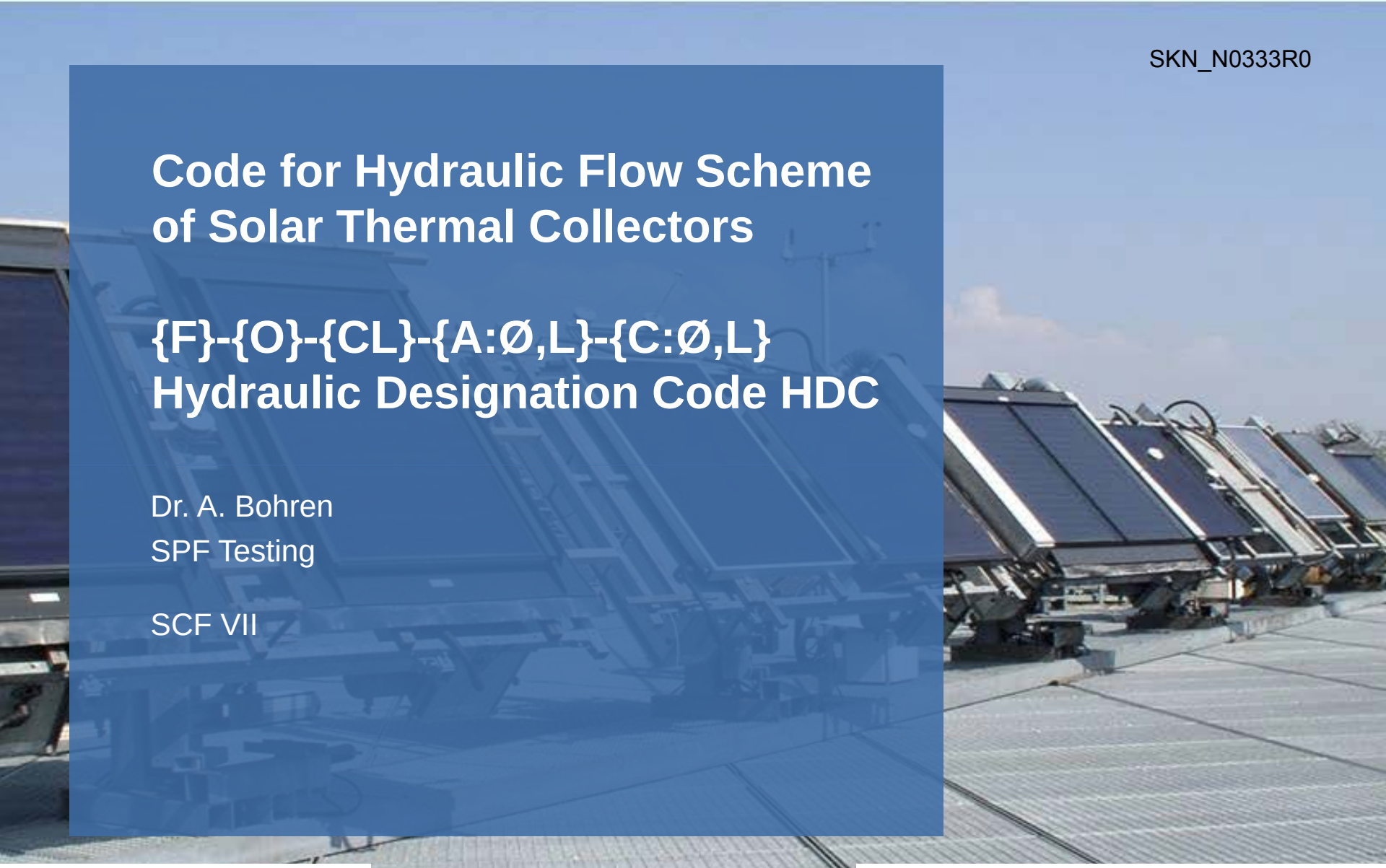
SKN_N0333R0

Code for Hydraulic Flow Scheme of Solar Thermal Collectors

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L} Hydraulic Designation Code HDC

