# HOW TO INSERT A NEW TUBE IN SHELL

Open "Archive management" and select "Tubes" and "Customer":
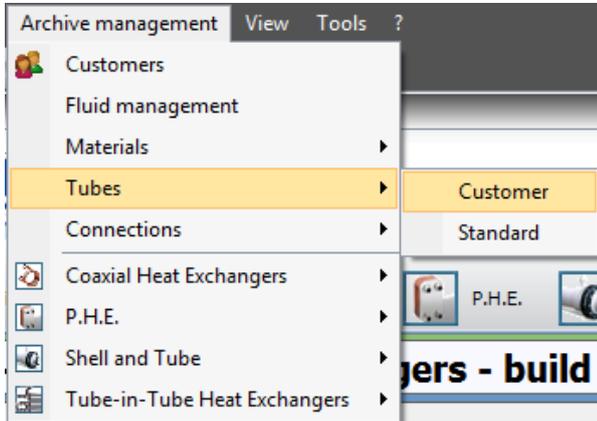

It appears the window "Tubes management":
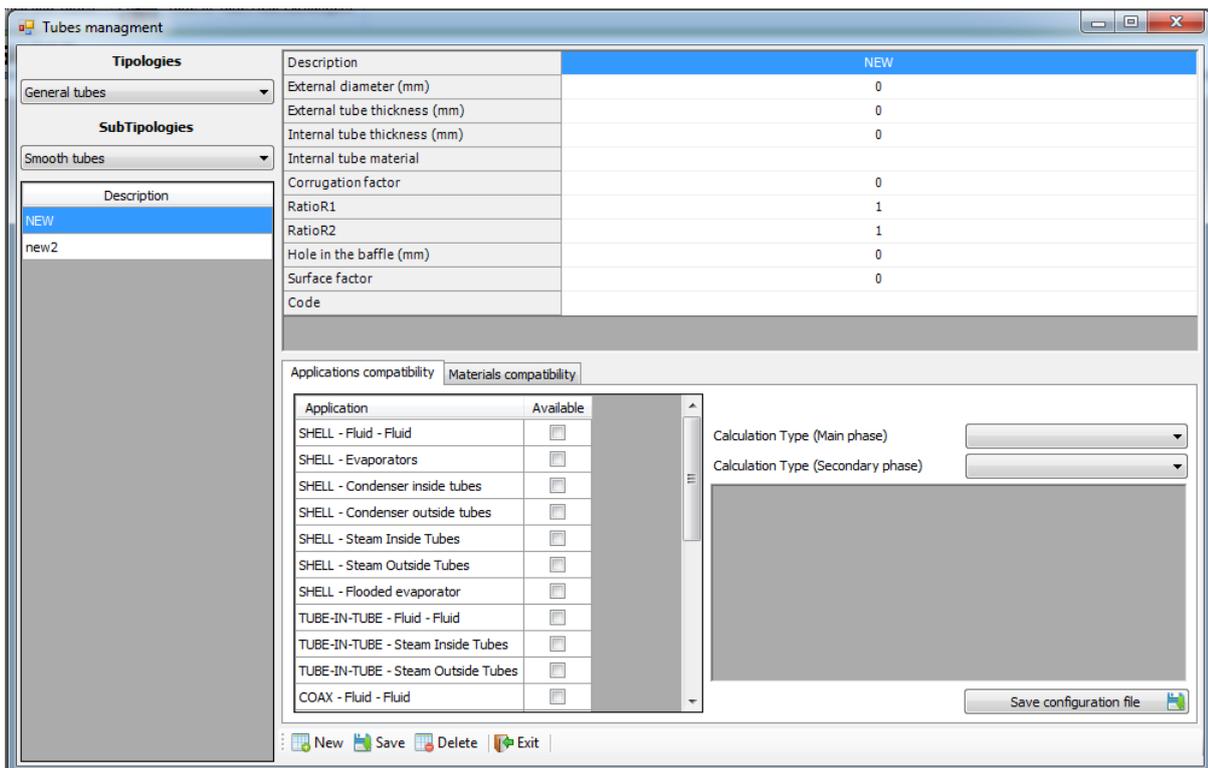
At first you have to choose the tipology of the tube:

Tipologies

General tubes
General tubes
Evaporators tubes
Condensers tubes
Evaporators flooded tubes
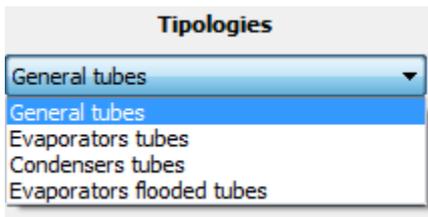
Then also the subtipology:

SubTipologies

Smooth tubes
Smooth tubes
Radial finned tubes
Grooved tubes
Wieland
Wolverine
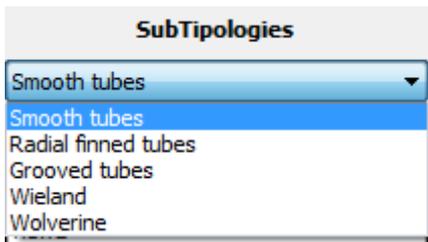
Now you have to click on "New":

New   Save   Delete   Exit

In the window that appears you have to write the name of the new tube:

New tube   X

Insert the name of the new tube: OK

Cancel
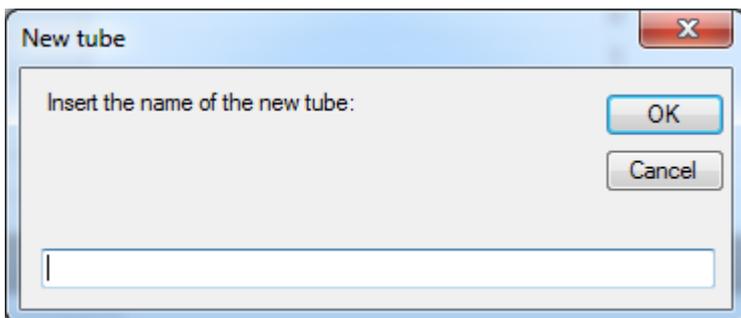
Now you have to fill the fields with the geometrical characteristics of the tube (different for each subcategory):

Description	NEW
External diameter (mm)	0
External tube thickness (mm)	0
Internal tube thickness (mm)	0
Internal tube material	
Corrugation factor	0
RatioR1	1
RatioR2	1
Hole in the baffle (mm)	0
Surface factor	0
Code	

Select the applications where you want to use the tube by putting a flag in the box "Available" and, click on the application, and set the type of calculation on the default mode:

Applications compatibility	Materials compatibility	

Application	Available
SHELL - Fluid - Fluid	✓
SHELL - Evaporators	☐
SHELL - Condenser inside tubes	☐
SHELL - Condenser outside tubes	☐
SHELL - Steam Inside Tubes	☐
SHELL - Steam Outside Tubes	☐
SHELL - Flooded evaporator	☐
TUBE-IN-TUBE - Fluid - Fluid	☐
TUBE-IN-TUBE - Steam Inside Tubes	☐
TUBE-IN-TUBE - Steam Outside Tubes	☐
COAX - Fluid - Fluid	☐

Calculation Type (Main phase)   [1002] - Monophase (Default) ▼

[1002] - Monophase (Default)
[1017] - Special monophase
[1018] - Wieland monophase

Prop.	Value

Save configuration file 💾

Set also the materials compatibility putting a flag in the box "Available":

Applications compatibility	Materials compatibility	

Material	Code	Available
Copper	C12200 - Cu-DHP	☐
Copper Nickel 10%	C70600 - CuNi10Fe1Mn	☐
Copper Nickel 30%	C71500 - CuNi30Mn1Fe	☐
Copper Zinc 20%	C68700 - CuZn20Al2As	☐
Copper Zinc 28%	C44300 - CuZn28Sn1As	☐
EPDM-HT	EPDM-HT	☐
NBR-HT	NBR-HT	☐
HNBR	HNBR	☐
VITON	VITON	☐
Stainless Steel AISI 304L	TP 304L - X2CrNi19-11	☐
Stainless Steel AISI 316L	TP 316L - X2CrNiMo17-12-2	☐

