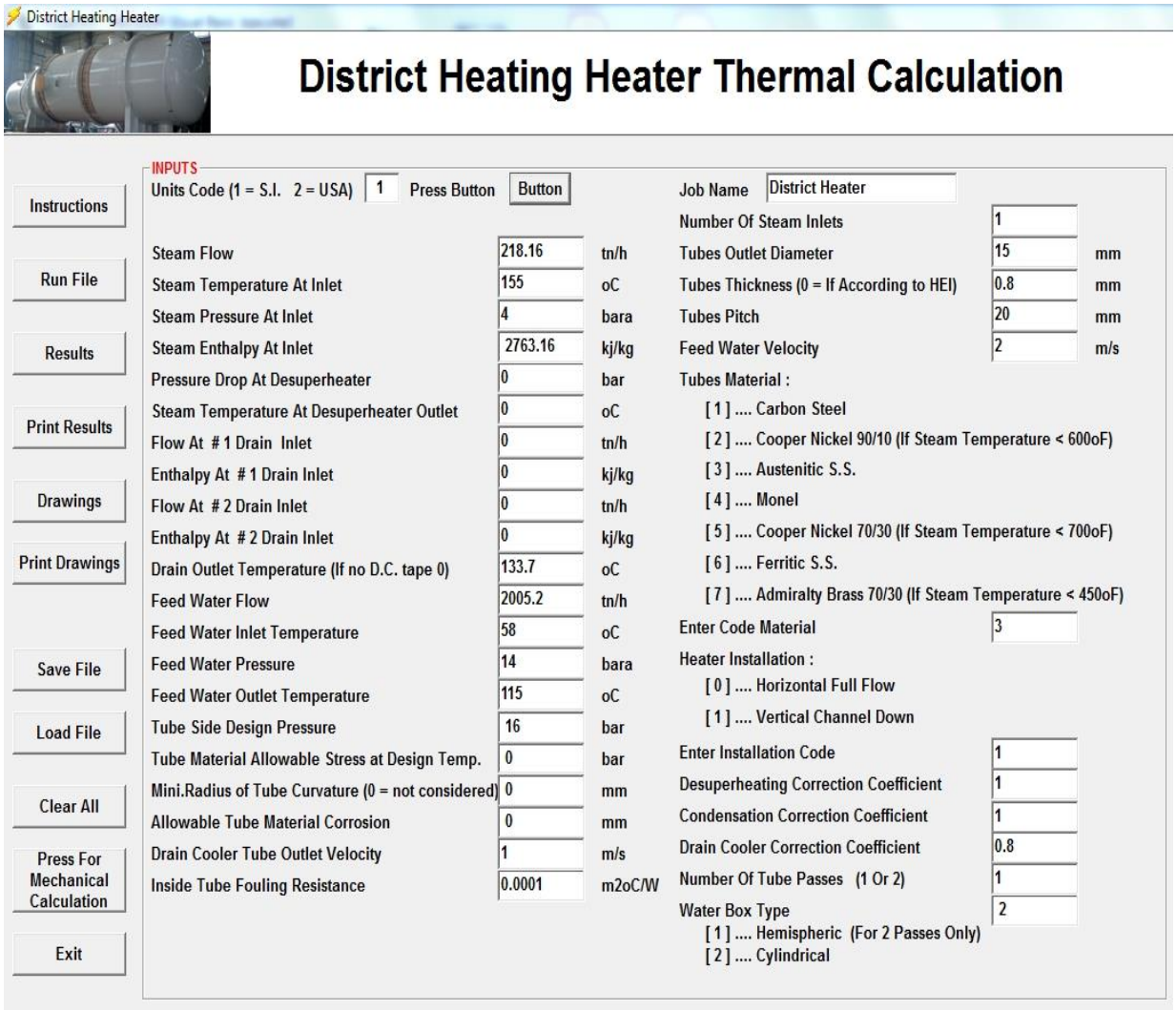
# District Heating

**Thermal and mechanical design of heaters for a District Heating System based on HEI standards and heat transfer coefficients based on classic correlations. Heaters are accommodated as are horizontal and specialy for vertical units. In addition the program also generates a heater drawing showing the principal dimensions of the unit and of the tube support system, tube layout and results sheet for thickness and weights.**

