

OPTICUBE FIELD



OPTICUBE FIELD - THE BASICS

The Opticube Field is specially designed to simplify the modeling and installation of the heating room used in large collector fields. Indeed, gathering all functional units in one or more turnkey storage containers simplifies project management from quotation to commissioning.

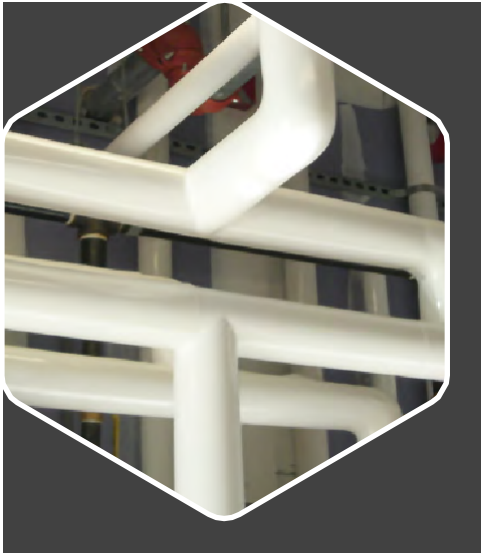
TechniQ Projects has therefore created a range of standard solutions in different sizes: from DN80 to DN250. Various options are also available so that the customer can keep a high degree of modularity on the selected Opticube Field.



The Opticube Field concept starts around a 40 foot double door container (one on each side). It is then modified and equipped in the workshop to meet the needs of the customer. This way, the container is transformed into a real heating room. But before describing the hydraulics of the installation, it is important to review the equipment that is not directly part of the process but that also has all its importance in a boiler room.

► Insulation of the container

The containers are insulated to avoid condensation inside and to help maintain a frost-free environment in winter. That's why the container is completely insulated. The walls and ceilings are insulated from the inside with 4 cm thick PUR iso sheets and the floor is foamed from underneath.



► Insulation of the piping

In order to minimize heat losses, the pipes are insulated with rockwool and protected by PVC shells. The insulation in place is class 4 and complies with EN 12828. Finishes on the end caps are made with aluminum shells. The valves and other organs are insulated with tailor-made hulls.

► Temperature management

Given the insulation in place and the heat sources, there is a risk for the electrical equipment to heat up inside the container. In case of frost, it is also necessary to protect the pipes from freezing. For these purposes, Opticubes Field are equipped with ventilation grills, a fan and an electrical radiator.



► Connection

In order to avoid the presence of pipes exposed to the open air, the connections to the Opticube are made via an opening in the floor of the container. The buried pipes just have to come out and connect directly to the fitting provided. Once the connection is established, the hole must be insulated and the opening closed to avoid any animal or plant incursion that could harm the equipment.

Maintenance assistance

The Opticube is designed to facilitate the implementation of a project by delivering a turnkey heating room. But the Opticube also aims to facilitate the maintenance of the installation. For this purpose, different elements are put in place. First, the equipment is set in a way that they can all be removed separately without having to dismantle other equipment pieces. To move heavy equipment, some hooks are provided on the ceiling so that it can be lifted by means of a hoist and placed on a carriage or truck.

A good marking is established for a quick and straightforward understanding of the hydraulic and electrical system. It makes it easy to locate the different components (probes, measuring instruments, etc.), as well as the direction of the pipes and their role, the elements of the electrical box and their correspondence as well as the junction boxes.



Electricity

At the electrical level, all the equipment is connected and the power supplies and measurement signals are brought to a box via cable trays or PVC sheaths. To connect the PLC automat through that box, just plug it to the terminal blocks. Note that the PLC is not included in the supply.

The different equipment and metal parts must be connected back to the ground. An earth rail is delivered in the container and must be sunk to the ground and connected to the general earth terminal of the container.

Heat exchanger

In general, the solar circuit is filled with glycolated water and pressurized. To avoid excessive volumes of glycol and to isolate the solar circuit, the use of a heat exchanger is necessary. Standard exchangers are soldered stainless steel plate exchangers. For large installations, an exchanger battery is installed to guarantee a maximum of 5°C pinch. On request we can also provide removable plate heat exchanger with seal.



Pumping groups

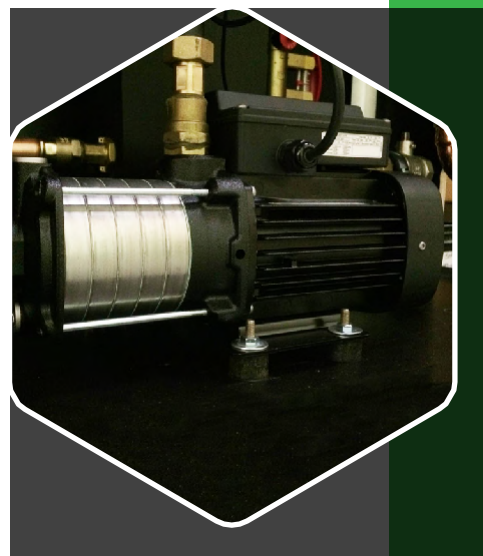
On both sides of the heat exchanger, liquids must circulate in order to transfer heat efficiently. Each pumping unit is equipped with a filter, shut-off valves to allow isolation of the filters and variable flow pumps to optimize energy production.



Filling kit

During commissioning, the entire solar network must be filled with coolant that is also frost-resistant. The Opticube Field is therefore equipped with a pumping unit that can fill the network from the Overtank. This pumping kit is also used to pump back the fluid into to the network in case it has been previously evacuated to the Overtank through the safety valves due to overheating.

Kits are provided in DN50 for filling.