GEOMETRICAL CHARACTERISTIC

SMOOTH TUBES
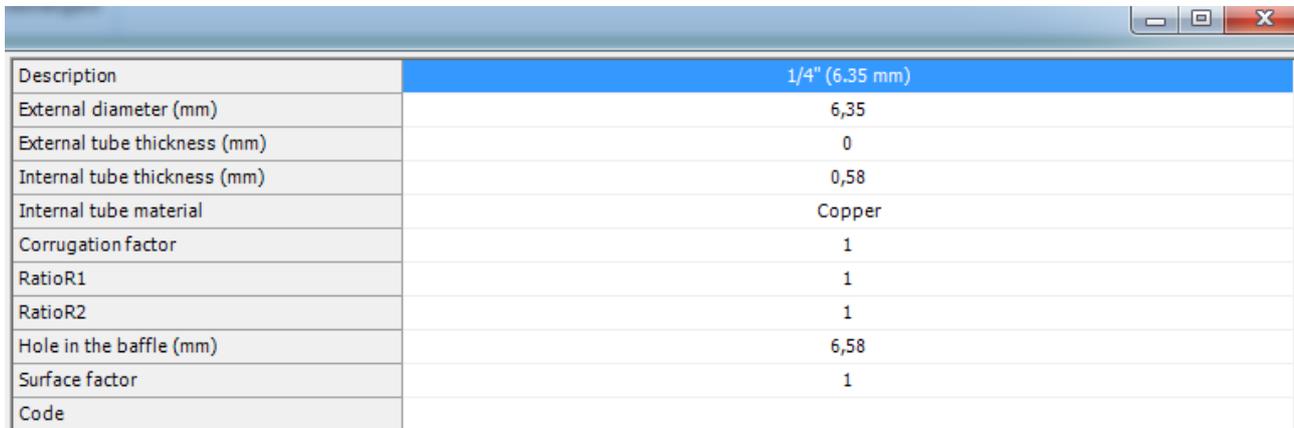
Description	1/4" (6.35 mm)
External diameter (mm)	6,35
External tube thickness (mm)	0
Internal tube thickness (mm)	0,58
Internal tube material	Copper
Corrugation factor	1
RatioR1	1
RatioR2	1
Hole in the baffle (mm)	6,58
Surface factor	1
Code	

- **External diameters:** it's the most external diameter of the tube
- **External tube thickness:** to set only if you have a double-material tube*
- **Internal tube thickness:** it's the tube thickness
- **Internal tube material:** it's the material of the tube
- **Corrugation factor:** indicates an internal corrugation of the tube if this is not perfectly smooth
- **RatioR1:** if set greater than 1 increases the internal heat exchange coefficient of the tube
  RatioR2: if set greater than 1 increases the internal pressure drops coefficient of the tube
- **Hole in the baffle:** it's the default value shown in the calculation mask
- **Code:** it's the code of the tube (for example the trade name, ecc…)

*If you set an **External tube thickness** different from zero, appears a new combo in the table in which you can select the material of the external tube:
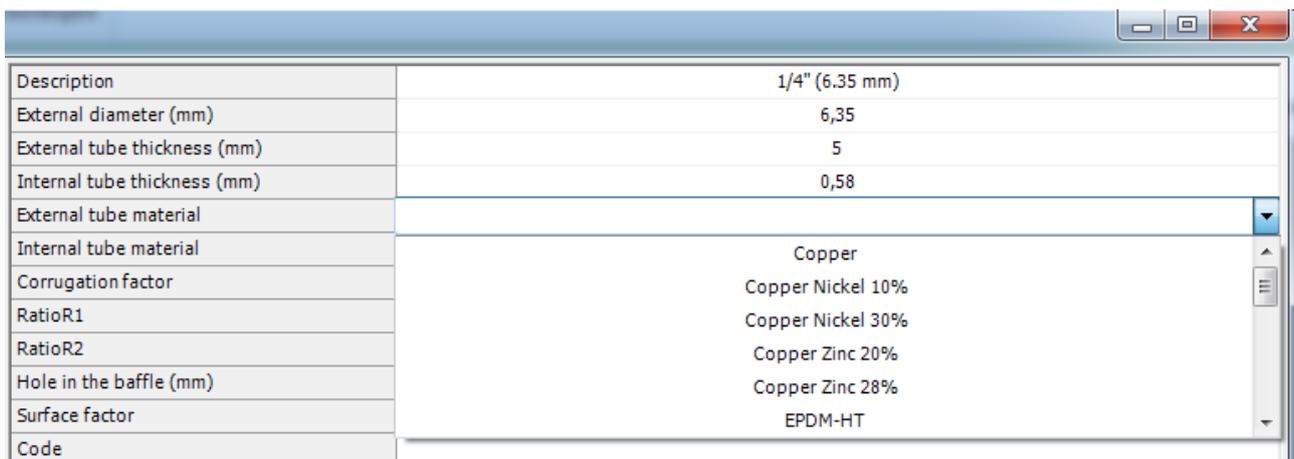
Description	1/4" (6.35 mm)
External diameter (mm)	6,35
External tube thickness (mm)	5
Internal tube thickness (mm)	0,58
External tube material	
Internal tube material	Copper
Corrugation factor	Copper Nickel 10%
RatioR1	Copper Nickel 30%
RatioR2	Copper Zinc 20%
Hole in the baffle (mm)	Copper Zinc 28%
Surface factor	EPDM-HT
Code	