## PROGRAM WINDOWS




## DATA ENTRY WINDOW

## DISTRICT HEATING HEATER - Data Results

Job Name : **District Heater**

### ■ Data Input

| | | |
|---|---|---|
| Steam Flow (Including 0.3% Lost) | 218,795 | tn/h |
| Steam Temperature At Inlet | 155 | oC |
| Steam Enthalpy At Inlet | 2763,15 | kj/kg |
| Steam Pressure At Inlet | 4 | bara |
| Specific Volume Of Steam Inlet | 0,4772 | m3/Kg |
| Steam Saturation Temp. At Inlet Pressure | 143,62 | oC |
| Steam Temp. At Condensation Pressure | 143,62 | oC |
| Condensed Water Enthalpy | 604,65 | kj/kg |
| Steam Temp. At Desuperheater Outlet | 0 | oC |
| Steam Enthalpy At Desuperheater Outlet | 0 | kj/kg |
| Flow At # 1 Drain Inlet | 0 | tn/h |
| Enthalpy At # 1 Drain Inlet | 0 | kj/kg |
| Flow At # 2 Drain Inlet | 0 | tn/h |
| Enthalpy At # 2 Drain Inlet | 0 | kj/kg |
| Drain Outlet Temperature | 133,7 | oC |
| Drain Outlet Enthalpy | 562,15 | kj/kg |
| Feed Water Flow | 2005,2 | tn/h |
| Feed Water Inlet Temperature | 58 | oC |
| Feed Water Inlet Enthalpy | 243,88 | kj/kg |
| Feed Water Outlet Temperature | 115 | oC |
| Feed Water Outlet Enthalpy | 483,32 | kj/kg |
| Average Feed Water Specific Volume | 0,001035 | m3/Kg |
| Tubes Outlet Diameter | 15 | mm |
| Tubes Thickness | 0,8 | mm |
| Tubes Pitch | 20 | mm |
| Feed Water Velocity | 2 | m/s |
| Tubes Material | Austenitic S.S. | |
| Heater Installation | Vertical | |
| Desuperheating Correction Coefficient | 1 | |
| Condensation Correction Coefficient | 1 | |
| Drain Cooler Correction Coefficient | 0,8 | |

### ■ Results

| | | |
|---|---|---|
| Desuperheating Duty | 0 | Mj/h |
| Condensation Duty | 472268,9 | Mj/h |
| Drain Cooler Duty | 9298,8 | Mj/h |
| Desuperheating L.M.T.D. | 0 | oC |
| Condensation L.M.T.D. | 51,61 | oC |
| Drain Cooler L.M.T.D. | 80,02 | oC |
| Desup.Heat Transfer Coefficient | 0 | kj/hoCm2 |
| Conden.Heat Transfer Coefficient | 9998 | kj/hoCm2 |
| D.C. Heat Transfer Coefficient | 7285 | kj/hoCm2 |
| Desuperheater Effective Surface | 0 | m2 |
| Condensation Effective Surface | 915 | m2 |
| D.C. Effective Surface | 16 | m2 |
| Total Surface | 959,7 | m2 |
| Inactive Surface | 28,8 | m2 |
| Number Of U Tubes | 2043 | |
| Tube Side Pressure Drop | 0,44 | bar |
| Feed Water Temp. At Conden. Inlet | 59,11 | oC |
| Feed Water Temp. At Conden. Outlet | 114,98 | oC |
| Terminal Temperature Difference | 28,62 | oC |
| Drain Cooler Aproach | 75,69 | oC |
| Approx. Inlet Channel Diameter | 1080 | mm |
| Approx. Inlet Shell Diameter | 1280 | mm |
| Approx. Heater Total Length | 12,46 | m |
| Approx. Straight Tube Length | 9960 | mm |
| Approx. Desuper. Casing Length | 0 | mm |
| Approx. Drain Cooler Casing Length | 280 | mm |
| Tube Number In Drain Cooler | 2043 | |
| Feed Water Nozzles Diameters | 500 | mm |
| Number Of Steam Nozzles | 1 | |
| Diameter Of Steam Nozzles | 800 | mm |
| Diameter Of Drain Nozzle | 260 | mm |

Dew Point Verification NIL oC

(It Must Be Less Than Temperature At Desuperheater Outlet)