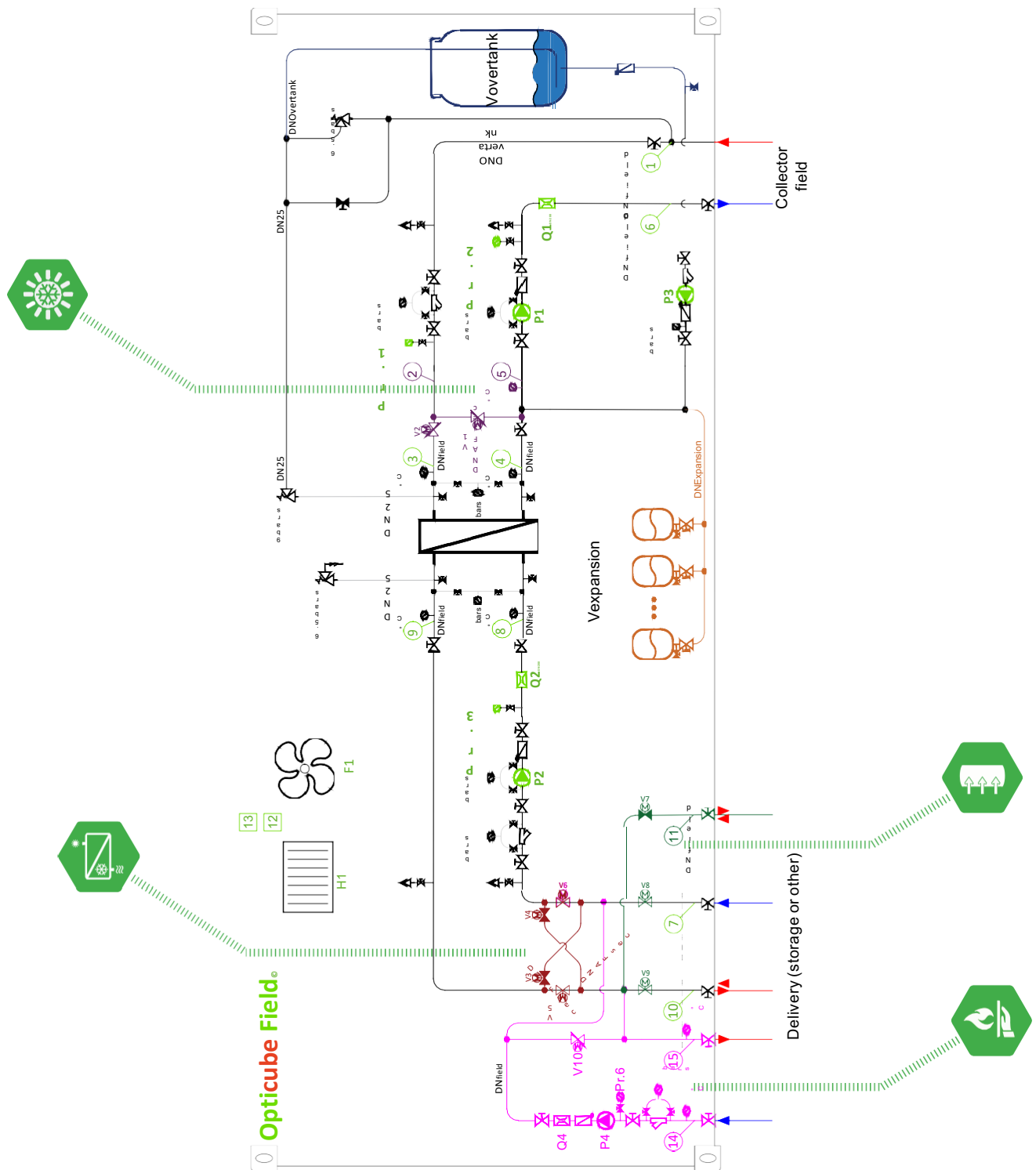
Measuring instruments

To regulate the installation and ensure its real-time operation, various measuring devices are installed on the network. For temperature, PT1000 probes are placed in thermowells, pressure is transmitted by means of electronic pressure sensors and flow rate is measured by impulse flow meters. For more convenience inside the container, manometers and thermometers are also installed at key locations.



OPTICUBE FIELD-OPTIONS

Below, the hydraulic diagram shows the basic Opticube Field completed with the various options available. For a better understanding, they have been put in color, and they are described one by one on next page.





SOLAR ANTIFREEZE

In freezing weather, the temperature of the solar liquid may drop below 0°C. Depending on the anti-freeze concentration, the solar liquid has a solidification point below 0°C. The solar Antifreeze option avoids reaching this solidification point. The option works in two phases. Initially, the solar pump (P1) makes the liquid circulate in the network to warm the collector field by fetching heat in the buried network portion. This heat comes from the losses that occurred during the last phases of production. Circulating the network also prevents stagnation in the pipes which is more conducive to the formation of ice caps. The liquid returning to the Opticube Field may potentially have a temperature below 0°C. It would therefore be dangerous to pass it through the exchanger, which contains water that solidifies at 0°C. The Antifreeze option therefore allows the bypass of the exchanger during this first phase.

If the cold persists, a heat source must take over. By reversing the direction of the secondary network piping (see Secondary Antifreeze) and switching on the secondary pump (P2), the secondary network provides heat to the exchanger, which can now transfer it to the solar network. The control valves (V1 and V2) make it possible to control the initial temperature of the fluid that goes to the collector field. The pipe size for this option is smaller than the main pipe. Indeed, it is not necessary to circulate the liquid at the maximum flow. If even so, the maximum flow is required, the fluid velocity will be greater in the «antifreeze» part, but this scenario will not occur often.



SECONDARY ANTIFREEZE

In brown, on the secondary side (to the left of the exchanger), there is a double bypass with valves that can reverse the flow and thus circulate the circuit the other way around. This ensures that we have a source hot enough to heat the solar fluid in time of persistent gel. This option is complementary to the solar antifreeze option. Regarding piping sizes, same thing applies as for the solar antifreeze option.

Opticube field size: DN...	80	100	125	150	200	250	300
Antifreeze pipe size: DN...	40	50	60	80	100	125	150



STRATIFICATION

The stratification option is in dark green on the hydraulic diagram. This option adds a connection making it possible to stratify the storage volume according to its own temperature and the temperature from the departure of the exchanger.



DELIVERY

The delivery option adds a pumping group which will be connected to a district heating network or another process depending on the application. The goal is to deliver the produced heat to a consumer. Depending on the degree of sunshine, this heat can come directly from the solar network or the storage tank. The Delivery option can be placed in the basic container up to the DN200. Above that, it will be installed in an additional container.

OPTICUBE FIELD PHILOSOPHY

Various Opticubes Fields are available according to their options and sizes, but one important point is how to manage expansion. Thus, during the heating of the collector field, the solar liquid expands and the pressure of the system tends to rise and is taken up by expansion vessels. When the liquid overheats, it vaporizes which suddenly creates an increase in volume and therefore also in pressure in the closed system. There are then two ways to manage this overpressure.



«LIQUID» PHILOSOPHY

The expansion volume is only able to manage the expansion of the solar liquid. The passage to steam is taken care of by the safety valve that evacuates the excess pressure to the overtank whose volume must thus be more consequent. To restart the system, it is necessary to have a technician that will pump back the discharged fluid towards the solar network using the filling pump (P3).



«STEAM» PHILOSOPHY

The expansion volume allows both the expansion of the liquid and of the passage of steam of the liquid in the whole system (volume of the collector field as well as the hot pipes). The expansion volume must thus be larger and the Overtank may be smaller. When cooling down, the evaporated solar fluid condenses and the pressure drops. The vases push back the liquid into the network. The intervention of a technician is not necessary. This technique requires a preemptive vase before the expansion vessels in order to avoid contact between high temperature liquid and the expansion vessels' membrane.

In order to optimize the Opticubes' groundspace, the expansions tanks and Overtank are placed in the Opticube Field if possible. If there is not enough space, the Overtanks are then external tanks while the expansion role is taken over by the Opticube Expansion. The latter is a 20' or 40' container which contains expansion vessels and if necessary prevases.

Subsequently, we present the full available range of Opticubes Field. The main features of standard sizing are displayed. The second column shows the maximum allowable values for each size.

OPTICUBE FIELD-FULL RANGE



«LIQUID» PHILOSOPHY

- ✓ Dn80 (800 to 1.500 m²)
- ✓ Dn100 (1.500 to 3.000 m²)
- ✓ Dn125 (3.000 to 5.000 m²)
- ✓ Dn150 (5.000 to 7.250 m²)
- ✓ Dn200 (7.250 to 13.000 m²)
- ✓ Dn250 (13.000 to 20.000 m²)
- ✓ Dn300 (20.000 to 30.000 m²)

OPTICUBE FIELD - Dn80

>> FROM 800 TO 1.500 m²

AVAILABLE OPTIONS:



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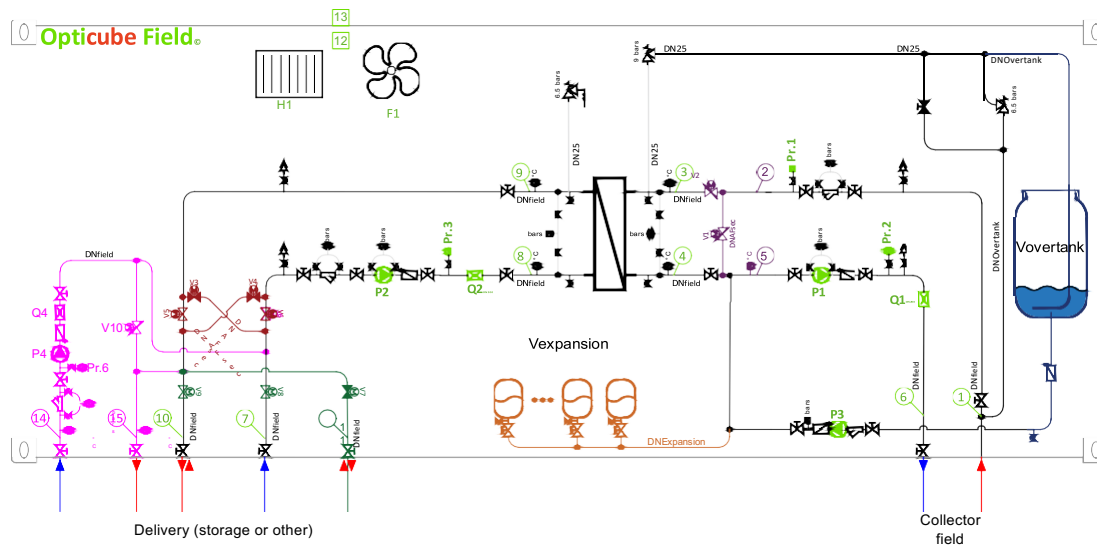


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Standard sizing
Up to...