Dr. A. Bohren
SPF Testing

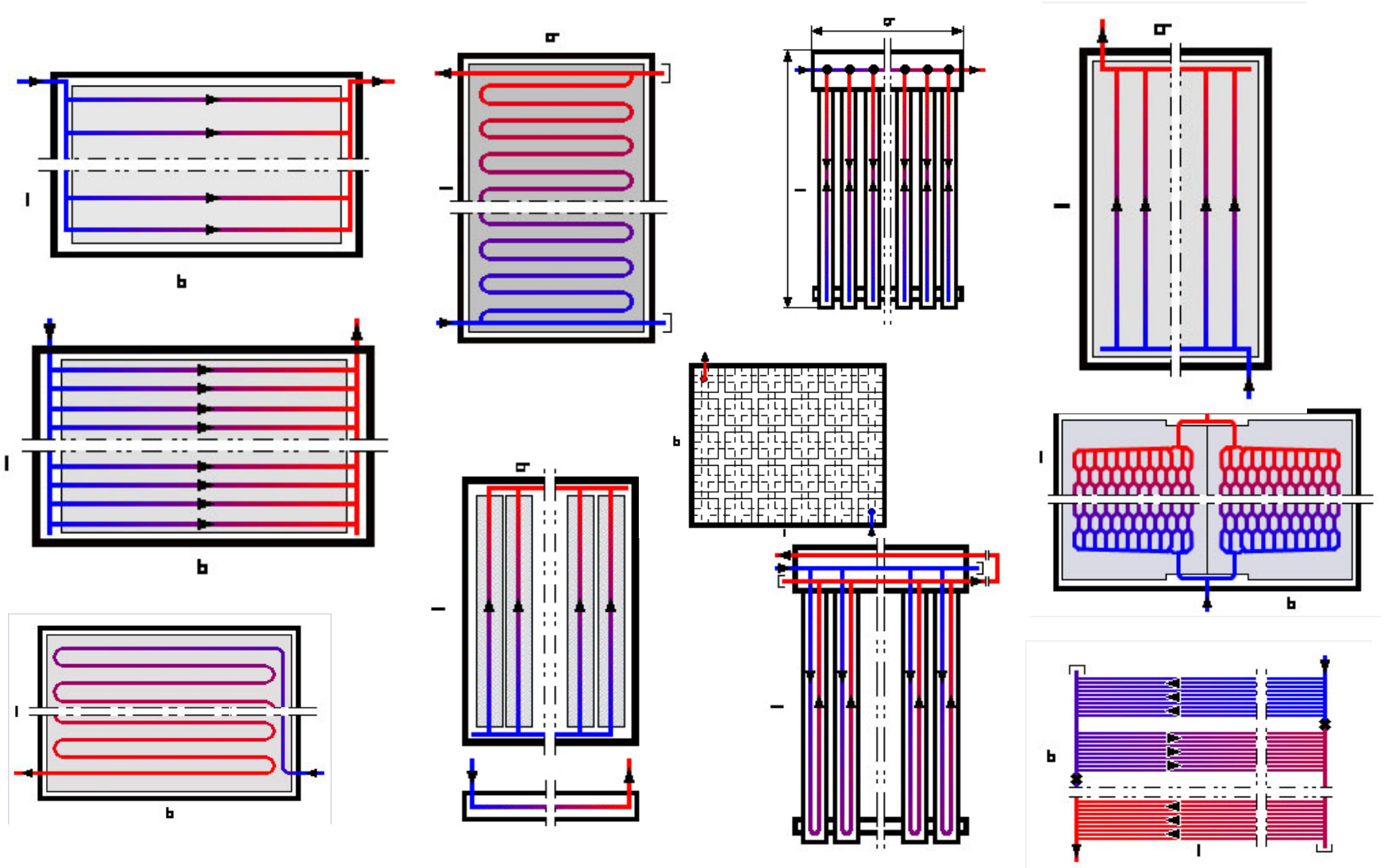
SCF VII



HSR
HOCHSCHULE FÜR TECHNIK
RAPPERSWIL
FHO Fachhochschule Ostschweiz

SPF
INSTITUT FÜR
SOLARTECHNIK

Flow schemes - and many more of course



Intention

- **Make available the following information in a unambiguous code**

  Hydraulic Configuration / Flow Scheme

  Length and inner diameter(s) of the absorber tubes
  Number of parallel absorber tubes

  Number of serial groups

  Length and Inner Diameter Header Tube

  Length/Innerdiameter of Connector/Compensato

WHY?
Important information for planners
Distinguish between hydraulically different collectors

Proposal

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

«Hydraulic Designation Code» HDC

{F} Hydraulic Flow Scheme Code (Definition)

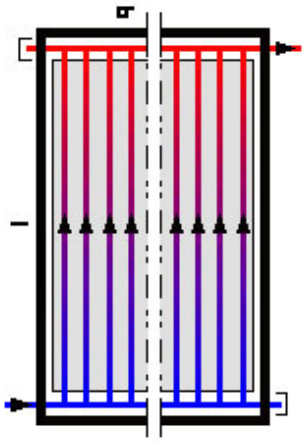
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

- **{F} Number of serial groups/Flowscheme, i.e. Absorber elements**
  N = N parallel tubes (N ≥ 1)
  1= Serpentine (usually)
  12=Harp with 12 tubes
  3,4,6 = Serial bundles of 3, 4 and 6 parallel tubes
  X = Any other flow scheme

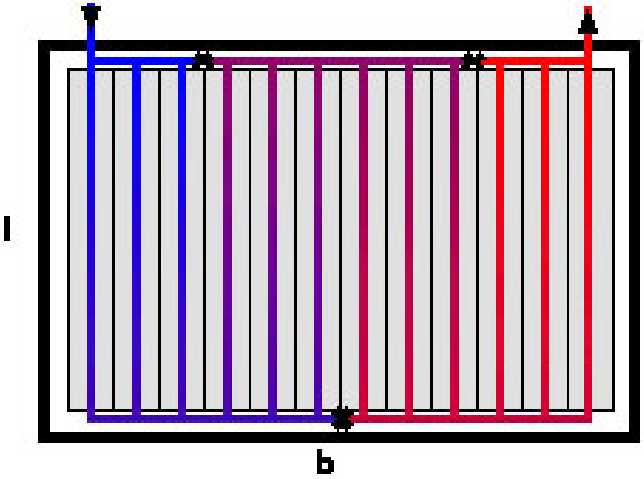
- **{F} is mandatory**

{F} Hydraulic Flow Scheme Code (Examples)

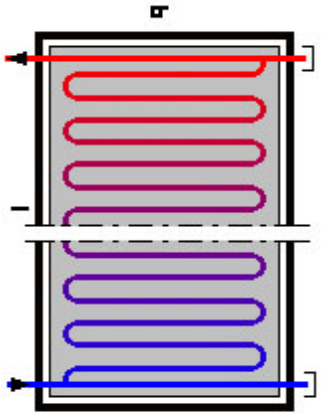
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{F} = 10



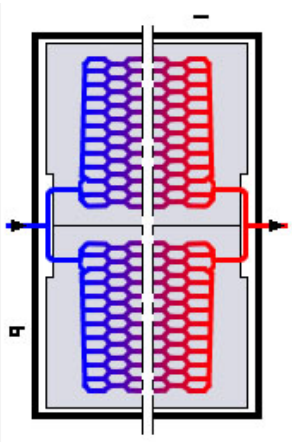
{F} = 3,3,3,3



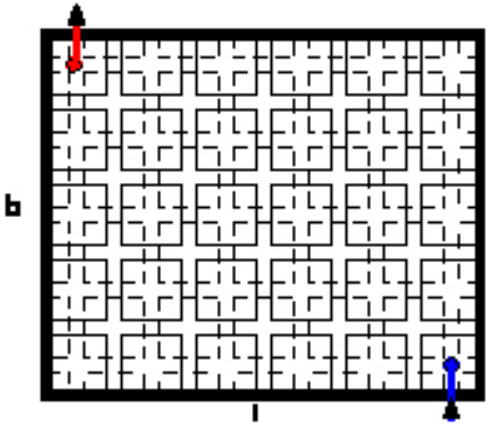
{F} = 1

{F} Hydraulic Flow Scheme Code (Examples)

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

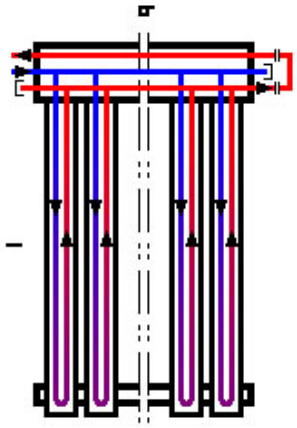


{F} = X



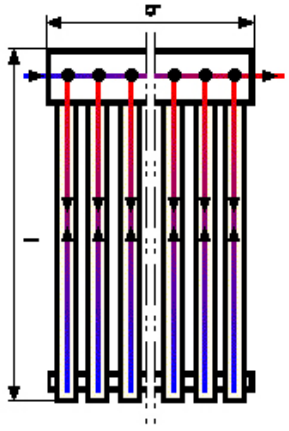
{F} = X

Direct flow



{F} = 8

Heatpipe



{F} = 1

{O} Orientation (Definition)