**For Desuperheater :**

Support Plates Number

Pressure Drop bar

**For Drain Cooler :**

Support Plates Number 2

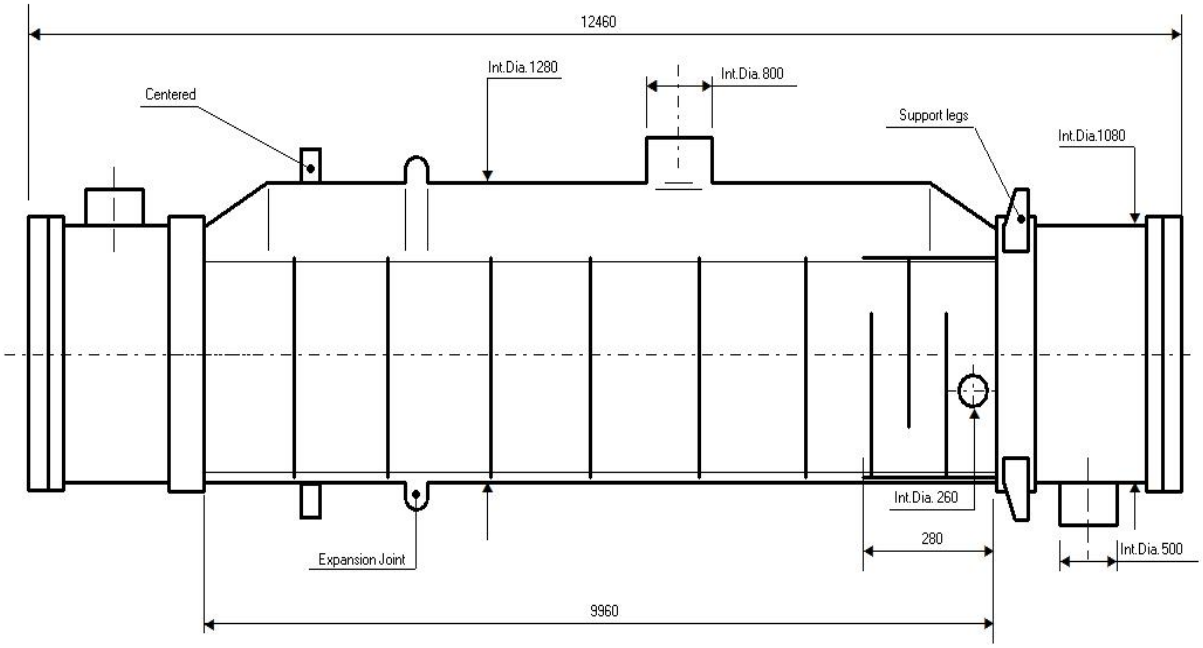
Pressure Drop 0,14 bar

**For Condensing :**

Support Plates Number 14

Pressure Drop NEGLIGIBLE

# RESULTS SHEET

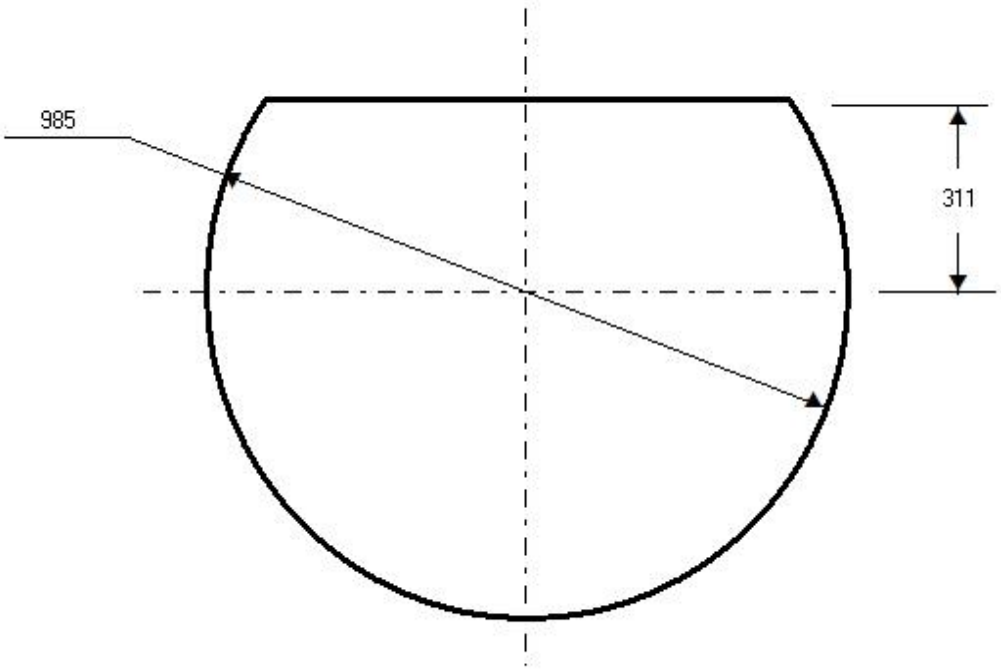



VERTICAL TYPE - Condensing and Drain Cooling Zones

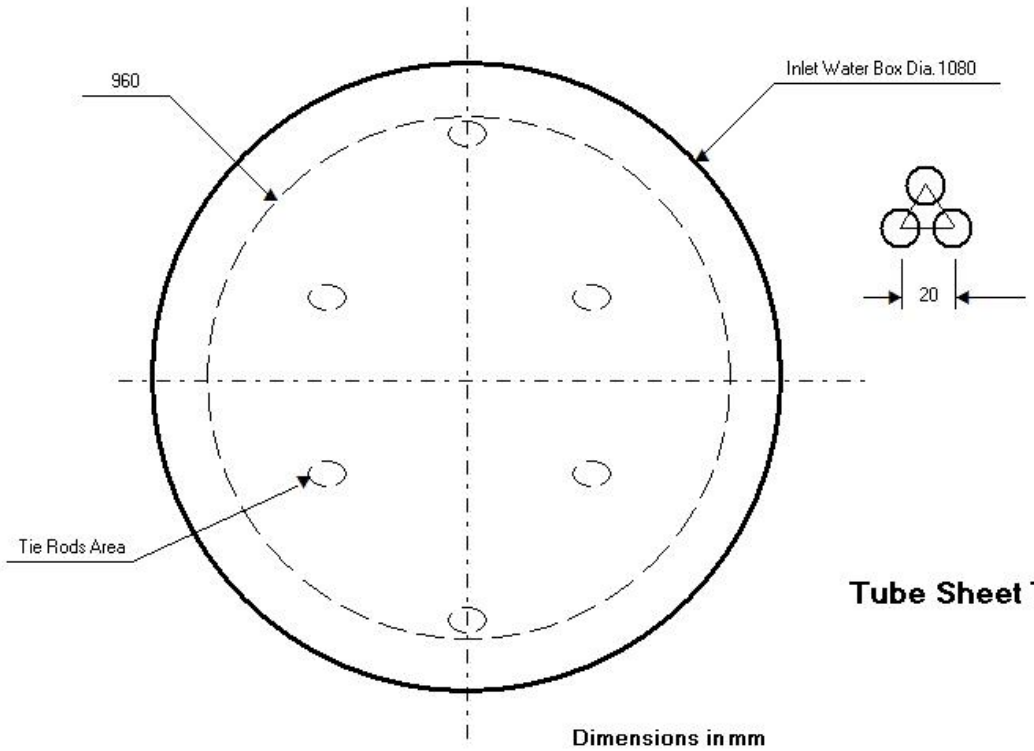
**Dimensions in mm**

# DIMENSIONAL DRAWING

# DRAIN COOLER TUBES SUPPORT PLATE ARRANGEMENT



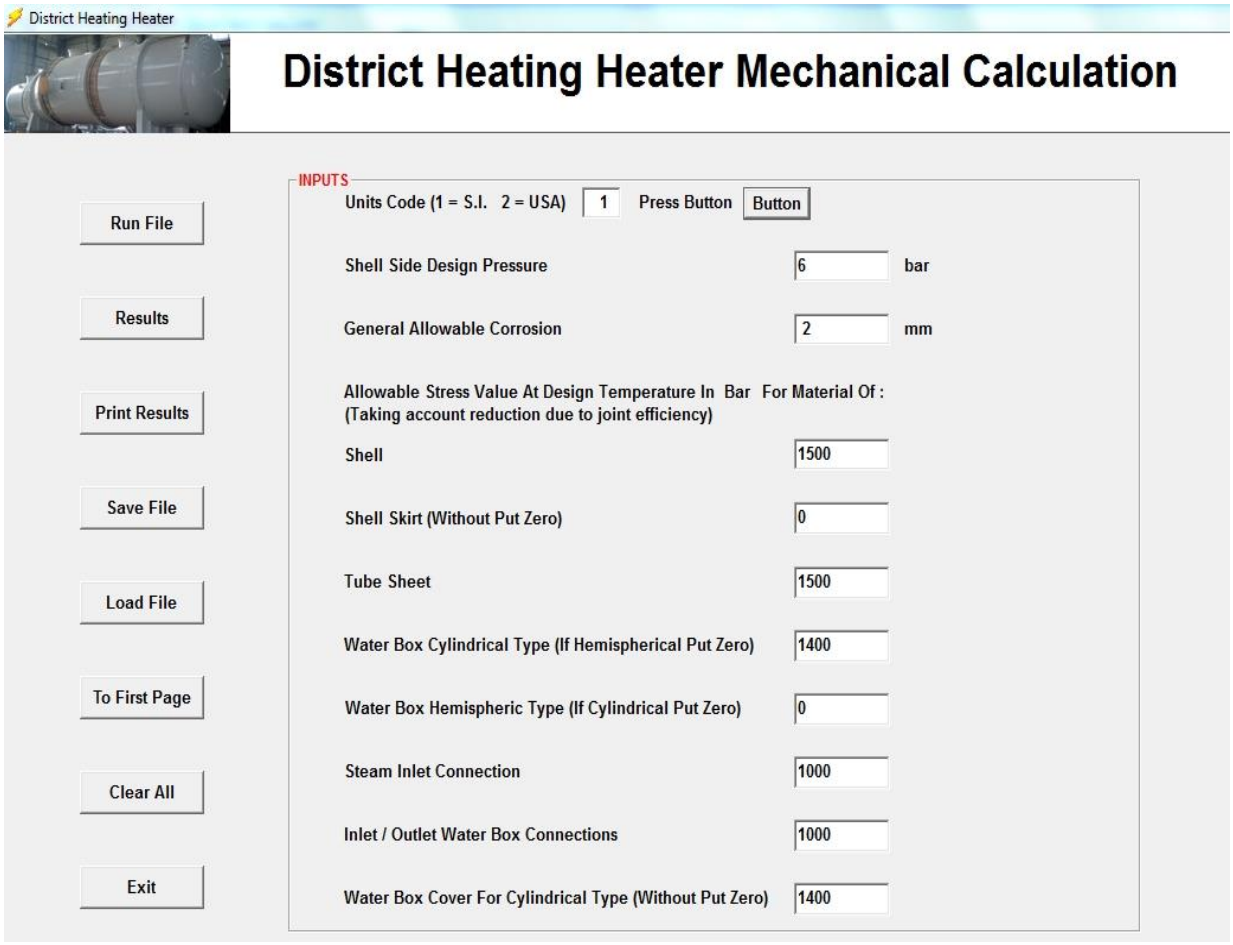

Dimensions in mm