DN100 Liquid	Standard sizing	...	Up to
Collector area	1.220 m ²		1.500 m ²
Solar and secondary flow	26,2 m ³ /h		32,6 m ³ /h
Fluid speed	1,45 m/s		1,8 m/s
Exchange power	919 kW		1.140 kW
DTlog heat exchanger	5°K		5°K
Expansion Volume	600 liters		3.000 liters
Overtank Volume	3.000 liters		6.000 liters
Dimensions	Base = 40'container	► Ref. I 13001	Base = 40'container ► Ref. I 13002

OPTICUBE FIELD - Dn100

>> FROM 1.500 TO 3.000 m²

AVAILABLE OPTIONS:



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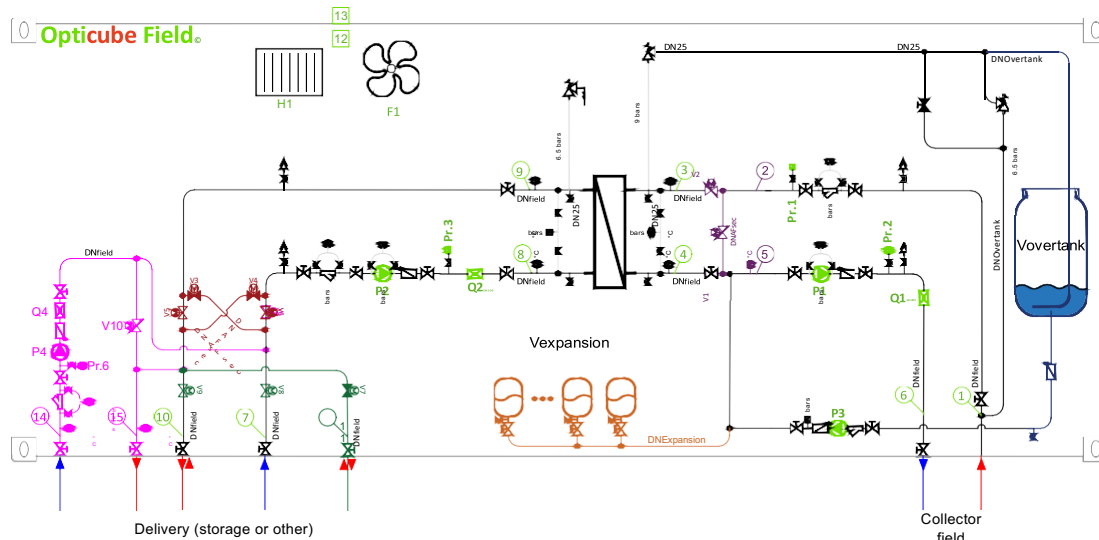


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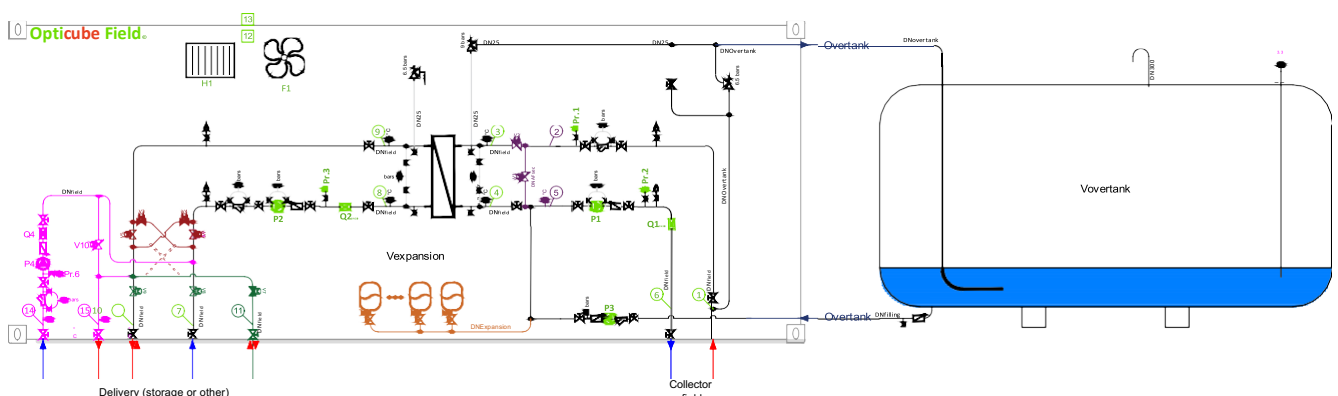
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Standard sizing



DN100 Liquid	Standard sizing	... Up to
Collector area	2.250 m ²	2.770 m ²
Solar and secondary flow	48,1 m ³ /h	59,4 m ³ /h
Fluid speed	1,7 m/s	2,1 m/s
Exchange power	1.683 kW	2.078 kW
DTlog heat exchanger	5°K	5°K
Expansion Volume	1.000 liters	5.000 liters
Overtank Volume	6.000 liters	10.000 liters (external Overtank)
		Base = 40' container
Dimensions	Base = 40' container	Overtank 10 m ³
	Ref. I13003	Ref. I13004
		Ref. I13058

Up to...





OPTICUBE FIELD - Dn125

>> FROM 3.000 TO 5.000 m²

AVAILABLE OPTIONS:



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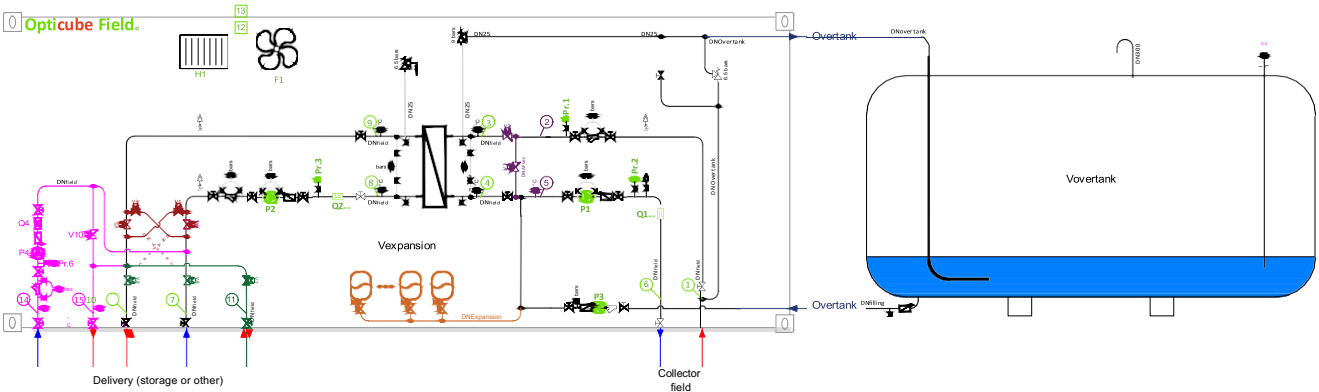


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Standard sizing
Up to...



DN125 Liquid	Standard sizing		... Up to	
Collector area	4.125 m ²		5.000 m ²	
Solar and secondary flow	88,4 m ³ /h		106,0 m ³ /h	
Fluid speed	2 m/s		2,4 m/s	
Exchange power	3.093 kW		3.711 kW	
DTlog heat exchanger	5°K		5°K	
Expansion Volume	2.000 liters		5.000 liters	
Overtank Volume	20 m ³ (external Overtank)		40 m ³ (external Overtank)	
Dimensions	Base = 40' container	➤ Ref. 113005	Base = 40' container	➤ Ref. 113006
	Overtank 20 m ³	➤ Ref. 113059	Overtank 40 m ³	➤ Ref. 113060

OPTICUBE FIELD - Dn150

>> FROM 5.000 TO 7.250 m²

AVAILABLE OPTIONS:



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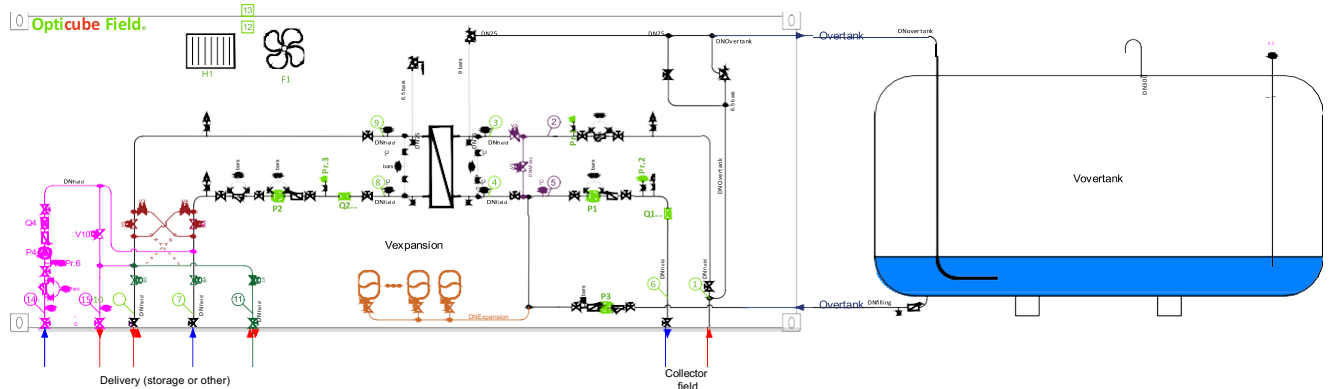


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Standard sizing



DN150 Liquid	Standard sizing	... Up to
Collector area	5.950 m ²	7.125 m ²
Solar and secondary flow	127,2 m ³ /h	152,7 m ³ /h
Fluid speed	2 m/s	2,4 m/s
Exchange power	4.453 kW	5.344 kW
DTlog heat exchanger	5°K	5°K
Expansion Volume	3.000 liters	5.600 liters (external Opticube Expansion)
Overtank Volume	20 m ³ (external Overtank)	40 m ³ (external Overtank)
Dimensions	Base = 40' container	I Base = 40' container
	Overtank 20 m ³	Expansion = 20' container
		Overtank 40 m ³



Ref. I13007

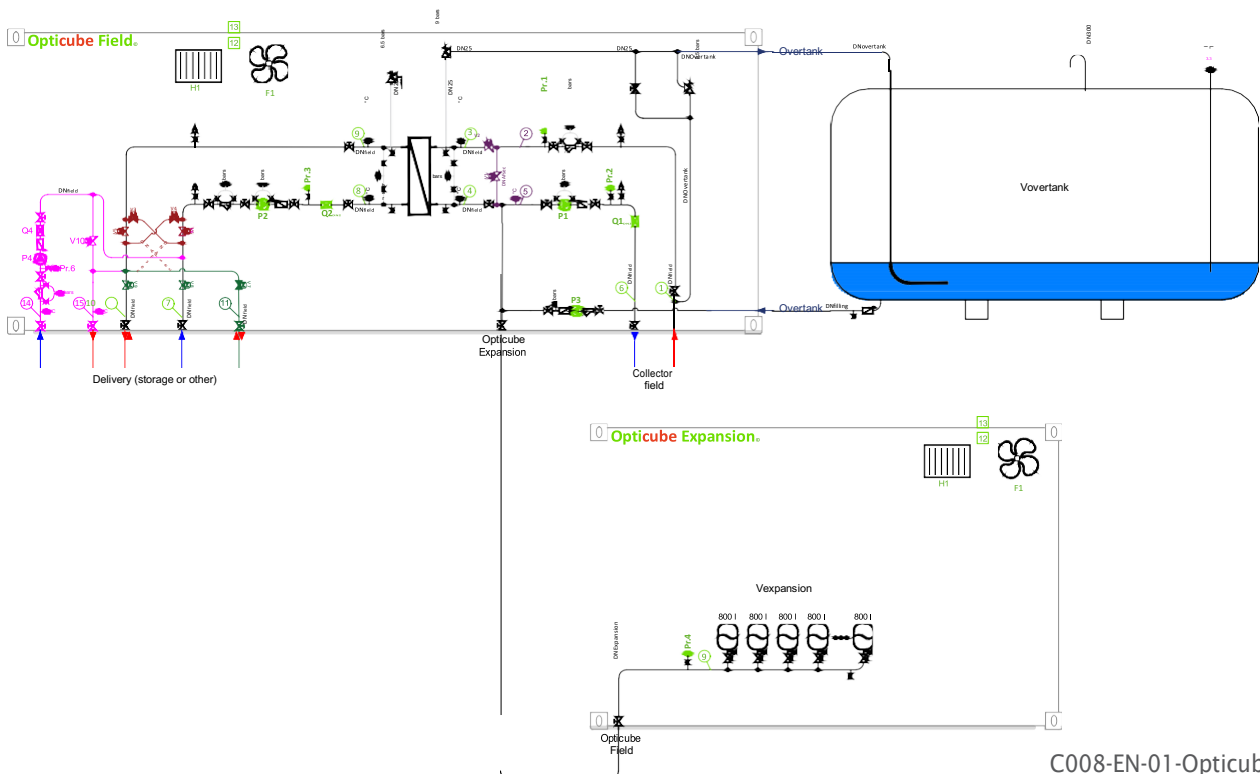
Ref. I13059

Ref. I13008

Ref. I13065

Ref. I13060

Up to...





OPTICUBE FIELD-Dn200

>> FROM 7.000 TO 13.000 m²

AVAILABLE OPTIONS:



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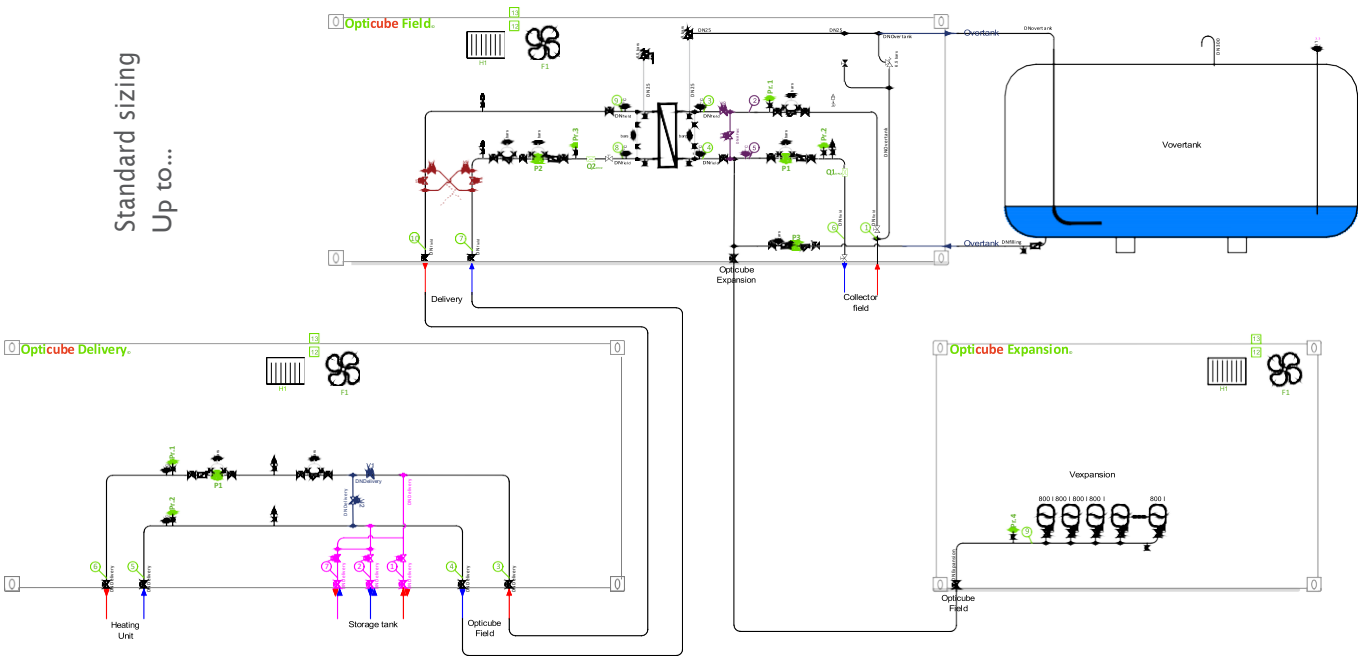


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*The stratification option is available for the DN200 Opticube Field as 113045. If the client installs an Opticube Delivery in addition, the stratification option will be set up in the delivery container and becomes reference n° 113047.