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

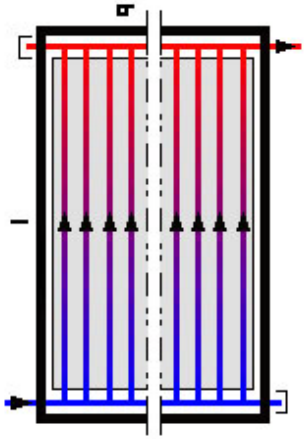
- **{O} Orientation of main flow* elements (as tested):**
  - **V = Vertical**
  - **H = Horizontal**
  - **VH = Tested as V, can be installed H as well**
  - **HV = Tested as H, can be installed V as well**
  - **X = Can not be described as V or H**

*** Flow of the hydraulic loop (in and outlet), Heatpipe is not “flow”**

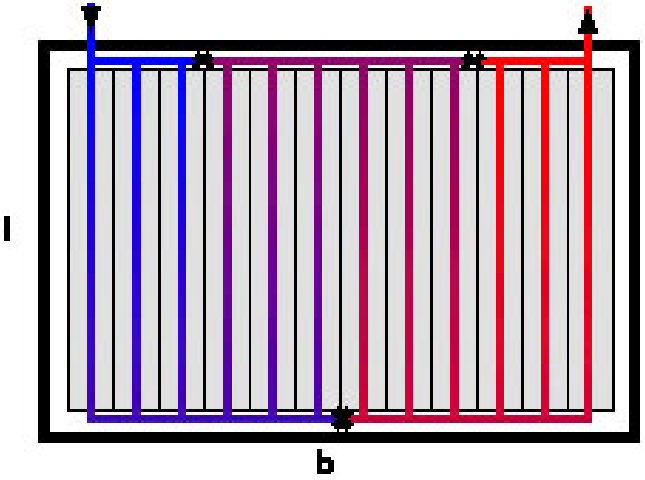
- **{O} is mandatory**

{O} Orientation (Examples)

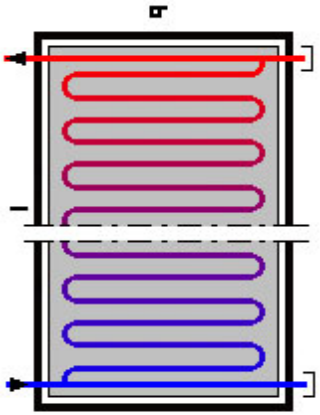
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{O} = VH



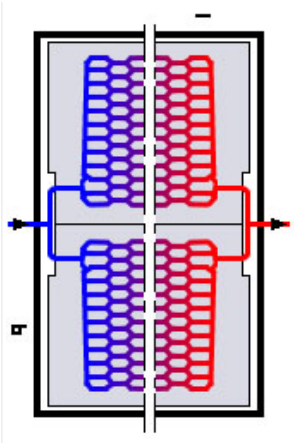
{O} = VH



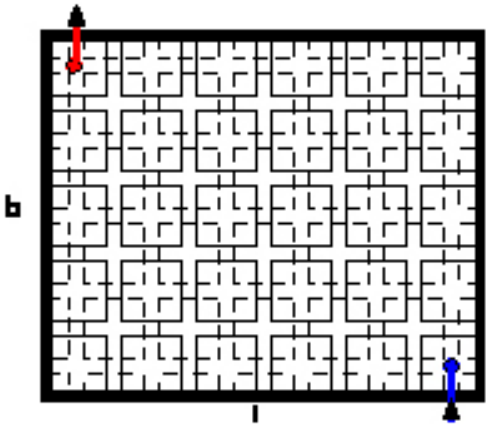
{O} = H

{O} Orientation (Examples)

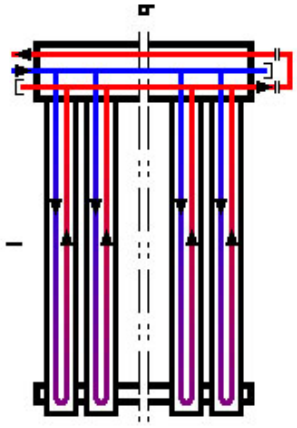
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



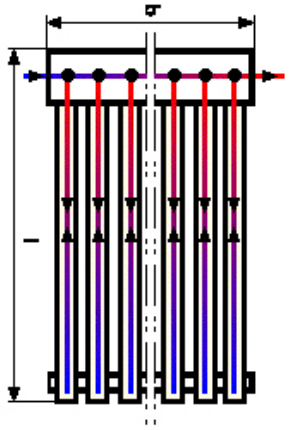
{O} = HV



{O} = X



{O} = VH



{O} = H

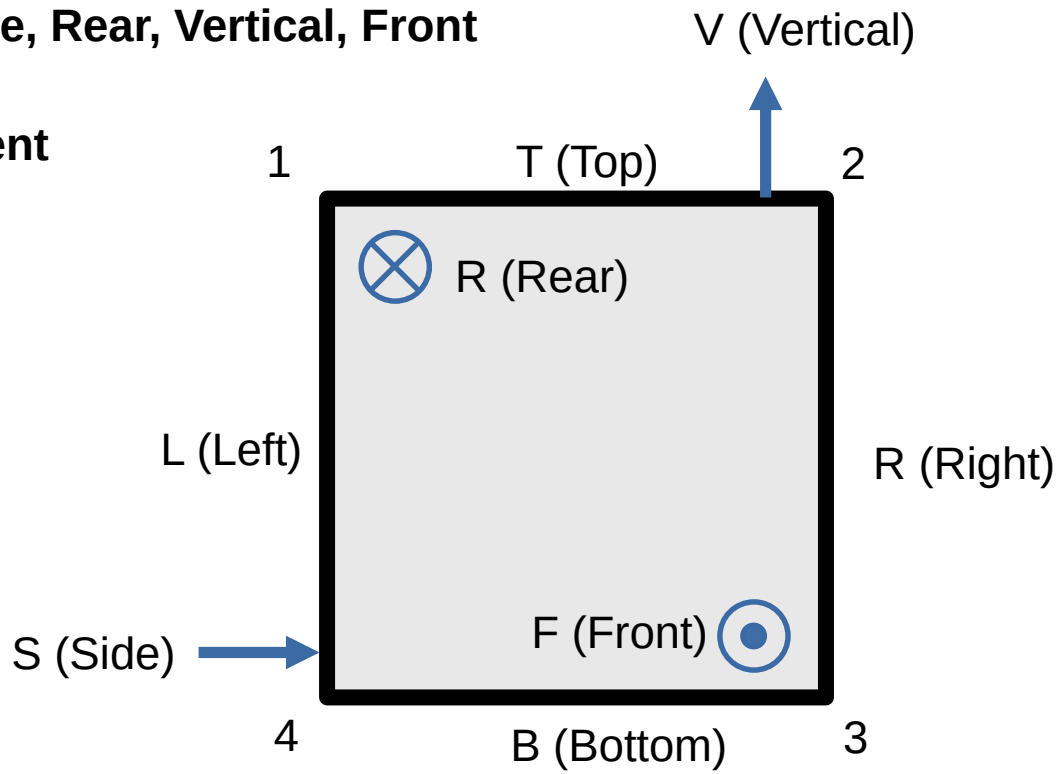
{CL} Connectors location and direction (Definition)