**Tube Sheet Tube Layout**

**Dimensions in mm**

# MECHANICAL CALCULATION




# MECHANICAL CALCULATION DATA WINDOW

## DH HEATER RESULTS - Thickness (mm) and Weights (Kg)

Job Name : **District Heater**

### ■ THICKNESSES

| | |
|---|---|
| Shell | 12 |
| Shell Skirt | 0 |
| Shell To Water Box Transition Piece | 12 |
| Tube Sheet | 69 |
| Water Box (Hemispherical Type) | 0 |
| Water Box (Cylindrical Type) | 9 |
| Water Box Cover (Plate Type) | 66 |
| Water Box Cover (Elliptical Type) | 0 |
| Tubes Support Plate | 10 |
| Shell Expansion Joint | 2 |
| Steam Inlet Pipe | 5 |
| Feedwater Inlet/Outlet Pipe | 7 |
| Drains Outlet Pipe | 3 |

### ■ WEIGHTS

| | |
|---|---|
| Exchange Tubes | 5850 |
| Tube Sheets Gross | 1020 |
| Tube Sheets Net Weight | 620 |
| Shell With Expansion Joint, Pipes And Internals | 4370 |
| Shell Skirt | 0 |
| Hemispherical Water Box, Pipes And Manhole | 0 |
| Cylindrical Water Box , Pipes And Plate Cover | 1640 |
| Cylindrical Water Box, Pipes And Elliptical Cover | 0 |
| Complete Desuperheating Crate | 0 |
| Complete Drain Cooler Crate | 70 |
| Condensing Tubes Support Plates And Tie Rods | 620 |
| Heater Supports | 170 |
| Heater Empty | 13340 |
| Heater In Operation | 18400 |
| Heater Full Of Water | 26800 |

**RESULTS SHEET**