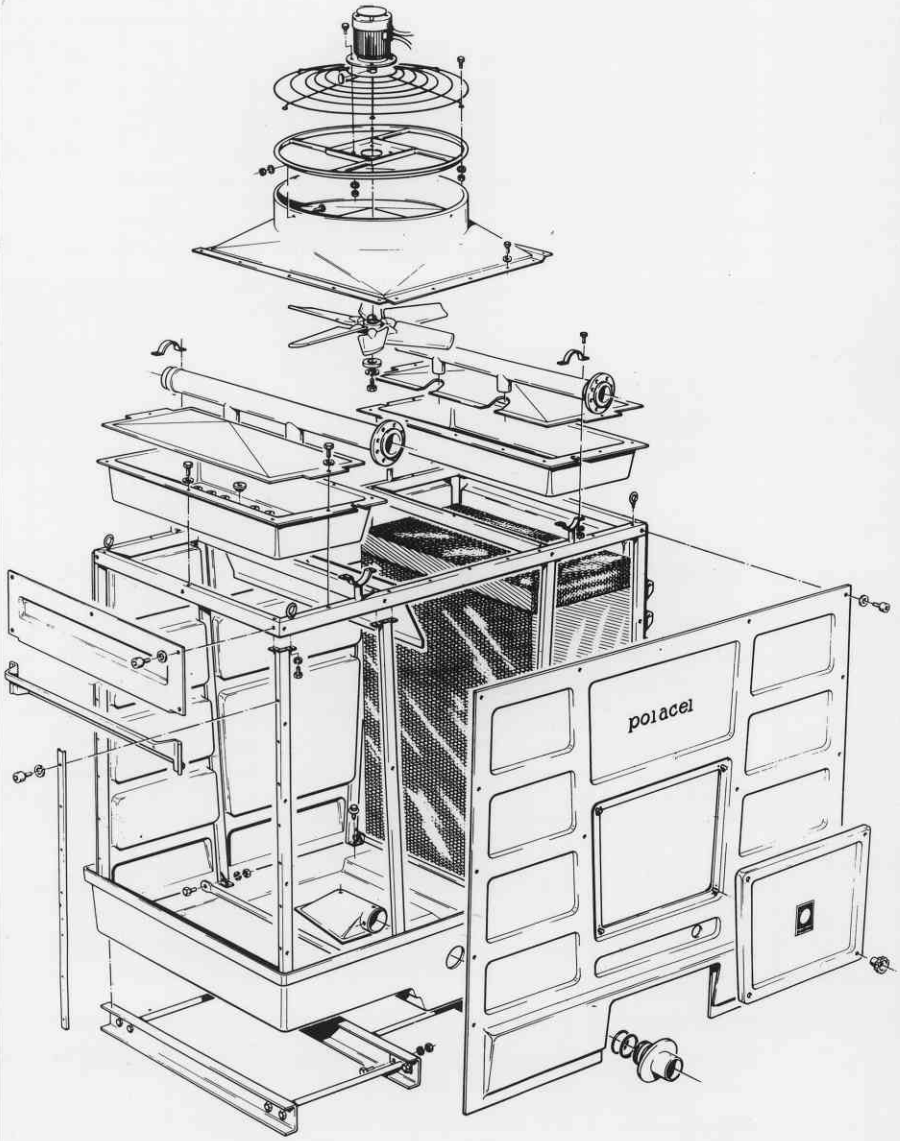
Why Polacel XE cooling towers?

Low noise level.

The polypropylene axial fans on the XE cooling towers provide, in combination with the direct driving system and the low pressure drop of the fill, a low noise level.

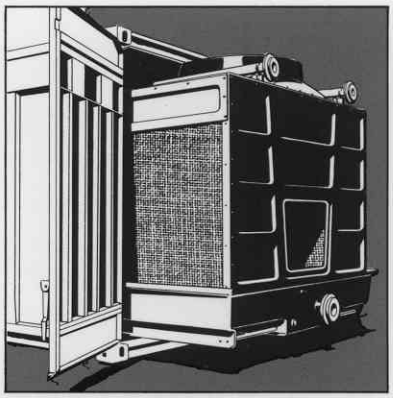
Low energy consumption.

The cross flow design with P.V.C. fill provides a low pressure drop which results in a low motor power consumption. The gravity water distribution system saves pump energy.



Long operation time.

Through the exclusive materials which we use, the cooling towers meet with the requirements of being completely corrosion and chemical resistant. In combination with the direct driving system of the fan this guarantees a long operation time.



Compact appearance.

The XE cooling tower is equiped with the crossflow modular design which results in a most compact tower size. The model is developed in such a way that despatch in a container is possible which saves costs of seaworthy packing and benefits in this way the export purposes.

Low maintenance costs.

The cooling tower being equiped with an inspection door, the water distribution system and internal parts of the cooling tower are easily accessible. Moreover, because of the direct driving system of the fan the cooling tower hardly requires any maintenance.

polacel

Polacel BV
Vlijtstraat 25
PO box 296
7000 AG Doetinchem
Netherlands
Telex 45948
Telefax 31 (0)8340-44884
Tel. 31(0)8340-33034

CTI member