{T}-{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

- **{CL} Connector location and direction**
  1,2,3,4,T,R,B,L Top, Right, Bottom, Left
  S,R,V,F Side, Rear, Vertical, Front

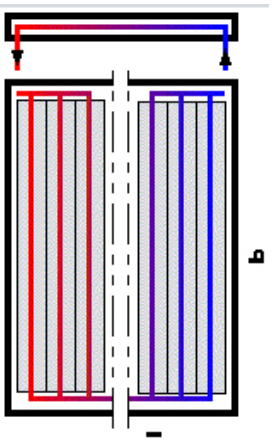
- **In the rare case of different directions:**
  separate by commas
  Example: {CL} = 1F,3R

- **{CL} is mandatory**

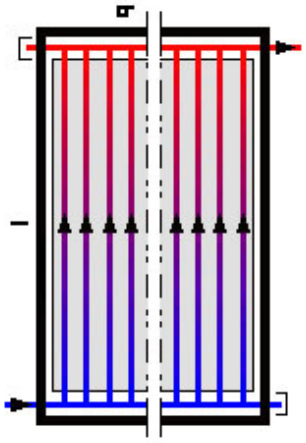


{CL} Connectors location and direction (Examples)

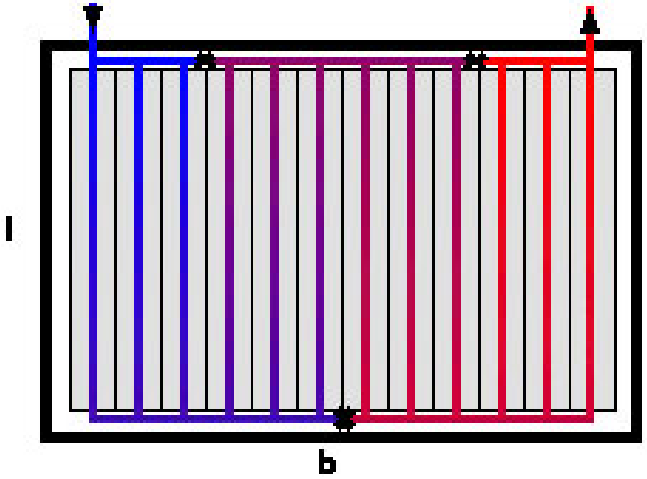
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



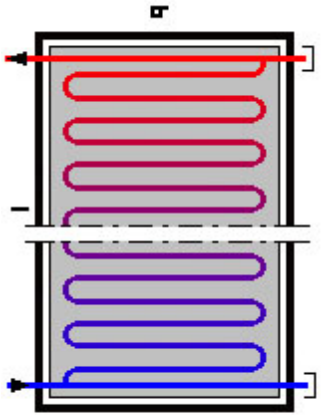
{CL} = 12R



{CL} = 1234S



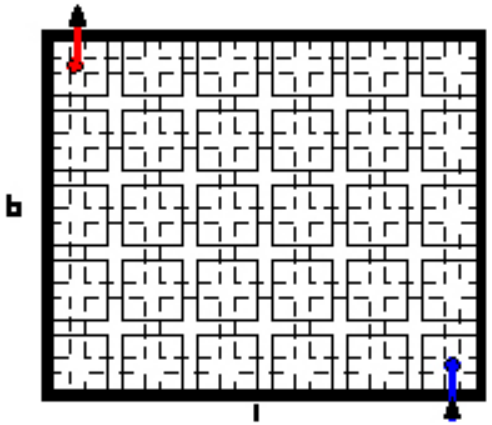
{CL} = 12V



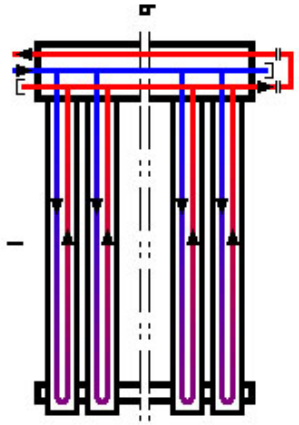
{CL} = 1234S

{CL} Connectors location and direction (Examples)

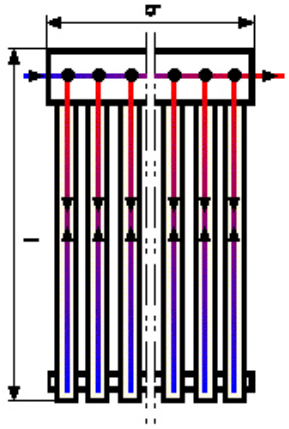
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{CL} = 13F



{CL} = 1122S



{CL} = 12S

{A:Ø,L} Absorber Element Details (Definition)

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

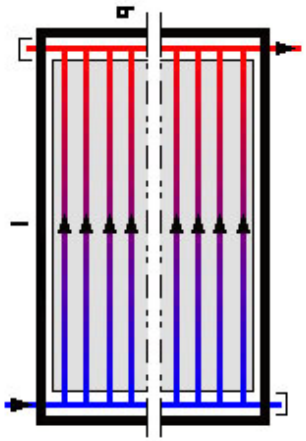
- **Absorber element is where the fluid is heated up**

- **{A:Ø,L} Inner diameter [mm] and length of the main single absorber element(s) [mm]**
  8,23000: 8mm inner diameter, length of 23 m
  10, 1900: 10mm inner diameter, length of 1.9 m