DN200 Liquid	Standard sizing		... Up to	
Collector area	10.556 m ²		12.750 m ²	
Solar and secondary flow (m ³ /h)	226,2 m ³ /h		271,4 m ³ /h	
Fluid speed (m/s)	2 m/s		2,4 m/s	
Exchange power (kW)	7.916 kW		9.500 kW	
DTlog heat exchanger (°C)	5°K		5°K	
Expansion Volume (liters)	4.000 litters (external Opticube Expansion)		6.400 liters (external Opticube Expansion)	
Overtank Volume (liters)	40 m ³ (external Overtank)		65 m ³ (external Overtank)	
Dimensions	Base = 40' container	➤ Ref. 113009	Base = 40' container	➤ Ref. 113010
	Delivery = 40' container	➤ Ref. 113046	Delivery = 40' container	➤ Ref. 113046
	Expansion = 20' container	➤ Ref. 113063	Expansion = 20' container	➤ Ref. 113066
	Overtank 40 m ³	➤ Ref. 113060	Overtank 65 m ³	➤ Ref. 113061

OPTICUBE FIELD-Dn250

>> FROM 13.000 TO 20.000 m²

AVAILABLE OPTIONS:



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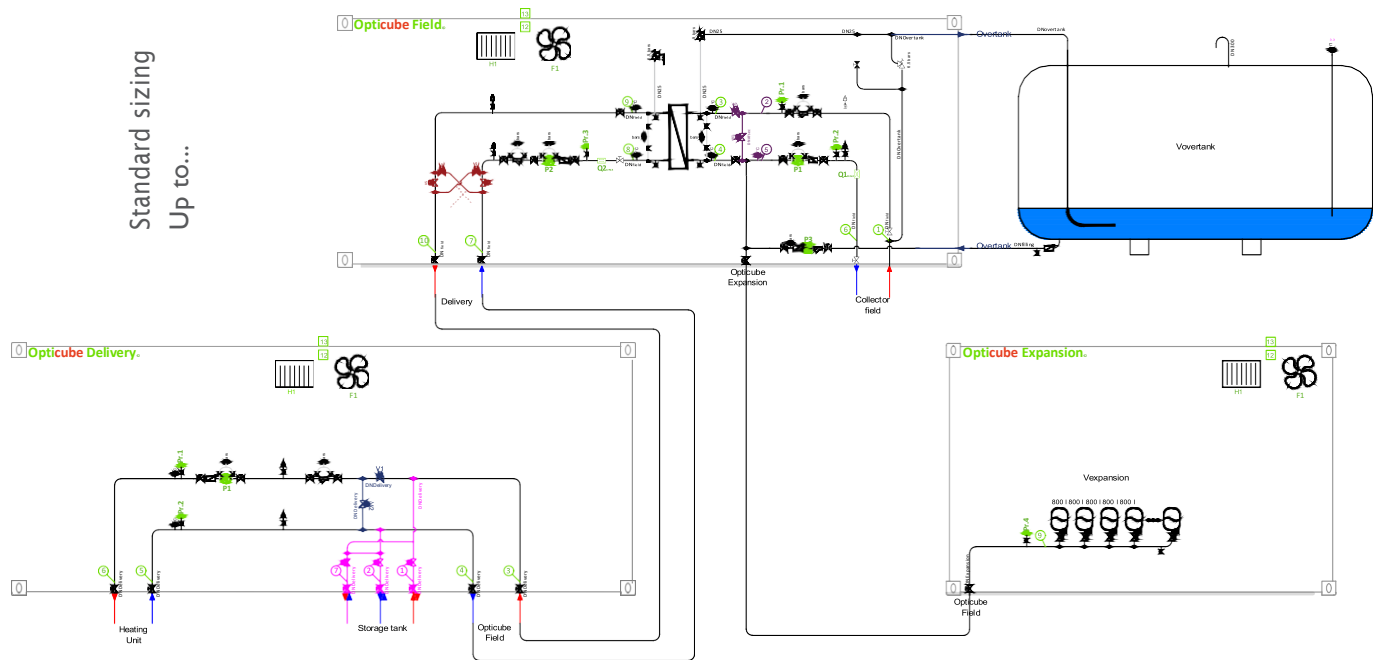


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*The stratification option is available for the DN250 Opticube Field as 113050. If the client installs an Opticube Delivery in addition, the stratification option will be set up in the delivery container and becomes reference n° 113052.



DN250 Liquid	Standard sizing		... Up to	
Collector area	16.500 m ²		19.800 m ²	
Solar and secondary flow	353,5 m ³ /h		424,1 m ³ /h	
Fluid speed	2 m/s		2,4 m/s	
Exchange power	12.370 kW		14.844 kW	
DTlog heat exchanger	5°K		5°K	
Expansion Volume	8.000 liters(external Opticube Expansion)		11,2 m ³ (external Opticube Expansion)	
Overtank Volume	65 m ³ (external Overtank)		100 m ³ (external Overtank)	
Dimensions	Base = 40' container	➤ Ref. 113011	Base = 40' container	➤ Ref. 113012
	Delivery = 40' container	➤ Ref. 113051	Delivery = 40' container	➤ Ref. 113051
	Expansion = 20' container	➤ Ref. 113068	Expansion = 20' container	➤ Ref. 113072
	Overtank 65 m ³	➤ Ref. 113061	Overtank 100 m ³	➤ Ref. 113062



OPTICUBE FIELD-Dn300

>> FROM 20.000 TO 30.000 m²

AVAILABLE OPTIONS:



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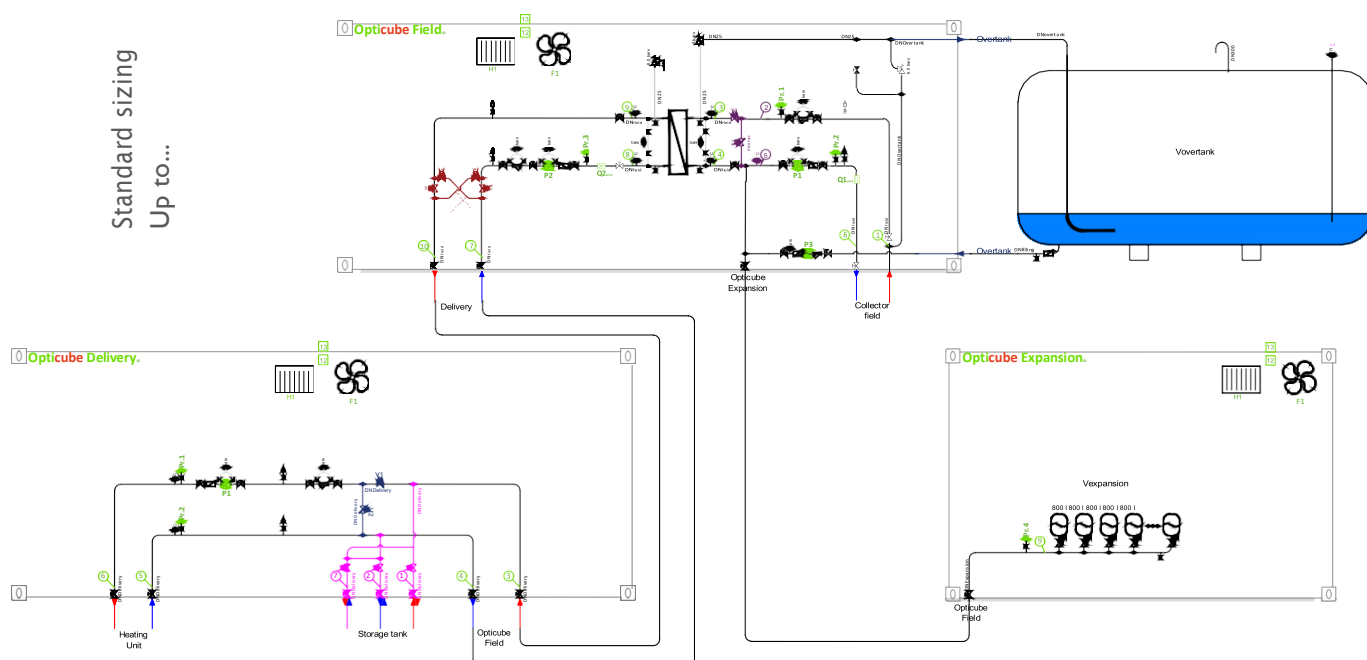
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*The stratification option is available for the DN300 Opticube Field as 113055. If the client installs an Opticube Delivery in addition, the stratification option will be set up in the delivery container and becomes reference n° 113057.