RADIAL FINNED TUBES

Description	3/4" (19.05)
External diameter flat zone (mm)	19,05
External diameter under fin (mm)	15,88
Under fin thickness (mm)	1,25
Fin Height (mm)	1,58
Fin thickness (mm)	0,1
Fin ratio (N°/m)	1000
Exchanging surface (m²/m)	0,2
Surface factor	1
Global Factor	1
RatioR1	1
RatioR2	1
RatioR3	1
Tube Material	Copper
Code	
Smooth external part (mm)	50
Smooth internal part (mm)	20

From the picture below you can easily understand the meaning of the entries in the table:
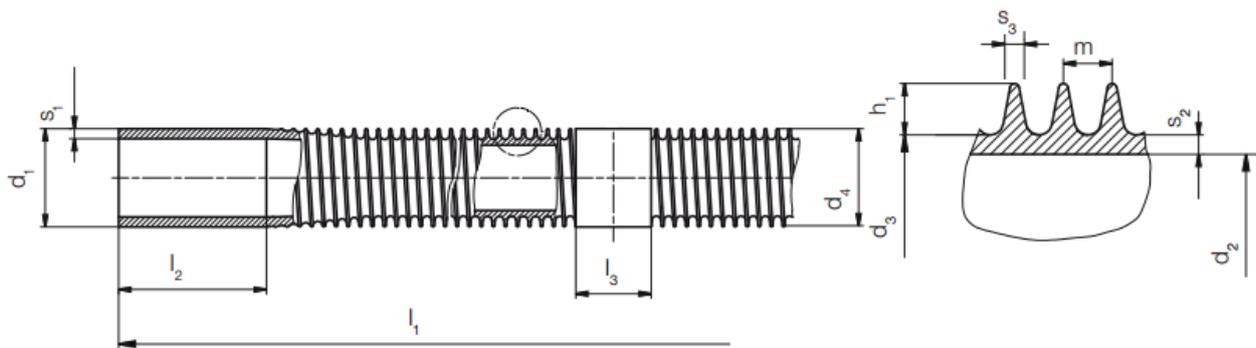
- d_1: External diameter flat zone
- d_3: External diameter under fin
- s_2: Under fin thickness
- h_1: Fin height
- m: is the step between two fins, so its reciprocal 1/m (with m expressed in meters) is the "Fin ratio"
- s_3: Fin thickness (mean value)
- l_2: Smooth external part
- l_3: Smooth internal part

Then you have:

- **Exchanging surface:** è l'area di scambio esterna in [m²] per ogni metro di tubo
- **Surface factor:** indica una corrugazione interna al tubo se il tubo non è perfettamente liscio

- **Global factor:** posto maggiore di 1 aumenta il coefficiente di scambio termico globale del tubo
- **RatioR1:** if set greater than 1 increases the internal heat exchange coefficient of the tube
- **RatioR2:** if set greater than 1 increases the internal pressure drops coefficient of the tube
  RatioR3: if set greater than 1 increases the external heat exchange coefficient of the tube
- **Tube material:** it's the material of the tube
- **Code:** it's the code of the tube (for example the trade name, ecc…)

GROOVED – WIELAND – WOLVERINE

Description	test_grv_1
External diameter (mm)	12
Internal tube thickness (mm)	0,12
Internal tube material	
Corrugation factor	1
RatioR1	1
RatioR2	1
Hole in the baffle (mm)	12,2
Surface factor	1
Code	
GroovesNumber	1
FinHeight	2
SpiralAngle	3
ApexAngle	4

In addition to the parameters already seen for the other types, there are:

- **Surface factor:** it's the coefficient of increase of inner area compared to a similar smooth tube
- **Grooves Number:** it's the number of fins
- **Spiral angle:** it's the angle between the fins and the horizontal plane
- **Apex angle:** it's the angle of fins apex