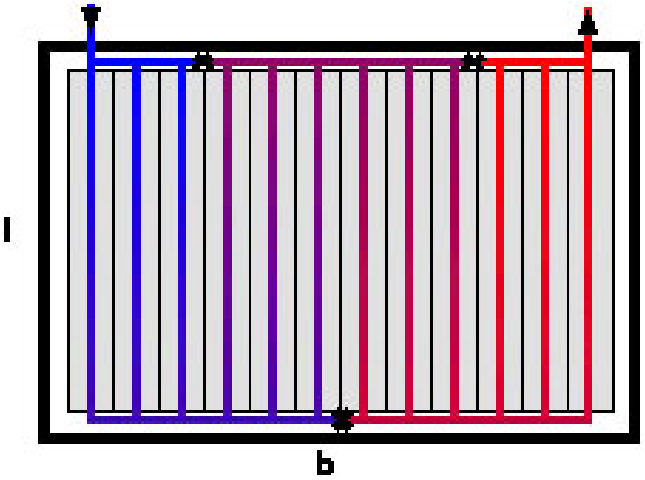
- **If variable diameters: Minimum diameter**
  If not round tube: Equivalent diameter giving the same area
  If different lengths: Average value
  If several different absorber tubes: Several statements are possible such as A:8,1000-A:10,1200
  If not clear what to write: Indicate A:X

{A:Ø,L} Absorber Element Details (Examples)

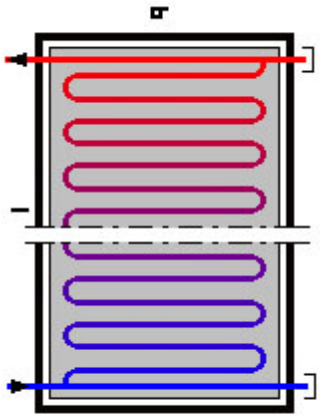
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{A:Ø,L} = A:8,1800



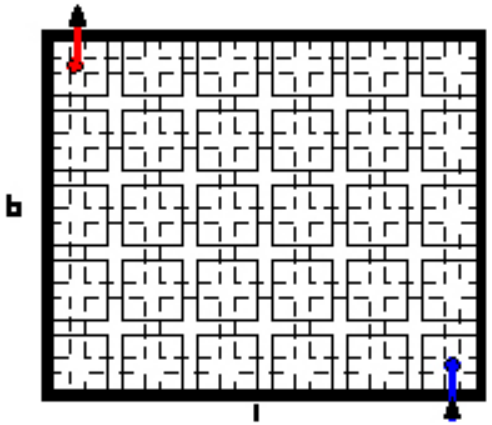
{A:Ø,L} = A:8,1000



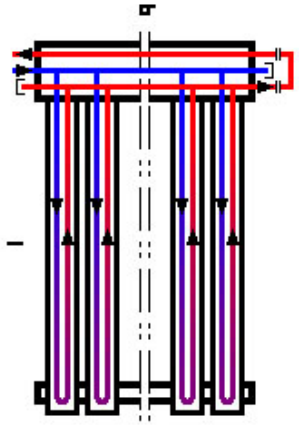
{A:Ø,L} = A:10,20000

{A:Ø,L} Absorber Element Details (Examples)

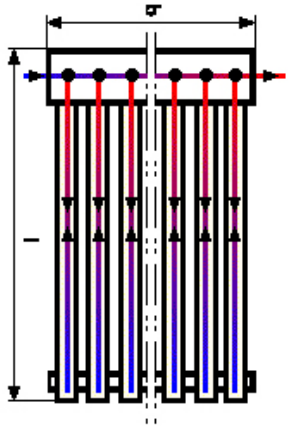
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{A:Ø,L} = A:X,1500



{A:Ø,L} = A:8,2000



{A:Ø,L} = {}

{C:Ø,L} Collector Element Details (Definition)

{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

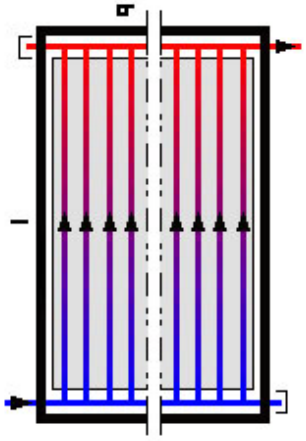
- **Collector is where the absorber tubes are collected**

- **{C:Ø,L} inner diameter [mm] and lenght of the collector element(s) [mm]**
  8,23000: 8mm inner diameter, length of 23 m
  10,1900: 10mm inner diameter, length of 1.9 m

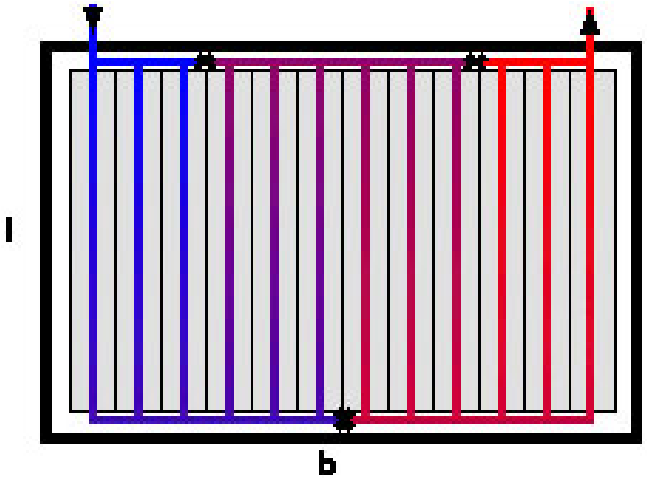
- **If variable diameter: Minimum diameter**
  If not round tube: Equivalent diameter
  If different lengths: Average value
  If different collector tubes: Several statements are possible
  such as C:22,900-C:22,3000
  If not clear what to write: Indicate C:X

{C:Ø,L} Collector Element Details (Examples)

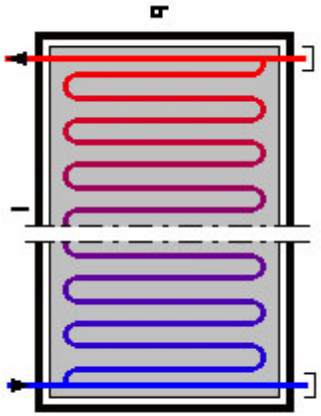
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{C:Ø,L} = C:18,1000