Standard sizing
Up to ...



DN300 Liquid	Standard sizing		... Up to	
Collector area	23.750 m ²		29.700 m ²	
Solar and secondary flow	508,9 m ³ /h		636,2 m ³ /h	
Fluid speed	2 m/s		2,4 m/s	
Exchange power	17.812 kW		22.266 kW	
DTlog heat exchanger	5°K		5°K	
Expansion Volume	8.800 liters (external OpticubeExpansion)		16m ³ (external Opticube Expansion)	
Overtank Volume	65 m ³ (external Overtank)		100 m ³ (external Overtank)	
Dimensions	Base = 40' container	► Ref. 113013	Base = 40' container	► Ref. 113014
	Delivery = 40' container	► Ref. 113056	Delivery = 40' container	► Ref. 113056
	Expansion = 20' container	► Ref. 113069	Expansion = 40' container	► Ref. 113078
	Overtank 65 m ³	► Ref. 113061	Overtank 110 m ³	► Ref. 113062

OPTICUBE FIELD-FULL RANGE



«STEAM» PHILOSOPHY

- ✓ Dn80 (800 to 1.500 m²)
- ✓ Dn100 (1.500 to 3.000 m²)
- ✓ Dn125 (3.000 to 5.000 m²)
- ✓ Dn150 (5.000 to 7.250 m²)
- ✓ Dn200 (7.250 to 13.000 m²)
- ✓ Dn250 (13.000 to 20.000 m²)



OPTICUBE FIELD - Dn80

>> FROM 800 TO 1.500 m²

AVAILABLE OPTIONS:



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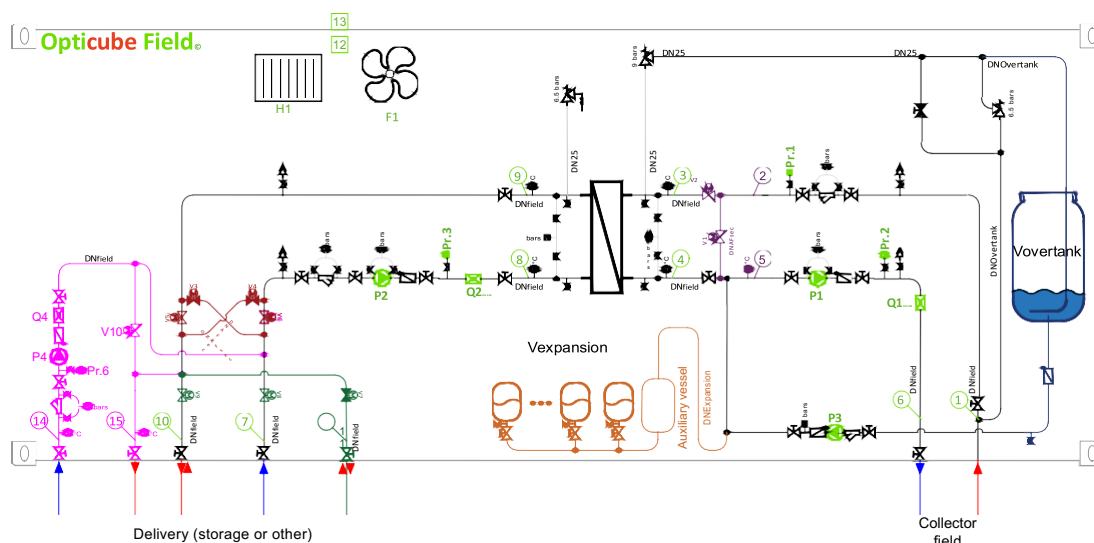


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Standard sizing
Up to...



DN80 Steam	Standard sizing	... Up to
Collector area	1.220 m ²	1.500 m ²
Solar and secondary flow	26,2 m ³ /h	32,6 m ³ /h
Fluid speed	1,45 m/s	1,8 m/s
Exchange power	919 kW	1.140 kW
DTlog heat exchanger	5°K	5°K
Auxiliary vessel volume	1.000 liters	1.500 liters
Expansion Volume	2.000 liters	5.000 liters
Overtank Volume	1.500 liters	3.000 liters
Dimensions	Base = 40'container	Base = 40'container

► Ref. I 13015

► Ref. I 13016

OPTICUBE FIELD - Dn100

>> FROM 1.500 TO 3.000 m²

AVAILABLE OPTIONS:



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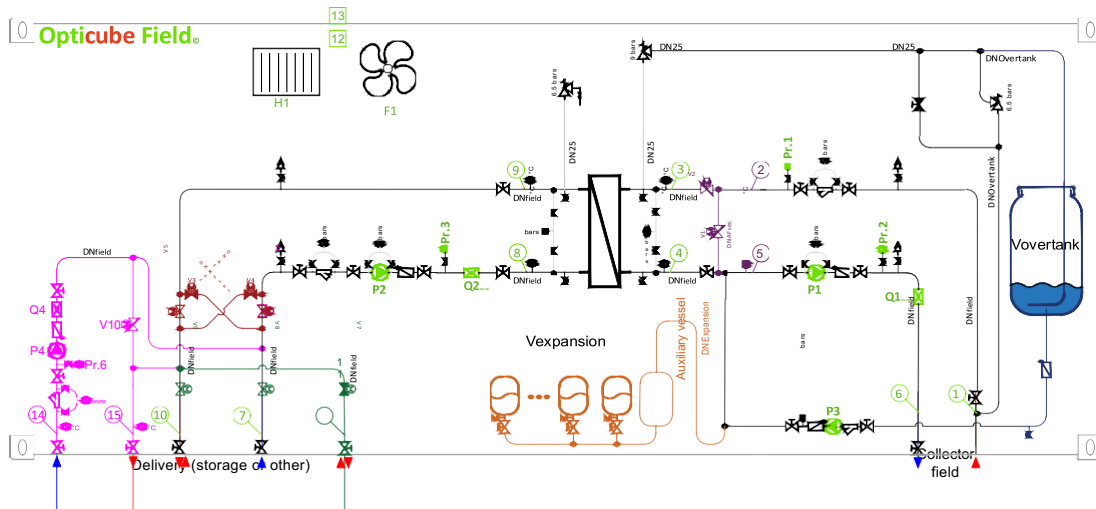


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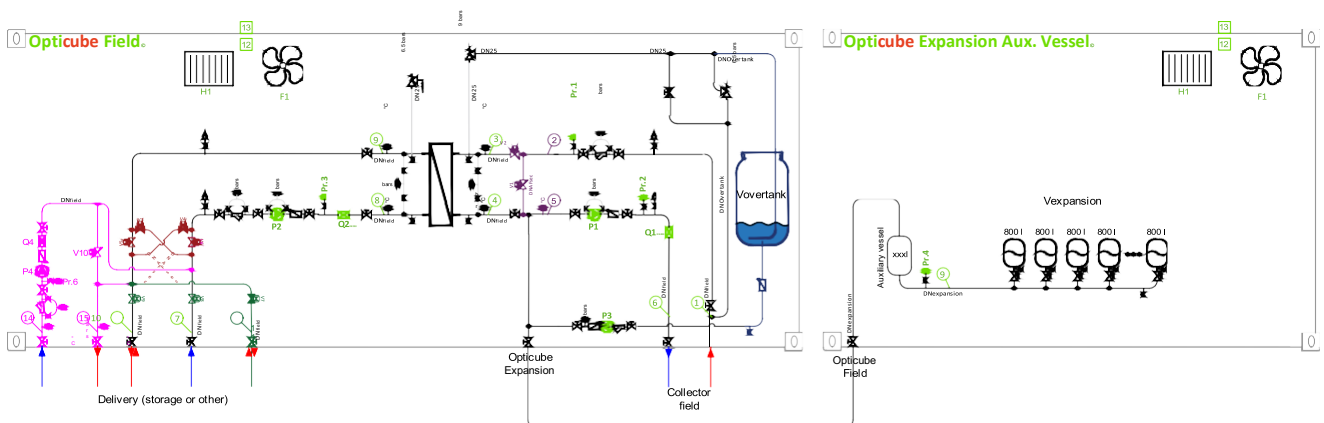
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Standard sizing



DN100 Steam	Standard sizing	... Up to
Collector area	2.250 m ²	2.770 m ²
Solar and secondary flow	48,1 m ³ /h	59,4 m ³ /h
Fluid speed	1,7 m/s	2,1 m/s
Exchange power	1.683 kW	2.078 kW
DTlog heat exchanger	5°K	5°K
Auxiliary vessel volume	2.000 liters	3.000 liters (external Opticube Expansion)
Expansion Volume	4.000 liters	8.000 liters (external Opticube Expansion)
Overtank Volume	2.000 liters	6.000 liters
		Base = 40' container
Dimensions	Base = 40' container	Expansion = 20' container
	Ref. 113017	Ref. 113018
		Ref. 113090

Up to...