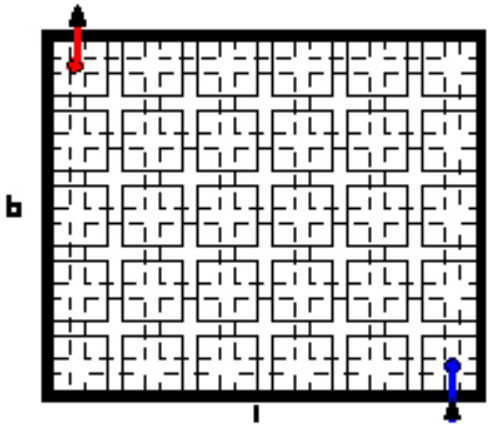
{C:Ø,L} = C:18,2200



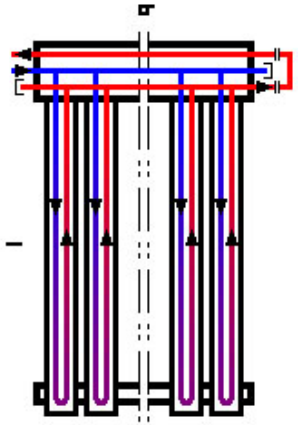
{C:Ø,L} = C:18,1000

{C:Ø,L} Collector Element Details (Examples)

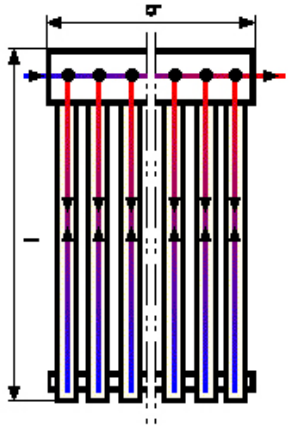
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}



{C:Ø,L} = C:X



{C:Ø,L} = C:18,1000



{C:Ø,L} = A:18,1000

{A:Ø,L} - {C:Ø,L} Collector Element Details (Definition)

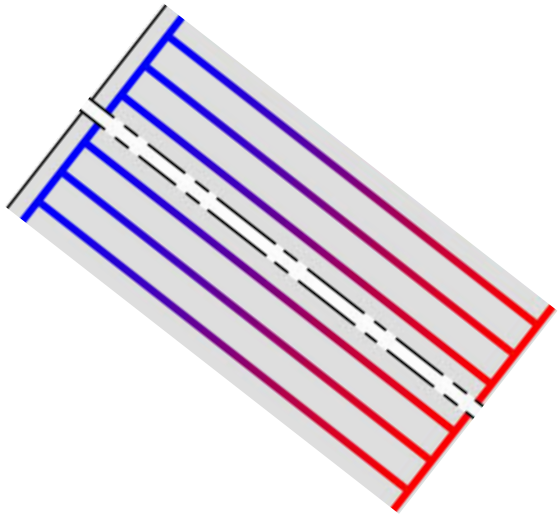
{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

- **Either {A:Ø,L} or {C:Ø,L} must be indicated**
- **If {A:Ø,L} = {C:Ø,L} then indicate only one {AC:Ø,L}**

Example 1

10-HV-1234S-A:8,1900-C:18,1000

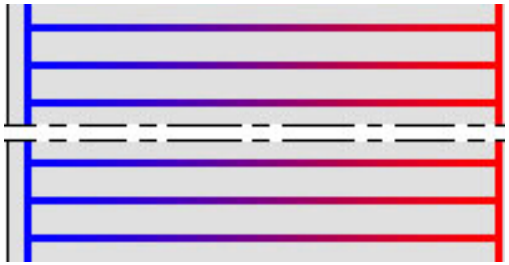
10 parallel tubes



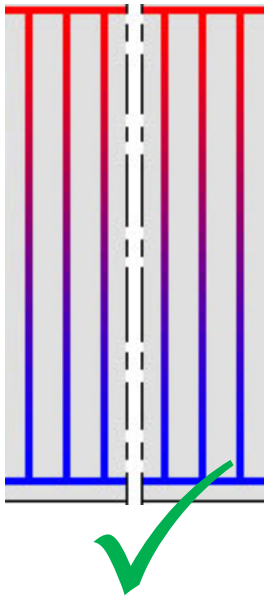
Example 1

10-HV-1234S-A:8,1900-C:18,1000

10 parallel tubes, horizontal as tested, can be installed vertical,



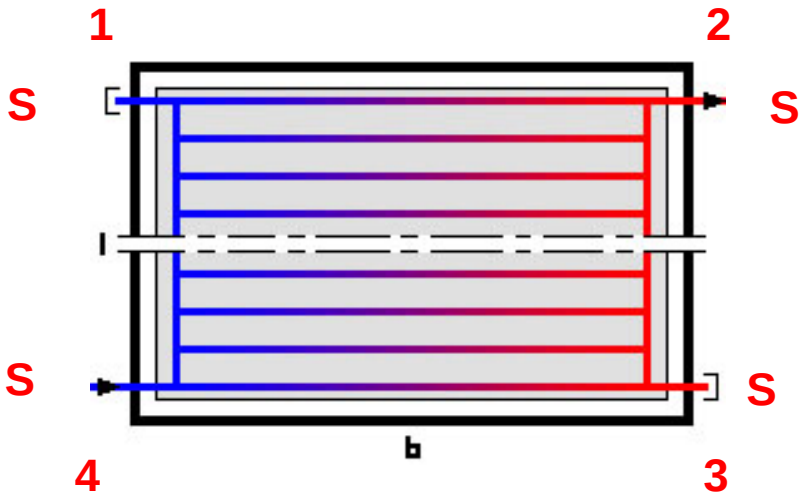
Tested

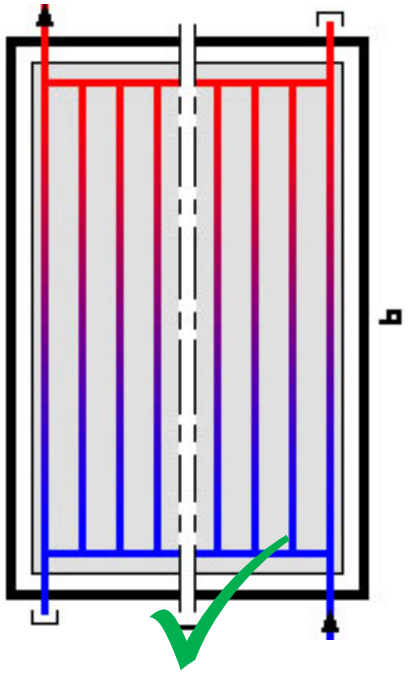


Example 1

10-HV-1234S-A:8,1900-C:18,1000

10 parallel tubes, horizontal as tested, can be installed vertical, Connectors in all 4 corners to the side