OPTICUBE FIELD - Dn150

>> FROM 5.000 TO 7.250 m²

AVAILABLE OPTIONS:



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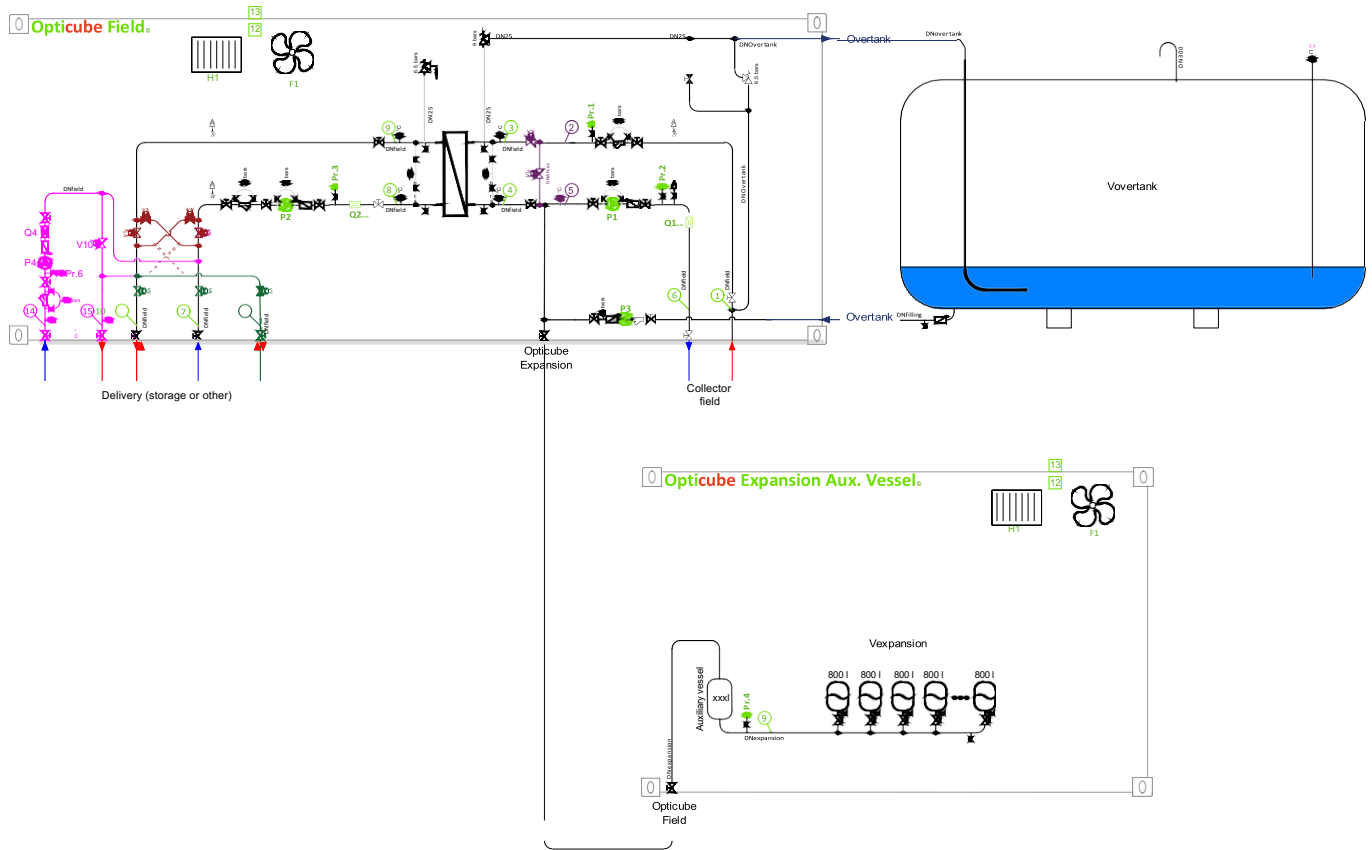


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Standard sizing
Up to...



DNI50 Steam	Standard sizing		... Up to	
Collector area	5.950 m ²		7.125 m ²	
Solar and secondary flow	127,2 m ³ /h		152,7 m ³ /h	
Fluid speed	2 m/s		2,4 m/s	
Exchange power	4.453 kW		5.344 kW	
DTlog heat exchanger	5°K		5°K	
Auxiliary vessel volume	4.000 liters (external Opticube Expansion)		9.000 liters (external Opticube Expansion)	
Expansion Volume	10,4 m ³ (external Opticube Expansion)		16 m ³ (external Opticube Expansion)	
Overtank Volume	10 m ³ (external Overtank)		20 m ³ (external Overtank)	
Dimensions	Base = 40' container	➤ Ref. 113021	Base = 40' container	➤ Ref. 113022
	Expansion = 40' container	➤ Ref. 113091	Expansion = 40' container	➤ Ref. 113094
	Overtank 10 m ³	➤ Ref. 113058	Overtank 20 m ³	➤ Ref. 113059



OPTICUBE FIELD-Dn200

>> FROM 7.000 TO 13.000 m²

AVAILABLE OPTIONS:



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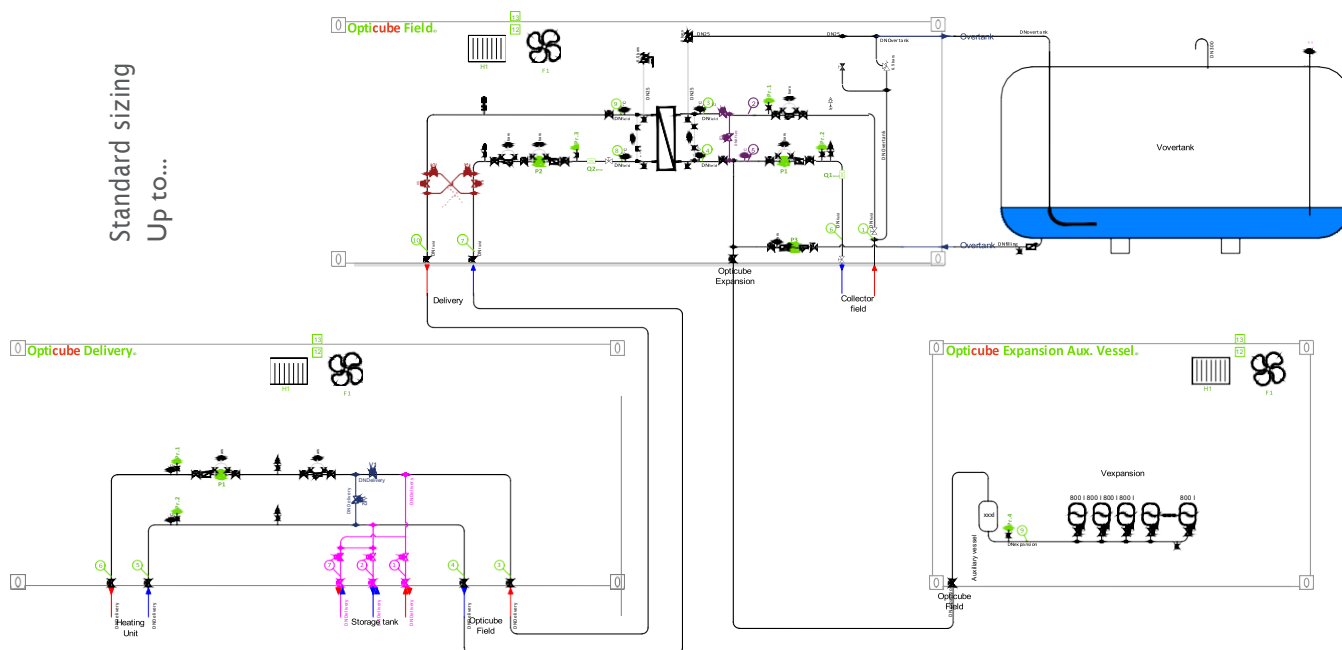
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*The stratification option is available for the DN200 Opticube Field as 113045. If the client installs an Opticube Delivery in addition, the stratification option will be set up in the delivery container and becomes reference n° 113047.