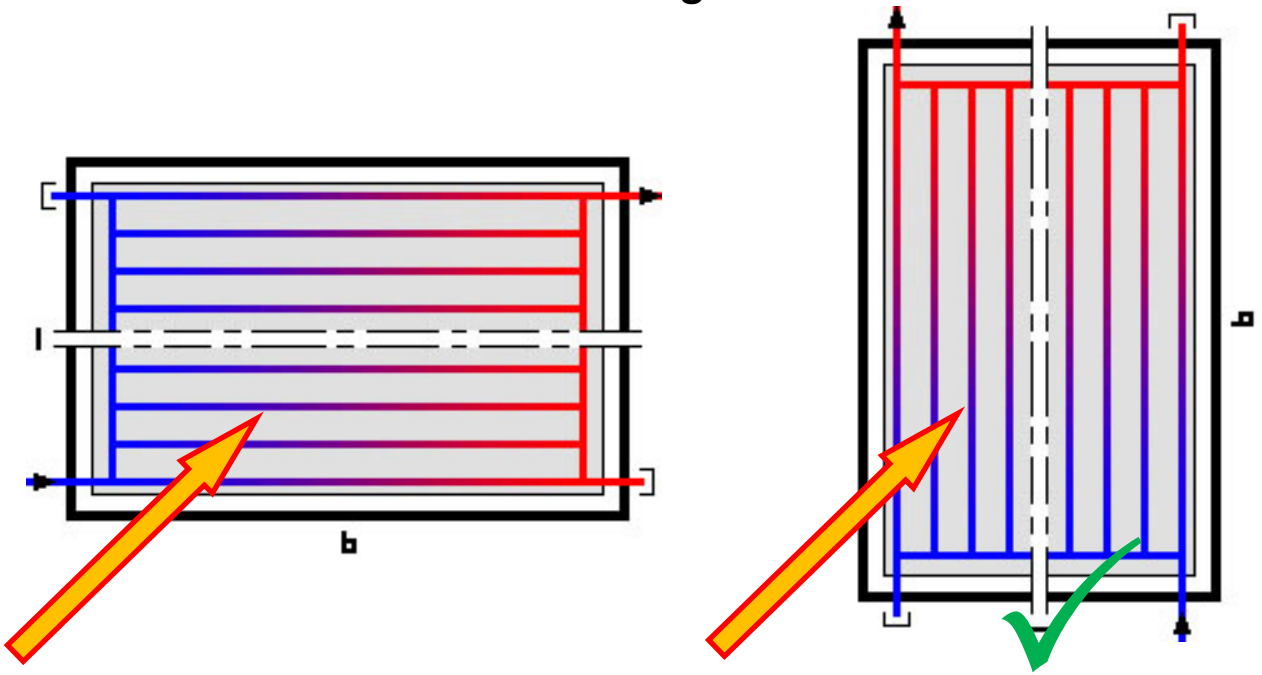




Example 1

10-HV-1234S-A:8,1900-C:18,1000

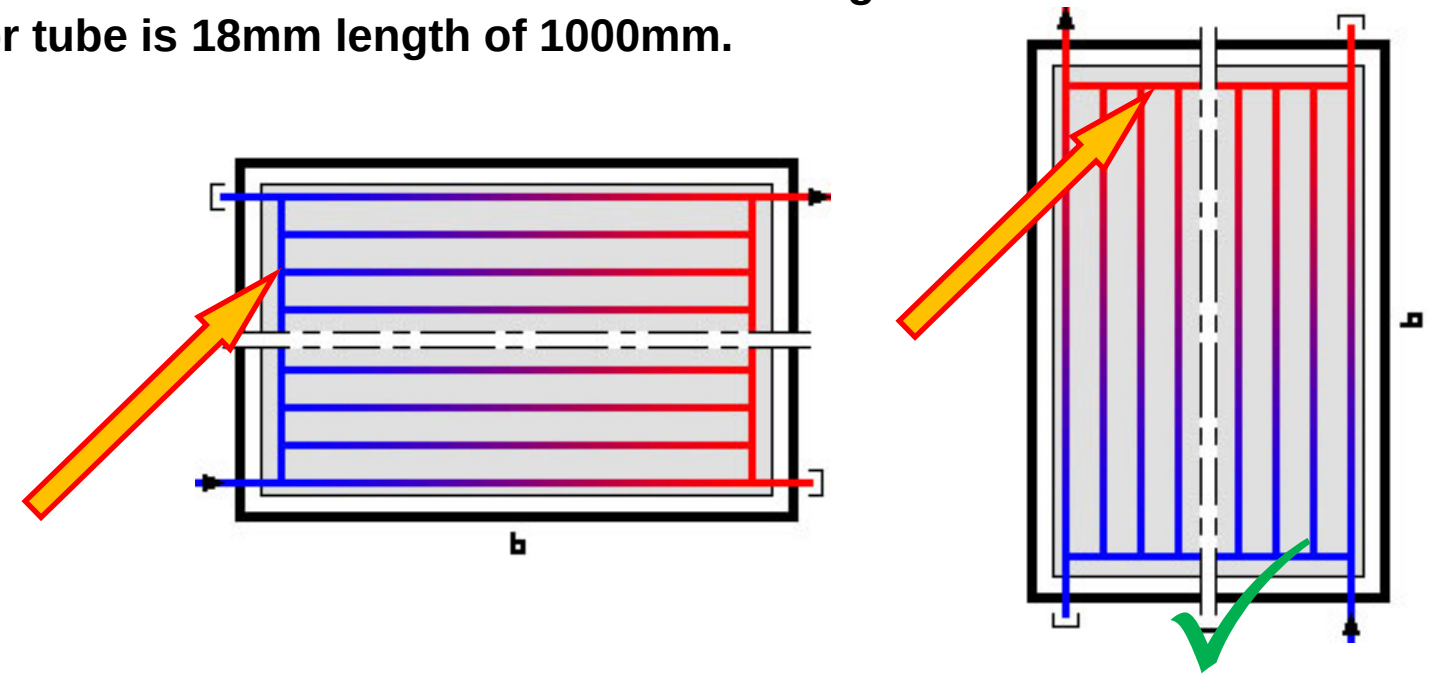
10 parallel tubes, horizontal as tested, can be installed vertical,
Connectors in all 4 corners to the side.
Absorber tube is 8mm inner diameter with a length of 1900mm



Example 1

10-HV-1234S-A:8,1900-C:18,1000

10 parallel tubes, horizontal as tested, can be installed vertical,
Connectors in all 4 corners to the side.
Absorber tube is 8mm inner diameter with a length of 1900mm
Collector tube is 18mm length of 1000mm.



Example 2

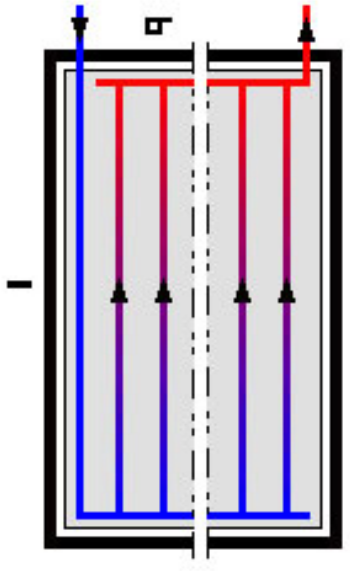
8-V-12V-A:8,1900-C:18,1000-C:18,3000

8 parallel tubes, vertical NOT horizontal, two connectors in corner 1 and 2 to the (vertical). Absorber tube are 8mm inner diameter with a length of 1900mm, Collectortube1 is Ø18mm length of 1000mm and Collectortube2 is Ø18mm length of 3000mm and.

Example 2

8-V-12V-A:8,1900-C:18,1000-C:18,3000

8 parallel tubes, vertical NOT horizontal, two connectors in corner 1 and 2 to the (vertical). Absorber tube are 8mm inner diameter with a length of 1900mm, Collectortube1 is Ø18mm length of 1000mm and Collectortube2 is Ø18mm length of 3000mm and.



Example 3

1-H-12S-C:22,1000

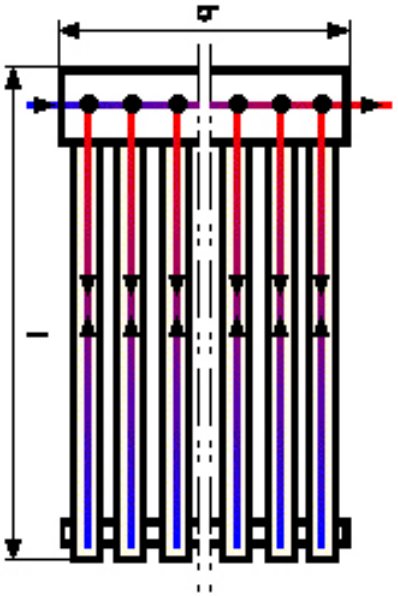
One tube, horizontal and NOT vertical. Two connectors in the top corners to the sides. No absorber tubes in the hydraulic loop, only collector tube with 22mm & length of 2100mm.

Example 3

1-H-12S-C:22,1000

One tube, horizontal and NOT vertical. Two connectors in the top corners to the sides. No absorber tubes in the hydraulic loop, only collector tube with 22mm & length of 2100mm.

Heat pipe, heat pipes are not in contact with the external hydraulic loop



Example 4

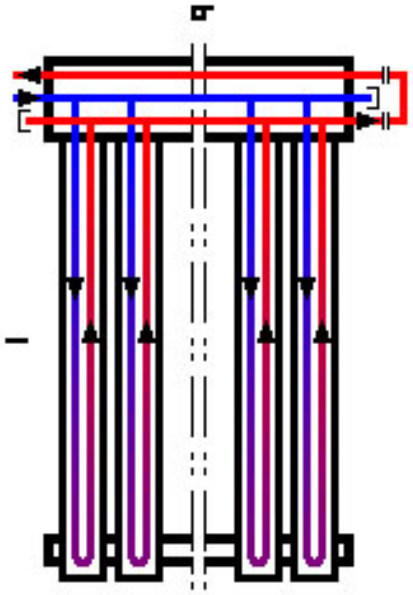
12-V-1122S-A:5,1800-C:20,1000

12 parallel tubes, vertical-NOT horizontal, 4 connectors in the upper corners to the side. Absorber tubes are 5mm inner diameter with a length of 1800mm per tube, Collector tubes are 20mm & length of 1000mm.

Example 4

12-V-1122S-A:5,1800-C:20,1000

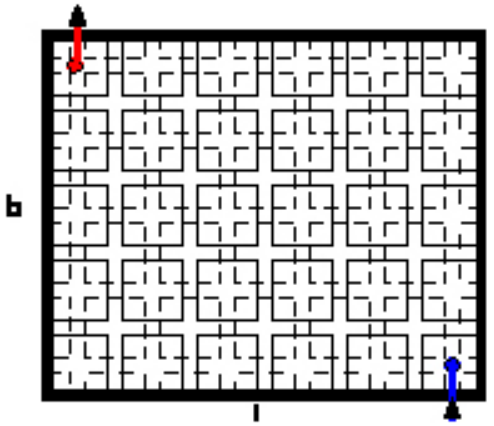
12 parallel tubes, vertical-NOT horizontal, 4 connectors in the upper corners to the side. Absorber tubes are 5mm inner diameter with a length of 1800mm per tube, Collector tubes are 20mm & length of 1000mm.



Example 5

X-VH-13F-AC:X

Flow scheme is X
Can be installed V and H
There are two connectors in corners 1 and 3 to the front
Diameters and lengths of absorbers and collectors can not be defined easily



{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}

- **{F} Number of serial groups/Flowscheme, i.e. Absorber elements**
  N = N parallel tubes (can be 1)
  3,4,6 = Serial bundles of 3, 4 and 6 parallel tubes
  X = Any other flow scheme

- **{O} Orientation of main absorber elements (tested):**
  V = Vertical **VH = V and can be installed H**
  H = Horizontal **HV = H and can be installed V**

- **{CL} Connector location and direction**
  1,2,3,4,T,R,B,L **Corner1/2/3/4, Top, Right, Bottom, Left**
  S,R,V,F **Side, Rear, Vertical, Front**

- **{A:Ø,L} Inner diameter,Length of absorber element(s) [mm]**
  {C:Ø,L} Inner diameter,Lenght of collector element(s) [mm]
  {AC:Ø,L}: If the same

- **No Spaces, No {}, «-» between all indicators**

What to do with the Hydraulic Designation Code (HDC)

- **HDC provides information about the hydraulic setup of a collector**
- **HDC covers estimated >>95% of the absorber designs.**
- **Proposal for Solar Keymark Requirement:**
  -> Different HDC => Different Collector model (name / order code)
- **Proposal:**
  -> Indicate HDC in new EN 12975
- **Proposal:**
  -> Indicate HDC in next SK Datasheet