Standard sizing
Up to...



DN200 Steam	Standard sizing	... Up to
Collector area	10.556 m ²	12.750 m ²
Solar and secondary flow	226,2 m ³ /h	271,4 m ³ /h
Fluid speed	2 m/s	2,4 m/s
Exchange power	7.916 kW	9.500 kW
DTlog heat exchanger	5°K	5°K
Auxiliary vessel volume	6.000 liters (external Opticube Expansion)	9.000 liters (external Opticube Expansion)
Expansion Volume	18 m ³ (external Opticube Expansion)	36 m ³ (external Opticube Expansion)
Overtank Volume	40 m ³ (external Overtank)	65 m ³ (external Overtank)
Dimensions	Base = 40' container	Base = 40' container
	Delivery = 40' container	Expansion = 40' container
	Expansion = 40' container	Delivery = 40' container
	Overtank 40 m ³	Expansion 24 m ³ = 40' container
		Overtank 65 m ³
	> Ref. 113023 > Ref. 113046 > Ref. 113093 Ref. 113060	> Ref. 113024 > > Ref. 113095 > Ref. 113046 > Ref. 113098 Ref. 11306



AVAILABLE OPTIONS:



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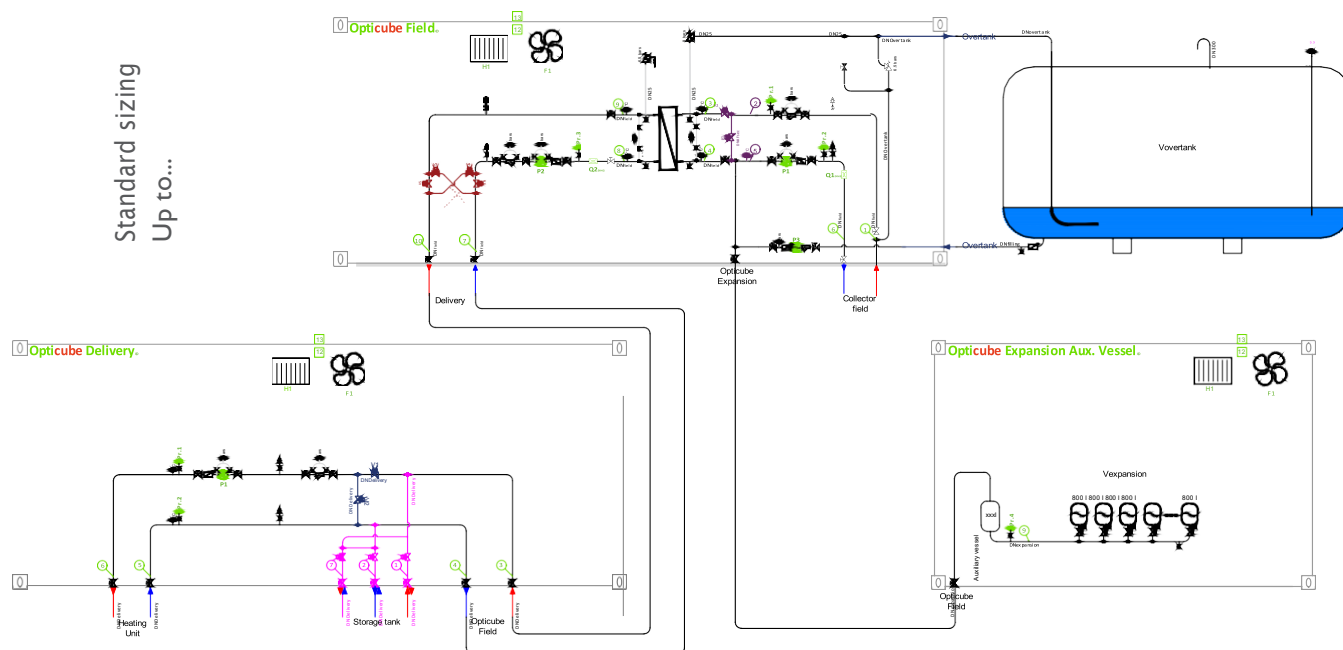


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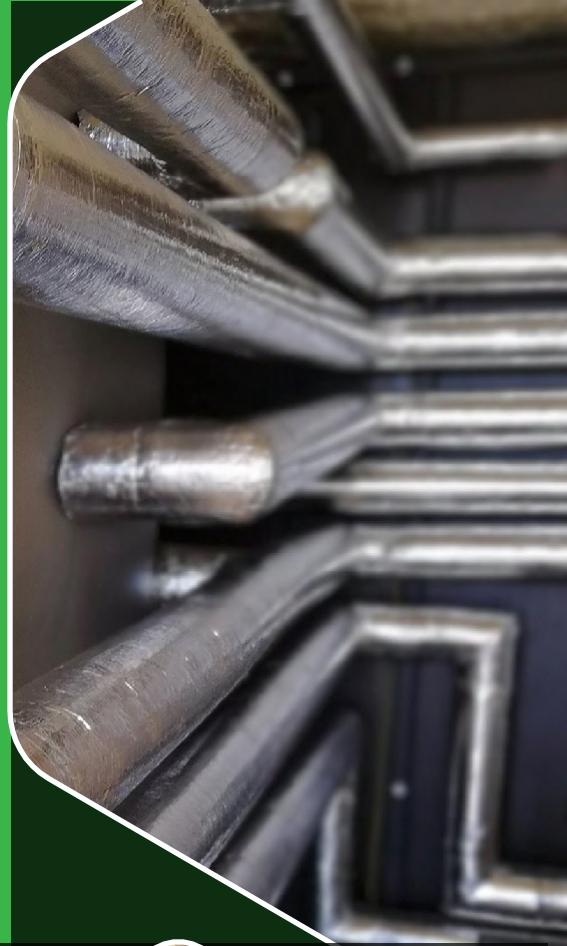
*The stratification option is available for the DN250 Opticube Field as 113050. If the client installs an Opticube Delivery in addition, the stratification option will be set up in the delivery container and becomes reference n° 113052.



DN250 Steam	Standard sizing	... Up to
Collector area	16.500 m ²	19.800 m ²
Solar and secondary flow	353,5 m ³ /h	424,1 m ³ /h
Fluid speed	2 m/s	2,4 m/s
Exchange power	12.370 kW	14.844 kW
DTlog heat exchanger	5°K	5°K
Auxiliary vessel volume	10 m ³ (external Opticube Expansion)	12 m ³ (external Opticube Expansion)
Expansion Volume	28 m ³ (external Opticube Expansion)	56 m ³ (external Opticube Expansion)
Overtank Volume	65 m ³ (external Overtank)	100 m ³ (external Overtank)
Dimensions	Base = 40' container	Base = 40' container
	Delivery = 40' container	Expansion = 40' container
	Expansion = 40' container	Delivery = 40' container
	Overtank 65 m ³	2 x Expansion 24 m ³ = 40' container
		Overtank 100 m ³
	> Ref. 113025 > Ref. 113051 > Ref. 113096 Ref. 113061	> Ref. 113026 > Ref. 113097 > Ref. 113051 > Ref. 113098 Ref. 113062

CONTACT US

We would like you to challenge us! Send your project to info@techniq-projects.nl and see what we can do for you !



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